

Research Dialogue

Evolutionary psychology and consumer behavior: A constructive critique

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Abstract

We examine the theoretical basis for the evolutionary narrative common to the target papers by Saad (this issue) and by Griskevicius and Kenrick (this issue) and identify areas of controversy that have sparked debate about evolutionary psychology [EP] among biologists and behavioral ecologists. The two main areas of disagreement are over (1) the role of genetic adaptations resulting from natural selection in ancient times compared to other forces leading to current behavior; and (2) the likelihood that evolution resulted in a set of highly specialized mental modules or information-processing circuits thought to be instrumental in determining present-day behavior. We review the EP research discussed by the authors of the target papers as a means of evaluating the evidence in support of the theory and of suggesting future directions of research. © 2013 Society for Consumer Psychology. Published by Elsevier Inc. All rights reserved.

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Introduction

The two target papers, by Griskevicius and Kenrick [GK] and by Saad [S] highlight the advantages of viewing consumer behavior through the lens of evolutionary psychology [EP]. In what follows, we identify some issues and controversies inherent in the EP perspective and possible future directions.

An evolutionary approach to behavior

Prior to the evolutionary synthesis of the 1940s (Huxley, 2010, 1942) scant attention was paid to the evolution of human behavior, which was still a matter of some controversy. In *Descent of Man, and Selection in Relation to Sex* Darwin (1874) had made clear that his theory of natural selection was just as applicable to the evolution of human thought and human behavior as it was to the evolution of gills and lungs, wings and tails in nonhuman animals. He wrote: “A tribe including many

members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy were always ready to aid one another, and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection” (Darwin, 1874, p. 132). Resistance to these ideas continued to be strong (see Richerson & Boyd, 2001 for a review). Wilson’s (1975) synthesis of prevailing views appeared to settle many issues: genes (segments of DNA that code for a protein) were understood as the primary agent of human evolution by incorporating variance produced by sexual reproduction over time as well as more abrupt mutation (primarily from DNA replication failures and exposure to environmental factors). There is, however, continuing controversy over the extent to which genetic adaptations, most dating from Pleistocene hunter-gatherer times (discussed further below), are primarily responsible for many of the heritable behaviors and predispositions studied by EP and other behavioral and social scientists. There are many examples of plasticity in pre-existing genetic and developmental capacities that allow for substantial variations in visual processing, bodily structure, language comprehension, and so forth and which argue against a gene-dominant view of such inheritance (West-Eberhard, 2003). In what has been termed a

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“paradigm shift,” the science of genetics now sees DNA as dynamic (rather than largely static) and “subject to a wide array of rearrangements, insertions, and deletions” (Charney, 2012, p. 331).

Evolution and inheritance

Emerging trends in evolutionary science suggest that human inheritance involves a complex interaction between genetic, epigenetic and learned information, all of which respond to features of the physical and social environment that we have increasingly helped to construct (Bolhuis, Brown, Richardson, & Laland, 2011). We begin with the idea that natural selection operates on phenotypes (because they interact directly with the environment) rather than on the underlying genetic material — DNA. Though genes remain central, recent work on inheritance has cast a broader net to identify factors pivotal to phenotype development (see Jablonka & Lamb, 2007). Epigenetic processes (in which the transmission of phenotypic variations across generations does not stem directly from DNA/genetic differences) have garnered increasing attention, and have been said to represent “a new frontier in the study of mammalian behavior” with particular implications for the human brain (Charney, 2012, p. 332).

We first discuss the cellular epigenetic process. The complex biochemical system that regulates DNA expression enables the inheritance of traits with no changes to the DNA sequence (Charney, 2012). A large number of recent studies have been reported by the Encyclopedia of DNA Elements [Encode Project Consortium \(2012\)](#), including the initial analysis of 1640 data sets examining the entire human genome. Among the key findings is that over 80% of the genome is involved in such biochemical functions and that a roughly equal proportion of these lie outside protein-coding genes. This research supports an increasing role for other cellular influences, particularly in regulating the extent and timing of gene expression/repression and modulation. For example, while earlier research on cancer and other diseases focused almost entirely on protein-coding genes, it now appears that cellular regulatory processes play an essential role.

Embryonic interactions between mother and embryo, such as through hormonal variations induced by environmental factors or bodily states represent a second category of developmental epigenetic processes. Embryonic influences on phenotype variation are well known. In species where multiple offspring in the uterine environment can have a severely biased sex-ratio, for example, a testosterone-rich environment often induces a similar hormonal and behavioral state in daughters. This can be perpetuated across multiple generations. Inherited food preferences in rabbits have been shown to result from information transmitted via the mother’s milk and feces during gestation, possibly leading the young to make less risky food choices when on their own. [Heijmans et al. \(2008\)](#), in a well-controlled study, found that even a short famine (the Dutch Hunger Winter in 1944–45) produced epigenetic changes in human DNA that have persisted for six decades as a result of prenatal exposure. They

describe the process as superimposing on the DNA sequence, a “layer of epigenetic information that is heritable” (p. 17046).

An extreme focus on early (e.g., Pleistocene) genetic adaptations may also be unwarranted. Environmental pressures over a period of time alter living patterns, including shared mate phenotype preferences for advantageous features (e.g., body type, contraindications for certain illnesses) resulting in opportunities for adaptive genetic change: “If conditions persist, natural selection will favor the most well-adjusted phenotypes and the genes underlying them — the genes whose effects lead to a more reliable, faster, developmental adjustment, or the ones with fewer undesirable side-effects” (Jablonka & Lamb, 2007, p. 362). In short, because the genome is a good deal more responsive to the environment than many had thought, both cellular and embryonic epigenetic influences on phenotype development can bring about subsequent genetic change (Gluckman & Hanson, 2005). Importantly, then, genetic adaptations useful in ancient times, may have a less significant role today — a topic to which we return later.

Socially mediated information transmission affects survivability and reproductive fitness and hence is a second major non-genetic input to natural selection of successful phenotypes. It is a particularly powerful engine for inheritance of preferences and behaviors across a wide range of activities (e.g., food and habitat, predation and defense, mating and parenting), especially in conjunction with evolved capacities for symbolic communication (Gluckman, Hanson, & Beedle, 2007; Richerson & Boyd, 2005). Even in species lacking such capacities, there are many examples of sophisticated information transmission. A classic example would be blackbirds exposed either to the mobbing behavior of a familiar predator or to the same mobbing behavior of a novel, harmless animal (Curio, Ernst, & Vieth, 1978). The latter blackbirds not only continued to mob the non-predator but, of evolutionary significance, also could induce similar behavior in other naïve blackbirds, demonstrating the ability to learn and behave in a way that would protect their young even when there was no survival threat from an actual predator. While there is clearly a genetic adaptation for mobbing, the specific behavior toward a harmless animal reflects socially mediated learning. Similarly, though a genetic adaptation enables migratory birds to navigate, their actual behavior can vary with changes in their environment. In one set of studies, lack of exposure to celestial cues prior to the time of migration or exposure to artificial night skies and a different reference star produced no migratory behavior in the first instance and perfect navigation but oriented to the wrong northern star pole in the second (Emlen, 1970).

One important implication for human behavior is that genetic influences affect underlying potentialities and constraints (i.e., the ability to carry out some action) to a much greater degree than they affect the specific content of a thought or action. There is less reliance on exclusively parent–offspring interactions in the ability of socially mediated information transmission to affect inheritance, though unlike genetic influences it cannot skip generations. Its effects can be intensified considerably when a prior generation creates an ecological niche (e.g., a dam constructed by beavers, human habitats, and societal infrastructure), and subsequent generations teach their offspring patterns of

behavior that are reinforcing and enhance the success of the group.

The classic version of EP tends to emphasize the innate preparedness most often associated with the genetic aspects of evolution and to minimize the role of information transmission. GK, for example, rely on what they call a “Fundamental Motives Framework” that “maintains that humans have inherited a set of psychological adaptations for solving a set of specific social challenges, which include: (1) evading physical harm, (2) avoiding disease, (3) making friends, (4) attaining status, (5) acquiring a mate, (6) keeping that mate, and (7) caring for family.” [S] sees evolutionary processes (i.e., survival adaptations) as the origin of human (and primate) “innate preparedness to fear specific stimuli (e.g., snakes and spiders) that have posed us a recurring threat in our evolutionary history.” However, if natural selection is responsible for either the specific fear response or avoidance behavior, the response should be proportionate to the threat, and mushrooms should generate an even stronger response since they have posed “a greater threat to the survival of the human species than have spiders and snakes combined” (Coelho & Purkis, 2009, p.338).

Further, Coelho and Purkis (2009) noted that rhesus monkeys displayed no innate fear of snakes until they acquired that response by observing others. Their analysis of evolutionary and learned fear responses suggests that the former can best be linked to more general categories of threat (e.g., height, water), but more specific fears tend to be learned or conditioned. Controlled experiments on pre-attentive peripheral processing (e.g., Ohman, Flykt, & Esteves, 2001) tend to link genetic effects to more general stimulus properties (e.g., motion, shape) rather than specific content (e.g., snakes, spiders), and that may be instructive for EP. Broadening the view of inheritance to incorporate epigenetic, environmental, and socially mediated information transmission appears to us to be a necessary step going forward.

There’s an app for that

A major ongoing controversy comes from the EP assertion that our evolutionary history produced a modular set of problem-solving psychological mechanisms (Tooby & Cosmides, 1992, 1995) and that the genetic adaptations of primary importance to current psychological functioning reside in a set of special purpose cognitive modules that arose in ancestral environments, particularly during the Pleistocene.

The primary rationale for this view is that multiple functionally specialized systems were likely to be more effective and efficient in dealing with the large number of different problems faced in ancient times. Since humans spent over 99% of our evolutionary history as Pleistocene hunter-gatherers (the transition to agriculture began around 12,000 years ago), Cosmides (1989) argued that our cognitive mechanisms should be adapted to the hunter-gatherer mode of life, and not to the twentieth-century industrialized world. Our reliance on these ancient modular adaptations have also been used to account for common mistakes in judgment when tasks are presented at a more abstract level or framed in an unfamiliar way (Fiddick, Cosmides, & Tooby, 2000). An alternative to EP’s reliance on content-specific and “hard-wired” mental programs (to

explain performance superiority relative to general purpose reasoning systems) is to acknowledge the flexible use of content specific knowledge when making inferences, especially since content free settings are not part of most people’s daily experience.

Other evolutionary scientists, particularly those in human behavioral ecology (HBE), also rely on the fundamental Darwinian principle of biological evolution — that is, differential rates of reproduction leading to increases and decreases in the frequencies of genes over time in a population. Whereas the classic version of EP posits the evolution of domain-specific adaptations in the human brain (modules) during the period when hunting and gathering was our exclusive mode of production, for scholars in the HBE tradition, the focus is on understanding the observable variation in adaptive behavior in current societies. That variation is understood to be the result of an interaction between an individual’s genes and environmental factors. In the HBE tradition, humans, like all organisms “are understood to be attempting to maximize their fitness under specific ecological conditions” (Sear, Lawson, & Dickens, 2007, p. 6), but those same scholars are “agnostic about the causative role of genes in the study of human behavioral variation” (Hames, 2001, p. 6946).

Modules in classic EP theory go beyond prior identification of special-purpose systems in peripheral functions (i.e., sensory processes) and are held to be the basis for central processes underlying reasoning and decision-making (Barrett & Kurzban, 2006). They are “information-processing circuits that take in delimited units of information and transform that information into functional output designed to solve a particular adaptive problem” (Confer et al., 2010, pp. 110–111).

EP theorists do not regard the mind as a flexible, general purpose problem-solver or having such systems and processes as a likely evolutionary outcome. Rather, Tooby and Cosmides (1992) compared EP’s modular mental system to a specially programmed jukebox designed to play a different song depending on environmental inputs. Kenrick, Li, and Butner (2003) offer a similar analysis to explain cultural variation. Essentially, moving the jukebox across environments doesn’t change the jukebox’s design but only the songs that are played. A related explanation views brain mechanisms as adaptive circuits established by natural selection in ancient times (e.g., a circuit for violence) and that environmental factors can play a role in setting the activation level of the circuit (Buss, 2005). “Our cognitive architecture,” said Tooby and Cosmides (1995: xiii), “resembles a confederation of thousands of functionally dedicated computers (often called modules) designed to solve adaptive problems.” In their view, people do not employ more general purpose and flexible problem solving and decision-making abilities. Instead, higher-order cognitive processes are similar to highly specialized sensorimotor input–output mechanisms in their reliance on massively modular constructs. Such modules operate on their proprietary inputs semi-automatically, outside the reach of top-down propositional and reasoning processes.

Critiques of specialized circuits

Cosmides (1989, p. 195) defended the existence of highly specialized mental circuits by saying, “Behavioral ‘plasticity’

or ‘flexibility’ is evolutionary death, unless it is accompanied by information-processing mechanisms that are specialized enough to guide behavior into the narrow envelope of adaptive conduct.” Critics abound. Buller and Hardcastle (2000) raised neurobiological objections, and Bolhuis et al. (2011, p. 3) bluntly stated, “The thesis of massive modularity is not supported by the neuroscientific evidence.” Geary and Huffman (2002) argued that genes function as constraints, limiting flexibility both for a person and within a population. In discussing brain evolution, these authors make the key point that only information patterns that covary with survival and reproductive success and that are invariant over generations would be expected to produce gene-based constraints on brain organization and cognitive function, rendering massive modularity less plausible as an explanation for so many diverse preferences and behaviors.

For variable information patterns, however, evolution should favor more flexible brain organization and cognitive systems that lend themselves to experience-driven modifications. Based on that premise, genetically based modular systems would serve as major constraints in environments characterized by variable information patterns for which experience-driven modifications would perform much better. Similarly, one frequent criticism of such a mental system is that it would be quite rigid, stimulus bound, and has difficulty coping with novel situations (Gerrans, 2002).

Responding to criticisms that some other mental process would then be required to recognize the content of problems and guide the input to the correct modules, EP theorists specified that modules responded instead to formal properties of stimuli in a template-matching fashion similar to recognition sites for individual enzymes (Barrett & Kurzban, 2006). Thus, a face-selection mechanism doesn’t have to “understand” what it is processing. It only must be sensitive to low-level features or their conjunction. Unfortunately, research on various proposed modules (e.g., cheater detection, face recognition, kin detection, emotion detection and response) often assumes their existence by explaining the survival/fitness benefits and does not describe their formal properties, including the class of inputs the module was designed, through natural selection, to process (Barrett & Kurzban, 2006). Specialized modules linked to peripheral sensory processes as well as having clear fitness benefits (e.g., face recognition) seem more plausible than those said to be involved in higher-order judgment and decision-making. Though specialized, the former are also capable of being recruited to process inputs and support skills that could not have been anticipated in ancestral times, as long as these are sufficiently similar (e.g., throwing a football and hurling a projectile weapon).

There has been debate about how extremely specialized modularity would deal with pragmatic comprehension of speech, analogy, inferences, and counter-factual thinking. More generally, the context sensitivity of assessments and decisions seems more consistent with the evolution of a cognitive system that was flexible enough to deal with changing circumstances rather than a massively modular system. Citing the long developmental period of our offspring as a costly adaptation (e.g., increased risk of death

prior to reproduction, greatly increased maternal investment), Geary and Huffman (2002) advanced the argument that its benefits must therefore be significant. These benefits would appear to lie in the increased opportunity to acquire and share information that would promote added problem-solving flexibility (e.g., in the ability to categorize local flora and fauna, tool development and use, hunting and gathering), and run counter to extreme reliance on a rigid mental system to guide behavior (Atran, 1998; Bloom, 1996). Further, humans are born with developmentally incomplete brains resulting in most neuronal connections being made in infancy and early childhood: “The evolutionary ‘purpose’ of these well-known features of brain development is to enable adaptive plasticity within a particular environment” (Charney, 2012, p. 390).

Cosmides, Tooby, and Kurzban (2003) tried to clarify EP’s position on automaticity as a definitional property of modules by showing that modules used to categorize people were not necessarily specific to one factor (e.g., race) but were more general categorization mechanisms. In Pinker’s (1997) generally supportive view, “functional specialization” is the distinguishing feature of modularity rather than the ability of modules to provide reflexive and automatic responses to triggering stimuli. This view of modularity discounts genetically pre-programmed systems of mental structure in favor of an as yet unspecified interaction among genes and self-organizing developmental processes in each generation to create functionally specialized cognitive modules adaptive to a particular environment. Moving toward this middle ground might help in identifying the genetic basis of cognitive processes that underlie judgment and decision making and are general enough to enhance fitness during subsequent generations. It would also respond to concerns regarding whether there are any limits to what Buller and Hardcastle (2000, p. 307) called the “promiscuous modularity” of a highly specialized computational theory of mind, with its heavy demand on genetically encoded information.

Confer et al. (2010) defend specialized psychological circuits by arguing that domain-general theories of rationality and judgment would require so many complex computations that vary with context and that cannot be reconciled with immediate emotional responses of jealousy to sexual inflexibility. In our view, they appear to assume a *de novo* situational assessment and too strongly discount the role of prior learning and culturally transmitted norms, values, and expectations. For example, while male sexual jealousy is nearly universal, its expression takes different forms across cultures (Daly, Wilson, & Weghorst, 1982).

Note that we are not implying that such responses do not have some type of evolutionary basis. We question three issues: (a) how much of that is a genetic adaptation, (b) whether the specialized circuits assumed to produce the emotional response and resulting behavior are responsible, and (c) whether the current state of EP renders such propositions falsifiable. Because rational risk-taking assessments are so contextually bound—i.e. what would be evolutionarily rational in one situation would be irrational in another—EP discounts the possibility that any domain-general thought process would be a likely starting point. However, EP fails to specify the circuitry

required to produce similar assessments under its modularity assumptions. Buller (2005), in a critical review, rejected the traditional EP view that there can be no general problem-solving mechanisms, but suggests that natural selection could well have led to some specific problem-solving mechanisms in the brain such as one that predisposes and facilitates social learning (and is possibly underdeveloped in autism).

In an earlier perspective on conditions likely to produce multiple memory systems, Sherry and Schacter (1987) made the important point that true functional incompatibility may be needed to select for different and at least partially independent memory systems. They cite compelling neurobiological evidence, for example, that gradual learning of skills and habits can proceed independently of the ability to recall specific events and that different brain regions are involved in each task. In the former task, it is essential to preserve invariances across episodes so that the mind can ignore or discard unique and idiosyncratic features of an event (since these do not recur and are not useful to the formation of skills and habits). The preservation of unique and detailed information would actually impair execution of activities necessary to the skill. An ideal recall system (used, for example, to locate stored food or the location of a predator) needs to do just the opposite and retain contextual details.

In other words, since the preservation of invariances for one frequent type of task and the preservation of unique variance for another are mutually incompatible, natural selection would have been likely to create functionally separate systems. Noting that prominent memory theorists have expressed concerns about a proliferation of memory systems (e.g., Jacoby, 1983; Roediger, 1984; Schacter & Tulving, 1982; Sherry, 1984), Sherry and Schacter (1987) expressed reluctance to support that type of modularity in the absence of a convincing case for functional incompatibility, such that a newly proposed system is needed to perform a function that cannot be already performed. This type of incompatibility analysis might be a sound approach to examining claims for the many proposed modular systems in EP.

While GK emphasize the importance of the ultimate motives that modern-day humans (and consumers) have inherited from ancient times (“ultimate causes focus on the evolutionary function of a behavior,”), they also adopt the strict EP view of brain-based psychological mechanisms specialized to solve evolutionary challenges (“different psychological systems for managing different evolutionary challenges,”) such as “inherited brain mechanisms wired to respond to luxurious possessions”. S agrees and also uses the “Swiss Army Knife” analogy to describe the human mind as a “set of computational systems that have each evolved to solve a domain-specific problem of evolutionary import (e.g., find a mate, forage for food, avoid predators, invest in kin, build nonkin alliances).”

In sum, EP theorists (compared to other evolutionary scholars) rely on a potentially more rigorous conceptualization of how evolution instantiated favorable adaptations (i.e., those that led to greater reproductive and survival success) and the mechanisms through which these adaptations continue to affect modern-day behavior. In doing so, they have made the requirements for

testing EP-based propositions more precise. However, determining the nature of the operative set of modules underlying particular judgments and decisions raises the bar for empirical research in EP.

Empirical testing of EP propositions

GK made a strong case that many novel hypotheses have been generated by EP and that most of the empirical implications have yet to be fully explored. We agree and will identify some key areas of empirical research. We have observed that many initial forays into potentially productive topics can be characterized as stronger in attempts to demonstrate consistency with an evolutionary narrative than in rigorous attempts to assess the contribution of such a narrative or to carefully examine any proposed EP mechanism (such as the existence of a specialized module) likely to bring about the observed outcome.

For example, Nairne, Pandeirada, and Thompson (2008) found that giving study participants a survival frame scenario when thinking about information produced better information recall than did other frequently used scenarios (e.g., autobiographical relevance). However, as is frequently the case, EP controls are weaker than they could be (e.g., in establishing equivalence among control conditions in other factors known to influence depth and extent of processing). Moreover, even if a study such as this was stronger on that dimension, consistency with an EP narrative is not equivalent to establishing that the behavior resulted from an evolutionary adaptation fed forward by the proposed modular processing system. Buller (2005) makes a similar point in his thorough analysis of some of the “classic” EP research on the cheater detection module (using the Wason selection task to compare reasoning under abstract and “social contract” frames) and on sex differences in responses to sexual and emotional infidelity. The next generation of EP research will almost certainly attempt to overcome such problems. Below we discuss some of the evidence that GK and S advance to support their views.

Mating behavior and jealousy

A prominent body of EP research focuses on sex differences in mating behavior and on responses to infidelity. The costs of reproduction for women—surviving pregnancy and successfully bringing their offspring through the latter’s reproductive stage—far outweigh those for men. Women should, then, seek mates who have resources that maximize their offspring’s likely reproductive success and who are willing to make the long-term investment of those resources. Saad, Eba, and Sejean (2009) test this, using a task that the authors acknowledge is not high in mundane realism (i.e., participants could select between 1 and 25 pieces of attribute information about a candidate for either a short- or long-term relationship). Women more quickly rejected candidates than did men across short- and long-term relationships, sampled a greater number of suitors than did men, and were more likely to reject a mating opportunity under “one-night stand” conditions.

Gender-specific differences in jealousy in response to sexual infidelity are a staple of EP theory. Men should be motivated not to make child-rearing investments if they might not be the father, and women should be motivated to keep men investing. A number of earlier studies found that women tend to identify instances of emotional infidelity (a signal of unreliable investment) by their partners as more distressing than instances of sexual infidelity, and conversely for men (because of parental uncertainty). Later research strongly implicated contextual assessments rather than reflexive responses from a pre-programmed cognitive module, with much research showing that responses to infidelity vary as a function of resource availability and local norms (Buller, 2005; DeSteno, Bartlett, Braverman, & Salovey, 2002; Wood & Eagly, 2002; but see also Gangestad, Haselton, & Buss, 2006 for an alternative view).

The mind's ability to carry out an appraisal of those resources and norms surely has very deep evolutionary roots, but there must be sufficient flexibility to reflect contextual assessments. Jealousy responses, for example, should be more consistent with EP predictions in societies that place strong control on women's sexuality (high value placed on premarital virginity for women but not for men, and strong penalties for female, but not for male infidelity) but less consistent in societies in which women's sexuality is not highly controlled. So even if we accept the "jealousy as a specific innate module (JSIM) hypothesis," as Harris (2003, p.103) put it, we are still left with a pattern of behavior that is not easily linked to a genetic adaptation. This pattern of behavior is driven by socially transmitted information and economic conditions (e.g., women's contribution to subsistence, Schlegel & Barry, 1986) some of which has been codified into norms.

Other EP research suggests similar over-time variance in mating preferences that is not easily linked to a genetic adaptation. Gangestad et al. (2006) report that traits particularly valuable in long-term mates, such as resources and status, do not show ovulatory increases in female preference. Instead fertile women appear to prefer short-term mates having indicators of competitive advantage (e.g., more masculine faces and male behavioral displays of social presence and intrasexual assertiveness) so as to confer genetic benefits to offspring. Although this is the typical finding (Durante, Griskevicius, Hill, Perilloux, & Li, 2011), in earlier times considerable risk would have been incurred by females who are more vulnerable both when they are pregnant and when caring for a child (Geary & Huffman, 2002). That is, survival would presumably have been jeopardized by the absence of a longer-term male protector and the unwillingness of any existing long-term mate to invest in another male's offspring (e.g., should a woman be unable to hide the fact that a mating encounter with another male produced the child). These fertile women might have responded to these consequences by learning to choose more committed and higher status partners whose attractiveness cues pertain more to health, resources and overall genetic fitness (e.g., lack of infection or its effects) than to aspects of heightened masculinity that are valued in an era when sex is as much recreational as procreational. Further EP research might usefully attempt to break such aspects of masculinity and femininity apart.

Related EP work attempts to identify specialized behavior by women to conceal fatherhood and specialized cognitive modules designed to identify "cheaters" (Buss & Kenrick, 1998; Cosmides & Tooby, 1992; Mealy, Daood, & Krage, 1996). It is assumed that these are largely pre-programmed and universal psychological mechanisms that arose during what Tooby and Cosmides (1990, 2005) called the "era of evolutionary adaptedness." Critiques of this concept (see Bolhuis et al., 2011) emphasize sex role variance across populations and transmitted culture, leading to more flexible behavior. This should be an empirical matter for EP advocates, given the advent of birth control, health and safety support systems, and a radical change in attitudes, concerns, and behavior with regard to sex by men and women alike. Haselton and Buss (2000) reported a confirmation of EP predictions based on the finding that women have greater skepticism toward declarations of love than men do. However, any present-day cost-benefit analysis of persuasion (e.g., Campbell & Kirmani, 2000) would arrive at the same prediction, since women can easily understand that they would pay higher costs if they were misled. Further, any theory of mind that includes general purpose inference-making and perspective-taking abilities would lead to the prediction that women would be likely to discount such a declaration of love, given that other motives (e.g., a desire for sex) would be taken into account. Such an account would be more parsimonious than one predicated on the assumed (and difficult to verify) existence of highly specialized cognitive modules.

The same is true of the daughter-guarding hypothesis (Perilloux, Fleischman, & Buss, 2008) according to which parents, for evolutionary reasons, are led to exert more control over the mating behavior of their daughters than of that of their sons. Across the industrial world, women are becoming increasingly independent from men economically. Even if natural selection favored daughter guarding to protect against unwanted pregnancy during the development of modern *Homo sapiens*, we should predict that parents in the industrialized world are (or soon will be) teaching daughters about how not to get pregnant, about how to abort, and that procreation is not an essential component of family life.

Durante et al. (2011) present interesting findings regarding shifts in female behavior during their ovulatory cycle, including a peak fertility preference for "sexy products" to enhance appearance. While this behavior in the presence of attractive rival women (via a priming manipulation) adheres to evolutionary precepts, the fact that product choice was not influenced by comparable priming of attractive men is more difficult to explain, especially since photographs of attractive males (leaving aside women's fertility status) did, in fact, lead them to choose a significantly more sexy status. That would suggest that fertility actually suppressed behavior that would have made the women more attractive to men, and that is inconsistent with evolutionary theory. Our review of that literature fully supports the idea that evolutionary-based hormonal processes are an important part of our biologically driven behavior. But whether and when such processes actually account for much variance in specific consumer choices (due to their less certain link to reproductive success) remains to be determined. Once again, to be faithful to the EP model, such research would need to

establish that an observed pattern of behavior can be explained by some specialized mental module.

Some evolutionary psychologists emphasize the applicability of evolutionary adaptations to consumer use and choice of products, especially those that could convey traits (e.g., female fertility, absence of disease, masculine dominance) that were pivotal during the evolutionary development of modern humans. [Griskevicius, Cialdini, and Kenrick \(2006a\)](#) build on Darwin's notion that some prominent physical features displayed during courtship (e.g., the elaborate plumage of peacocks) evolved via sexual selection — the “struggle between the males for possession of the females” and the resulting reproductive success of the victors ([Darwin, 1859, Ch. IV](#)). They extend this analysis to explain the effects of romantic motives on creativity by priming people with photographs of desirable and available mating candidates (either for short- or long-term relationships) and then assessed their creativity via ratings of their writing about an ambiguous image. Characteristic of primes used in EP studies, the primes used here were quite strong. They included: (1) a post-photograph exposure selection of a date partner; (2) writing a story about the perfect date with that person; and (3) what the authors term a prime “booster shot,” identical to the original prime a bit later.

The prime had an effect on creativity but no effect on level of effort (both time spent and words written) either for males or females, a result we (but not the authors) find surprising. Our reasoning corresponds to Darwin's peacock tail display in that the peacock (and animals that do similar things) goes to considerable effort to have prospective mates find him attractive. That's the whole point. In the absence of any difference in effort, perhaps more attention should be given to alternative explanations for the relationship between the complex prime and creativity. Indeed, since there was nothing to be gained in actual mating likelihood from any display of creativity in this scenario study, this begs the question of why a mating prime would be expected to have any effect. If it was truly a hard-wired, modular circuit, of course, the prime might be expected to act automatically. But then any interactions are more difficult to explain.

[Griskevicius et al. \(2006a\)](#) also noted that results from several studies indicated that a romantic mating prime significantly elevated creativity in males anticipating long-term relationships but not short-term relationships and had no effect for women. They reported an effect when women were primed with thoughts of a committed long-term mate who was (according to the authors), “high-quality relationship material” (p. 70). The latter was explained in part by women possibly having a higher threshold for sexual displays including creativity (due to their greater level of parental investment risk) and their resulting need to establish a male's trustworthiness and commitment. However, these are present-day college women who should be well into the sexual revolution prompted in part by modern birth control, and who, if anything, engage in sexual displays (via clothing, cosmetic use, perfume, etc.) far more than their male counterparts. [Durante et al. \(2011\)](#) document that women, across cultures and history, have consistently allocated a large portion of their resources to items that enhance physical appearance. The

evolutionary explanation ([Griskevicius et al., 2006a](#)) underscores the apparent lack of flexibility of natural and sexual selection adaptations and derived mental modules in response to significantly changed conditions. That such narratives are intriguing is undeniable. However, we hope that further work will shed needed light on both the validity and the applicability of EP findings.

Conspicuous consumption and benevolence

[Griskevicius et al. \(2007\)](#) presented costly signaling theory as a way to describe conspicuous displays of consumption and benevolence. A costly signal is one that has important communicative functions such as conveying desirable/heritable traits or scarce resources but entails costs (e.g., energy, resources, risking discovery by predators). In concept, a signal that is costly is more likely to be worth the effort and therefore more likely to be treated as reliable information. This implies, from an evolutionary perspective, that the signaler will gain some fitness advantage, typically in attracting desirable mates. The authors underscore the importance of such displays by considering behaviors that lack an obvious link to mating strategies.

As in some of their related work, [Griskevicius et al. \(2007\)](#) employed a priming manipulation to expose people to mating cues (via a combination of photographs and writing a story about an ideal first date with the selected target followed by a similar booster shot). The prime was followed by asking how much money the person would spend on five types of conspicuous purchases and how much time (out of 60 available hours) the person would devote to prosocial activities. A neutral photograph and story lacking social content were used in the control condition. These controls also may have provided less compelling reasons to engage in the measured behaviors, and the types of primes used could also have evoked a number of norms (e.g., equity, in that having a great time should make me willing to provide benefits to others) or have led to mood-consistent behavior. These and other design shortcomings have been a source of concern to us in this literature. In the end, though, men, but not women, spent more money in the mating condition, but women devoted more time than men in the same condition. That should not be the case if engaging in prosocial behavior sent a positive signal. But there is ambiguity about what attributes each sex should try to convey to send a positive signal. The specific content of self presentation should vary sharply between evolutionary and current times given that mating can be decoupled from breeding. In another study reported in their paper, very risky heroic actions were substituted for the simply helpful behaviors, and this did produce a significant increase in prosocial/selfless behavior that was also cost-free in terms of any consequences. The effects observed for conspicuous products and behavior disappeared when inconspicuous ones were used, as would be the case if signaling were a goal. Once again, study design may be an issue since there were no signaling consequences for the sender, a point recognized by [Griskevicius et al. \(2007\)](#).

Observing an effect in the absence of a recipient would be consistent with a mechanistic view of EP in which inputs are processed by specialized circuits and simply produce the designated response without much thought. As [Griskevicius et al. \(2007, p. 98\)](#) put it, motive activation: “stimulates specific mental sets that activate a cascade of functional perceptions, cognitions, and behaviors that can occur outside of people’s awareness”. However, the authors also suggest a possible assessment of the prosocial/selfless behaviors to determine what they might convey (e.g., general helpfulness, risk-taking and assertiveness, status and prestige, leadership). Strategic self-presentation, at least to us, does not sound like a process mediated by specialized mental modules outside of awareness.

Kinship

Kinship is an important subject in evolutionary history since it suggests an explanation for people diminishing their own survival prospects by helping others (by providing them with scarce resources or engaging in risky protection behavior). One type of analysis of pro-social behavior rests on the principle of inclusive fitness — that is, what matters is not only the survival of a person’s genes but also the reproductive success of kin who share many of these genes. Even in non-human species, social coalitions (often comprised of females) compete with one another to control resources that covary with survival or reproductive outcome. Victory in this competition leads to healthier and more successful offspring ([Geary & Huffman, 2002](#)). Evolution may have selected adaptations that favored reciprocal cooperation within the extended family group but that also selected against inbreeding. Kinship today is largely a cultural phenomenon. Its relevance varies dramatically between large, industrial, mobile societies and small-scale societies where family ties and tribal ties are keys to control over resources. Whether early inclusive fitness adaptations (during the putative era of evolutionary adaptedness) and evolved mental modules would serve the same purpose today is an empirical question.

[Lieberman, Tooby, and Cosmides \(2007\)](#) advanced a kin-detection mechanism in humans that computes a kinship index corresponding to a pairwise estimate of genetic relatedness between self and others. As with other modular systems of EP, it requires monitoring circuitry, a computational device leading to an output (the index) and programs to regulate sibling altruism and sexual aversion. They identified input cues for this mechanism by matching indicators of potential kin relatedness (such as perinatal association with one’s biological mother and the duration of co-residence) to variation in sibling altruism, aversion to engaging in incest, and moral opposition to others’ incest. This was done using a survey with behavioral and intention data such as willingness to donate a kidney for altruism and levels of disgust for incestuous behavior. Correlations confirm that norms against incest are applied to the requisite siblings and that people are inclined to be more altruistic toward their closest family members. Observational or experimental studies on whether people actually detect and use these cues in making judgments will help establish the meaning of these correlations, and further research would be needed to establish

the superiority of proposed EP explanations compared to strictly cultural explanations, which are equally consistent with these data.

Conformity

Many species enhance safety by grouping behavior that allows each individual to be less conspicuous. However, standing out in a crowd may be a better way to differentiate oneself and attract a mate ([Griskevicius, Goldstein, Mortensen, Cialdini, & Kenrick, 2006b](#); [Wilson & Daly, 2004](#)). Regarding gender, evolutionary theorists have suggested that women prefer a mate who is decisive, risk-taking, assertive, and willing to be a leader, thus a nonconformist in the presence of rivals. Men, on the other hand, should prefer a woman whose agreeableness is likely to produce harmony and group cohesion. [Griskevicius et al. \(2006b\)](#), in a carefully controlled set of experiments, examined several evolutionary hypotheses to evaluate predicted gender differences linked to the twin motives of self-protection and mate attraction.

Their research suggests that things are more complicated. Women, they predict, should also value a mate who has a positive disposition. A man who goes against the group when the group expresses negativity should make the prospective mate more attractive, while a man who goes against the group when the group expresses positivity should make the prospective mate less attractive. Priming either self-protection or mate selection motives through short scenarios in the context of judgments about a painting largely confirmed the authors’ more complex set of interactions. Men primed with a mate-selection goal went against the preferences of others to a greater extent than did women, but this was qualified by the positivity/negativity of that expression (i.e., the perceived dispositional impression of the action) and the subjectivity versus objectivity of the action (i.e., the perceived correctness impression of the action).

Our concern here is over how likely it would be for evolution to select for such a complex pattern of behavior, thereby creating a genetic basis for its inheritance. The fit with EP specifications for inheritance—relying on modular circuits and insisting on the absence of a general purpose reasoning system to enable context-specific inferences about the responses of others—seems weak. Though findings are presented in the context of an evolutionary narrative rather than a more traditional social psychology framework such as attribution theory, further research might try to compare them more directly.

Violence and hostility

The question of why people have evolved to act aggressively has been examined by comparative biologists and evolutionary scientists for some time. Thus, in ancient herding economies, since a man could lose everything if he was not seen as tough enough to stand up to raiders, the selection of the trait of aggressiveness among men from those cultures is a possibility. Some ten thousand years later, people from herding cultures tended to settle in the southern parts of the United States, with farmers settling in greater numbers in northern

states. According to Nisbett and Cohen (1996), this set of environmental factors produced a difference in activation levels for violence resulting in a “culture of honor” in the South and to greater rates of homicide in response to similar types of behavior (e.g., public insults, sexual jealousy). When subjected to further rigorous hypothesis testing, however, this prediction has not fared particularly well (D’Andrade, 2002).

Many studies indicate a link among aggression, status competition, and mating motives. Griskevicius et al. (2009) present evidence that direct aggression by males seeking a mate is particularly likely when the audience is male, and hence a potential threat to passing along genes, rather than female. As in most research we have examined, regardless of its natural selection roots, violence and hostility have evolved into a contextually dominated response in which potential benefits are balanced against potential costs. For example, the benefits of scaring away or disposing of mating rivals must be balanced against physical costs (e.g., possibility of death or severe injury, significant energy and resource expenditures) as well as more subjective costs such as creating a poor impression, particularly when a female audience is present and when more cooperative behavior is valued. Interestingly, though women appear to be predisposed to more indirect and non-violent forms of aggression (probably because the costs are much lower), this should change when costs are higher because resources are scarce (threatening survival of offspring). In fact, crime statistics reveal higher rates of violence by men but display unusually high inter-gender correlations as a function of resource scarcity (Campbell, Muncer, & Bibel, 2001). As discussed earlier, in our view EP mechanisms have a more difficult explanatory task when dealing with novel and multifaceted environmental and resource conditions. Social psychologists who have studied violence in close relationships (e.g., Cobb, DeWall, Lambert, & Fincham, 2013) implicate implicit theories of relationships (such as beliefs that relationships grow and evolve as opposed to static “destiny” beliefs) as major learned factors that contribute to tendencies to engage in violence. More general purpose reasoning systems and socially mediated learning seem better able to deal with such complex assessments than do highly modular mechanisms.

Evaluating EP research: what standards are appropriate?

A strong criticism of much current EP research (including all of the studies discussed in this paper) emanates from Tooby and Cosmides’ (2005, p. 14) claim that “organisms are adaptation executors, not fitness pursuers” and that “mapping the computational architecture of the mechanisms will give a precise theory of behavior, while relying on predictions derived from fitness maximization will give a very impoverished and unreliable set of predictions about behavioral dynamics”.

None of the studies we have reviewed here even attempt to describe the computational mechanisms that could produce the behavior under study. For example, establishing that women focus more than men on the costs of a sexual encounter confirms the importance of biology (and its implications for disproportionate parental investment), but it does not establish the validity of a special purpose set of cognitive modules

(dating to hunter-gatherer times) as a genetic inheritance mechanism responsible for producing such behavior.

In fairness, we believe that the evidentiary standards set forth by some leading EP theorists are likely to be beyond the reach of empirical research for quite a while. We would, however, like to see significantly more attention paid to validating expressed or implied fitness explanations so that they can be regarded as (1) something more than intriguing stories that are consistent with a natural selection rationale during hunter-gatherer times, and (2) a more conceptually sound basis for an observed relationship and subsequent predictions than other plausible explanations. Moving forward, some EP scholars—faced with continuing controversies over the EP emphasis on massive modularity and ancient, highly specialized circuits as problem-solving and assessment mechanisms—might be more comfortable assuming the existence of evolved mental adaptations (specialized for some tasks and less so for others) that meet processing requirements. Adopting this type of approach might also increase collaboration with the many cognitive and social psychologists who have an active interest in judgment and decision-making.

Evolutionary and cultural explanations

For some readers, exposure to EP (or evolutionary science more generally) may lead them to wonder why an analysis of present-day actions should include a far broader time span or conditions of life. Some phenomena of interest take eons to play out; others take decades or a few hundred years; and still others are really, really quick because many behaviors are based on thoughts that are present for a moment in time within a particular social context. Research paradigms, accordingly, range from the “ultimate” (as is the case for EP) to the truly “proximal” in order to address both the phenomena of interest and the desired level of explanation.

Consider the following. Why don’t human females senesce and die quickly after their reproductive years, as other mammals do? In other words, why are there grandmothers (Hawkes, 2003)? Answers to questions like these require an evolutionary lens and time scale. For scholars in EP this generally means most of the Pleistocene, from about 2.6 million years ago until the development of anatomically modern humans, around 200,000 years ago. During that time, changes in patterns of thought and behavior (changes in the ability to make stone tools, for example, or in the ability to communicate through language) were tied to changes in human biology (changes in brain size, for example, or in bipedalism or hand-eye coordination), and so both took a very long time.

Natural selection, of course, did not end with the development of modern humans. Sickle cell trait, for example (which provides resistance to malaria), was selected for in humans within a hundred generations (2000 years) in consequence of the adoption of a farming system that favored malaria vectors (Wiesenfeld, 1967). The development in northern European populations of post-infancy lactase persistence was likely an evolutionary response to pastoralism. Depending on modeling assumptions, the evolution of this latter trait took place in a span of no more than 9000 years and possibly much less (Holden & Mace, 1997).

In fact, overall, natural selection has been accelerating among humans in the last 40,000–50,000 years (Hawks, Wang, Cochran, Harpending, & Moyzis, 2007). Bolhuis et al. (2011) conclude that as much as 10% of human genes have been affected during this time, many of these in the human brain. By 40,000 years ago, the pace of cultural change—what Harris (1989) called “cultural take-off”—quickenened dramatically, and evolutionary change has been affected primarily by responses to culturally facilitated changes in human density, agriculture, domestication of animals and conditions of life (Bolhuis et al., 2011).

The end of the Pleistocene, about 12,000 years ago, and the retreat of the glaciers in Europe (and a few thousand years later, in North America) spelled extinction for the mastodons and other megafauna of the era. Humans were forced to change their production regimes from hunting large game to hunting small game and to experiment with the domestication of plants and animals. Success with these experiments, in the space of a few thousand years, meant the end of hunting and gathering and the growth of large, stable communities (Flannery, 1973), with all the cultural change that implies. For example, children as field hands became a source of wealth, and the birth rate skyrocketed in the first demographic transition (Handwerker, 1989). The growth of large villages and eventually cities meant the development of hierarchical political organizations (Carneiro, 1970) and the acceptance of wealth and power inequality.

In the last 300 years, since the start of the industrial era, the second demographic transition (Caldwell, 1982) has been characterized by a dramatic drop in the birth rate, with a few children absorbing wealth, and by romantic love replacing arranged marriages (Smits, Ultee, & Lammers, 1998). Explaining these and other important variations in modern human behavior and thought requires an intermediate time scale and an ecological, or materialist, rather than a Darwinian, perspective. Yes, proximate thoughts drive behavior, but we have different thoughts as a consequence of the material and social conditions in which we live. The prototype of this is Marx (1904, p.11–12) dictum that “it is not the consciousness of men that determines their existence, but, on the contrary, their social existence determines their consciousness” and Harris (1979) expansion of the paradigm of cultural materialism. In short, evidence of the constant interplay between people and their changing environments paints a different picture of inheritance than is offered by EP, and expanding our purview to include less immediate factors that affect present-day behavior should be a welcome contribution.

Conclusion

Students of consumer behavior have long sought to explain why people behave the way they do. Most research examines proximate explanations that are seen as immediate antecedents of the behavior (e.g., favorable beliefs and attitudes, instigating cues or circumstances) or can be conceptualized as the immediate field of forces, both internal and external, having directional significance. Some might argue that the increasing causal emphasis on momentary spikes in salience, such as through semantic and emotional priming as well as temporary shifts in perspective via

framing of decisions, has led to a more general level of unhappiness within the field regarding unusually narrow levels of explanation. Perhaps this has contributed to a desire to take another look at more enduring explanatory variables.

Previous efforts in consumer behavior research to provide greater explanatory power across situations have linked behavior to more fundamental motives and personality traits and various conceptions of a self-concept and self-identification as well as to “terminal” values (i.e., core beliefs about what is important and worthy of guiding one’s life), an approach that was revived in the 1990s by “means-end chain” and “laddering” research (Reynolds & Olson, 2001). Because these are further removed from immediate experience and situational contexts, they will typically account for less variance in any single action but they may offer more over-time explanatory power with respect to a person’s pattern of behavior. More important to some is the possibility that such explanatory variables will help in building a more complete and cohesive theory.

EP (including both target papers in this issue) pushes beyond prior approaches and emphasizes a program of research to discover truly ultimate causes of behavior — that is, the “evolutionary function of a behavior” (GK). Noting the “ubiquity of conspicuous consumption across history,” for example, GK suggest that “humans may have inherited brain mechanisms wired to respond to luxurious possessions. If so, then conspicuous consumption has served some ultimate evolutionary function” (GK). Judgments about appropriate levels of explanation are necessarily subjective and often reflect the purpose of the inquiry and goals of the researcher. Accordingly, we take no position on that question in the abstract. If one’s goal was to design an effective intervention, it might be reasonable to ask whether certain “deeper” levels of analysis serve that purpose aside from providing more general insights. Similarly, it is not obvious that speculating that loss aversion is “an adaptive bias that helped humans solve survival-related ancestral challenges” (Li, Kenrick, Griskevicius, & Neuberg, 2012) is either useful (in the sense of providing unique actionable insights) or testable. Furthermore, biologically grounded and less speculative explanations for directional biases are available: Physiological research has examined the importance of both approach and avoidance systems, citing a lower threshold for negative affect but also the presence of a “positivity offset” that may account for the functionality of exploratory behavior (Cohen, Pham, & Andrade, 2008, pp.326–27).

Sear et al. (2007, p.21) are optimistic that “a synthesis of the human evolutionary behavioral sciences is not only possible, but underway.” What that should look like is a matter of some controversy. Some scholars who adhere to an evolutionary paradigm often recognize the importance of multiple levels of explanation. S, for example, says: “A defining feature of a culture’s ethos appears to be an adaptive response to an ecological challenge. Culture and biology should not be pitted against one another. Consumers are an inextricable mix of their biological and cultural heritages.” Moreover GK say: “Proximate and ultimate reasons are not competing explanations. Rather, each one explains a behavior at a different level of analysis, with both types of explanations being useful for understanding any

given behavior.” We could not agree more. Unfortunately, EP has followed an uneven course in that regard (Lickliter & Honeycutt, 2003), often giving lip service to variable conditions of life but focusing on ancient genetic adaptations that are largely preprogrammed.

Prominent EP theorists insist that scientifically adequate explanations must deal with “ultimate” rather than “proximal” causation and must, therefore, reside in evolved mental circuits resulting from natural selection in ancient times. Moreover, this implies that behavior should not be explained in terms of desired outcomes or goals: “The teleological end that seems to exist in the future as the point toward which things tend is in reality a regulatory process or representation in the organism in the present” (Tooby & Cosmides, 2005, p. 12). Some may find doctrinal EP writings to be unusually strident in this regard:

“A genuine, detailed specification of the circuit logic of human nature is expected to become the theoretical centerpiece of a newly reconstituted set of social sciences, because each model of an evolved psychological mechanism makes predictions about the psychological, behavioral, and social phenomena the circuits generate or influence....A growing inventory of such models will catalyze the transformation of the social sciences from fields that are predominantly descriptive, soft, and particularistic into theoretically principled scientific disciplines with genuine predictive and explanatory power”.

[Tooby & Cosmides, 2005, p. 6]

Confirming an evolutionary narrative and mechanisms presents unrivaled challenges. Looking at the explanation offered for conspicuous consumption, for example, one needs to confirm that the hypothesized ultimate cause was an evolutionary adaptation in the first place and then confirm a genetically based mechanism for both inheritance and the enacted behavior. For most behavior of interest to consumer or social psychologists, that goal seems beyond the reach of today’s tool chest. On the other hand, the desire to better incorporate biological and culturally-based behavioral adaptations into a more integrative behavioral science presents unparalleled opportunities for the next generation of scholars, and so it would be a mistake to predict or prejudge what form this will take. In critiquing EP, Bolhuis et al. (2011, p.6) hope for a “broader, more open, and multidisciplinary theoretical framework, drawing on, rather than being isolated from, the full repertoire of knowledge and tools available in adjacent disciplines.” A particularly optimistic view was put forward by Gangestad et al. (2006, p.76), and we can only hope that it is a harbinger of the future:

“Most theorists recognize that genes and environment influence behavior only in a context partly defined by the other, such that a dichotomy between nature and nurture (the idea that influence can be understood through reference to only genes or environment, respectively) is wrongheaded. Behavior results from an underlying, often universal, evolved developmental system (itself consisting of both genetic and environmental components) in conjunction with individual environmental influences, including social experiences.”

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