and self-monitoring. In N. Eisenberg (Ed.), *Review of personality and social psychology: Special issue: Social development.* Thousand Oaks, CA: Sage.

Greenwald, A. G., Pratkanis, A. R., Lieppe, M. R., & Baumgardner, M. H. (1986). Under what conditions does theory obstruct research progress? *Psychological Review, 93,* 216–229.

Houts, A. C., Cook, T. D., & Shadish, W. R. (1986). The person–situation debate: A critical multiplist perspective. *Journal of Personality, 54,* 52–105.

Laboratory of Comparative Human Cognition. (1983). Culture and cognitive development. In P. H. Mussen (Ed.), *Handbook of child psychology* (4th ed., vol. 1, pp. 295–356). New York: Wiley.

Lewin, K. (1935). *A dynamic theory of personality* (D. K. Adams & K. E. Zener, Trans.). New York: McGraw-Hill.

McGuire, W. J. (1983). A contextualist theory of knowledge: Its implications for innovation and reform in psychological research. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 16, pp. 2–48). Orlando, FL: Academic.

Meehl, P. E. (1979). Theoretical risks and tabular asterisks: Sir Karl, Sir Ronald, and the slow progress of soft psychology. *Journal of Consulting and Clinical Psychology, 46,* 806–834.

Piatelli-Palmarini, M. (Ed.). (1980). *Language and learning: The debate between Jean Piaget and Noam Chomsky.* Cambridge, MA: Harvard University Press.

Trivers, R. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man: 1871–1971* (pp. 136–179). Chicago: Aldine.

Vygotsky, L. S. (1962). *Thought and language.* Cambridge, MA: MIT Press.

Evolution and Human Emotions

Christine R. Harris and Harold E. Pashler
University of California at San Diego

Buss's target article has much to commend it, and the research program he and his fellow evolutionary psychologists—such as Symons, Daly, and Wilson—have undertaken is of major importance to psychology. A better appreciation of evolutionary principles should result in more sophisticated theorizing in all areas of the field. We begin by describing four areas in which the potential benefits of evolutionary thinking seem most promising, and we then raise concerns about the soundness of some of the specific Darwinian accounts Buss proposes.

First, better understanding of Darwinian principles should help to make psychologists more clearheaded and disciplined in proposing functional explanations. Psychological theories often suggest functional accounts for common phenomena such as "the function of laughter is to reduce tension" or "the function of religious feeling is to help maintain group cohesion." Psychologists also frequently speak of *psychological dysfunctions,* applying that label to whatever emotional reactions they or their patients find troublesome or painful. (Some even go so far as to label large fractions of the population *mentally ill.*) This sort of functional talk implicitly invokes some natural principle or driving force that tries to maximize social harmony and personal happiness. From a Darwinian standpoint, this reasoning ranges from dubious to indefensible. For example, it is unlikely that an individual's happiness per se advances his inclusive fitness. Uncomfortable and even conflicting emotions may well reflect the smooth functioning of mechanisms doing exactly what they were adapted to do (cf. Nesse, 1990). Social harmony is also a dubious basis for constructing functional explanation; although individuals may sometimes gain from social cohesion, unrelated conspecifics are ultimately in competition and therefore may or may not stand to benefit from group cohesion (Symons, 1979). The point of these examples is that some of the functional explanations proposed by psychologists rest on very thin ground.

A second useful issue that Buss and his colleagues have raised concerns the incompleteness of cultural explanations—a point often overlooked in some areas of psychology and—even more often—in neighboring fields. Attributing behavior and attitudes to "cultural pressures" or "socialization" implicitly assumes that children (or adults) have a generalized propensity to internalize others' opinions and judgments (Symons, 1979). Obviously, people are powerfully affected by social pressures, but, as Buss points out, exhortation (be it to like spinach or to work enthusiastically for the common good) often has little effect. For that reason, invoking social pressures as an explanation is incomplete and possibly unsound. Theorists should be required to describe and defend whatever kind of social influence they wish to assume.

A third benefit of evolutionary awareness is in explaining why human beings—like other animals—are likely to have many wired-in, specific emotional predispositions. (Buss carefully avoids terms like *instinct* in favor of more modern-sounding terms like *mechanism* and *adaptation;* the difference is more cosmetic than substantive. He also shuns the term *innate,* letting the word *specific* pick up the slack.) For generations, social scientists (including psychologists) derided the belief that emotional tendencies, desires, fears, and

aversions could have any deep roots in biology. Like Moscow with its parks full of toppled statues, the landscape of social science is littered with the rubble of the theories that attributed all psychological structures and individual differences to experience. The most direct evidence against these ideas comes from findings of ethologists and behavior geneticists. However, evolutionary theory nicely complements these findings because it shows why blank-slate theories are so implausible to begin with. As the behavioral ecologists have pointed out, it is often inefficient and hazardous for each generation to have to learn the same lessons anew (Alcock, 1989). Furthermore, as Symons and others have noted, there is a cost to malleability—it makes people vulnerable to manipulation by conspecifics (Symons, 1979).

Fourth, as Buss points out, evolutionary thinking provides an excellent basis for formulating worthwhile theories about the nature of psychological mechanisms. What something is designed to do may provide rich clues about how it works.

These contributions of evolutionary thinking to theoretical psychology are of fundamental importance. Buss, however, asserts that evolutionary psychology can transform, rather than merely inform, the field. He claims that specific psychological adaptations involving all aspects of human behavior and experience have been and are being discovered and validated and that this onslaught will sweep away the traditional boundaries between different subfields of psychology. Here we reluctantly part company with him.

According to Buss, "many empirical findings that point to domain specificity" have already been discovered and accounted for in Darwinian terms. Most of the evolutionary psychologists' favorite examples, it seems to us, are plausible and worthwhile conjectures—but at this point still conjectures. Theories about innate (or "relatively innate") human predispositions are extremely difficult to verify (verification is difficult even with animals in whom selective deprivation studies can be carried out). Darwinian explanations for such predispositions are even harder to test. Buss seems untroubled by these difficulties. This may partly be because he doesn't construct very plausible competing "domain-general" explanations. The alternative explanations he does discuss are relatively easily dismissed.

For example, consider Buss's list of 20 cases in which, he argues, domain-specific adaptations are relatively well documented. One example is phobias. Buss points out that phobias of snakes and spiders are common, whereas fears of weapons and cars are rare. Following Seligman (1971), he suggests that people have innate fears of snakes and spiders—or at least innate tendencies to rapidly acquire such fears. A much less specific predisposition could account for the data he describes. For example, people might be disposed to develop fears not of snakes and spiders in particular, but of any small thing that darts around quickly, unpredictably, and uncontrollably. Note, for example, that fears of birds are about as common as fears of snakes (Marks, 1987). Furthermore, many people have a morbid dread of cockroaches and other harmless insects. If the present-day world contained small, dangerous, fast-moving robots, Buss's account would imply that phobias involving them should be rare. We are not sure that would be the case. The alternative illustrates the fact that, with a little thought, one can readily construct alternative explanations postulating less specific innate tendencies than Buss suggests. These alternatives will not always be so easy to rebut.

In many other cases, plausible alternative explanations would involve the human faculties of rational choice and cognition. Consider, for example, Buss's suggestion that people have a (presumably specific) adaptation to seek "mates who are kind, intelligent, and dependable". Surely minimal rationality—"seek whatever is most likely to help you achieve your goals"—is enough to explain why this preference is widespread. A mate who is unkind, stupid, or undependable will prevent one from attaining all sorts of personal goals. Presumably, Buss would not postulate a "Darwinian mechanism" leading people to seek transportation that is speedy, comfortable, and dependable, because rationality together with various (possibly innate) desires already leads them to do that.

This last example illustrates one reason why it is difficult to convincingly demonstrate domain-specific psychological adaptations in human beings—because means–ends thinking (what economists call *rational-choice theory*) often makes the same predictions as the "Darwinian mechanisms" postulated by evolutionary psychologists. Take the case of differences in male and female reproductive strategies. The ultimate cause of many innate sex differences (in the great majority of animal species) is the fact that males and females differ in how small an investment they could potentially make in an offspring and still have that offspring survive to reproduce (Trivers, 1972). This asymmetry makes different behaviors adaptive for males and females. Natural selection has shaped males' and females' dispositions accordingly. The evolutionary psychologists point out that there is no good reason to believe human beings should be an exception to this principle. They might be right.

However, the evidence Buss describes does not necessarily confirm this a priori expectation. This is because the fundamental asymmetry that Trivers describes affects the conscious plans people formulate in the here-and-now, as well as presumably having shaped human nature over many millennia. This greatly complicates efforts to demonstrate domain-specific emotional adaptations. People everywhere recognize,

for example, that, if their unmarried daughter has sexual intercourse, she may become pregnant and suffer negative economic and social consequences. Knowing this, parents are more than likely to try to prevent this from happening. The measures they take may range all the way from trying to inculcate virginal attitudes in their daughters to outright cloistering. None of these acts constitutes evidence that the females (or the parents, for that matter) have any wired-in emotional predispositions toward chastity.

The same goes for Buss's observations that more fertile women are typically sequestered and that women throughout the world seem less promiscuous in their desires. All these would naturally result from people making rational choices to deal with the practical situations they almost universally find themselves in, which include the possibility of pregnancy and its consequences. Surveys asking people whom they would choose as a mate are especially likely to detect conscious means–ends thinking. It may well be, as Symons (1979) suggested, that the sexual emotions, rather than the mating choices, are "closest to the genes." This recommends the more diverse but less formal kind of observations cunningly assembled by Symons (e.g., involving homosexuals and people suffering hormonal abnormalities). Despite its informality, this evidence may do more to bolster the Darwinian analysis than asking people to describe their conscious criteria of mate selection.

The application of evolutionary thinking to cognitive psychology raises similar problems. Buss focuses on Cosmides's (1989) studies of the "four-card problem" of deductive logic. Cosmides nicely demonstrated that, although people fail abysmally in most versions of this problem, they often do quite well when their task can be interpreted as detecting cheaters. This is true even when the content of the problem is otherwise completely unfamiliar to the subjects. Cosmides concluded that people must have an innate, specialized psychological mechanism for "cheater detection." However, competition and cheating are human universals. Therefore, everyone has had years of exposure to cheating, together with strong incentive to prevent themselves from being cheated. Here again, straightforward means–ends thinking can mimic the predictions of "Darwinian algorithms."

In summary, evolutionary psychology is likely to have many salutary influences on psychological theory, and an acquaintance with evolutionary theory and behavioral ecology should be a part of the training of all psychologists. Buss and his colleagues are to be commended for encouraging these developments and for advancing many novel and intriguing hypotheses. Some of these hypotheses will, we imagine, ultimately be proved correct. However, most of the specific Darwinian hypotheses Buss describes are far from conclusively demonstrated at this point.

On balance, though, starting with bold claims is not likely to be damaging to the enterprise. In addition to raising morale, it is likely to trigger researchers of different persuasions to propose more realistic domain-general alternatives, resulting in healthy debates. Even if, as we suggest, these alternatives won't always be easily dispatched, bringing the attention of psychology back to fundamental questions about human nature—questions that have been evaded for many decades—is sure to be worthwhile.

Note

Christine R. Harris and Harold E. Pashler, Department of Psychology, 0109, University of California at San Diego, La Jolla, CA 92093.

References

Alcock, J. (1989). *Animal behavior* (4th ed.). Sunderland, MA: Sinauer.

Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition, 31,* 187–276.

Marks, I. M. (1987). *Fears, phobias and rituals.* New York: Oxford University Press.

Nesse, R. M. (1990). Evolutionary explanations of emotions. *Human Nature, 1,* 261–289.

Seligman, M. E. P. (1971). Phobias and preparedness. *Behavior Therapy, 2,* 307–320.

Symons, D. (1979). *The evolution of human sexuality.* New York: Oxford University Press.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man: 1871–1971* (pp. 136–179). Chicago: Aldine.