General Article

Evaluating Evidence of Psychological Adaptation

How Do We Know One When We See One?

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ABSTRACT—*Evolutionary psychologists argue that human nature contains many discrete psychological adaptations. Each adaptation is theorized to have been functional in humans' ancestral past, and empirical evidence that an attribute is an adaptation can come from showing it possesses complexity, efficiency, universality, and other features of* special design. *In this article, we present a tutorial review of the evidentiary forms that evolutionary psychologists commonly use to document the existence of human adaptations. We also present a heuristic framework for integrating and evaluating cross-disciplinary evidence of adaptation. Pregnancy sickness, incest avoidance, men's desires for multiple sex partners, and an easily learned fear of snakes are evaluated as possible human adaptations using this framework. We conclude that future research and teaching in evolutionary psychology would benefit from more fully utilizing cross-disciplinary frameworks to evaluate evidence of human adaptation.*

During the past few decades, evolutionary perspectives on psychological science have become increasingly prominent. Despite the growing influence of *evolutionary psychology* as a progressive scientific paradigm (Barkow, Cosmides, & Tooby, 1992; Ketelaar & Ellis, 2000), many psychologists and cultural critics remain unconvinced that evolutionary theory has wide-ranging applications to contemporary human behavior and modern social problems (H. Rose & Rose, 2000). One of the main concerns with evolutionary psychology is its supposed inability to provide direct evidence of human adaptation. The purpose of this article is to provide a tutorial review of the most common evidentiary forms used to document the existence of human adaptations. We also present a heuristic tool for integrating and evaluating cross-disciplinary evidence of human adaptation. We begin with a common source of confusion—the definition of biological adaptation.

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BIOLOGICAL ADAPTATIONISM

In the history of evolutionary biology, very few ideas have been as problematic, and yet as important, as the concept of adaptation (Bock & Cardew, 1997; M.R. Rose & Lauder, 1996; Williams, 1966). One of the problems with this term is that it can be both a verb (i.e., adaptation as the process of evolution) and a noun (i.e., adaptation as a product of evolution). As a verb, *adaptation* refers to a creature changing and becoming better suited, or *fit*, to an environment. This process can include change in an individual creature over ontogenetic time, or change in an entire species over its phylogenetic history.

Adaptation as a noun comes in two basic forms. Some evolutionists define an adaptation as any attribute that helps a creature survive and reproduce at the moment (Reeve & Sherman, 1993). If you learn to eat a new food that increases your personal health and fertility, this new food-eating behavior could be considered an adaptation. However, most evolutionary biologists define adaptations as the historical end products of the process of evolution (Williams, 1966). The peacock's brilliant tail, female mammalian lactation, and the human tendency to help relatives according to genetic relatedness are considered historical or Darwinian adaptations because they likely stem from a long history of evolution by natural selection (Buss, 1999). There are more specific definitions of evolutionary adaptation (see Amundson, 1996), but our focus in this article is on understanding adaptations as products of historical evolution, that is, as features that were "functionally designed by the process of evolution by selection acting in nature in the past" (Thornhill, 1997, p. 4).

HOW DO EVOLUTIONARY SCIENTISTS IDENTIFY ADAPTATIONS?

Williams (1966) provided perhaps the most influential and enduring guide to identifying historical adaptations. He argued that only when an attribute shows evidence of special design for the purpose of increasing fitness should one consider an attribute to be an adaptation. According to this definition, to call an attribute an adaptation one must demonstrate that it increases a creature's fitness (i.e., leads to differential genetic contributions across generations; Alcock, 1993). Empirically determining whether an attribute increases fitness can be

difficult. However, if an attribute helps a creature (or its relatives) survive and reproduce (or has done so in the past), it likely increases fitness.

Also difficult is determining whether an attribute shows evidence of special design (Thornhill, 1997). Williams (1966) suggested that evidence of special design, or what can be called design specificity, can come from many different sources. For example, if an attribute is extremely efficient, subtly complex, or incredibly specialized, or emerges universally in all members of a species, then one can think of the attribute as possessing design specificity. These two components—fitness enhancement and special design—are considered essential features of biological adaptation.

THE ADAPTATIONIST PROGRAM

In evolutionary biology, the general approach of studying animals and discovering their basic adaptations to life is called the adaptationist program (Mayr, 1983). For some psychologists, identifying all the psychological adaptations that make up human nature—the adaptationist program of humanity—is what evolutionary psychology should be all about (Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998; Tooby & Cosmides, 1992). Given the current limitations of science, however, this is an especially difficult task.

Evolutionary psychologists do have help in that heuristic theories can tell them where to look for psychological adaptations. For example, inclusive-fitness theory (Hamilton, 1964) can lead evolutionary psychologists to look for certain kinds of familial helping adaptations. Reciprocal-altruism theory (Trivers, 1971) can assist in uncovering the adaptations of human friendship and coalition formation. Life-history theory (e.g., Hill & Hurtado, 1996) may lead to a greater understanding of the adaptations that cause people to expend effort on different types of relationships over the course of their lives, as well as the reasons why the human species goes about surviving and reproducing differently than other species (Low, 1998).

Given Williams's (1966) guidelines for identifying biological adaptations, evolutionary psychologists have another important aid in their quest to map human nature. They have a reasonably good idea about how human adaptations will be phenotypically expressed. That is, they know what most psychological adaptations will probably look like (Bock & Cardew, 1997). For example, human psychological adaptations will likely display a substantial amount of functionality. They will aid people in their survival and lead to more successful reproduction (i.e., fitness enhancement). Of course, this is not always true and becomes quite problematic when one looks for evidence of adaptation in modern technological cultures (Crawford, 1998). Still, evolutionists usually expect that psychological adaptations will be expressed in functional, as opposed to dysfunctional, behavior.

Most evolutionary psychologists also expect that human adaptations will display domain-specific modularity (Pinker, 1997). That is, psychological adaptations will tend to be relatively discrete, each with its own particular design and its own special function (cf. Geary, 2000). Each adaptation should be designed to accomplish a task that, given a natural developmental environment, will lead to the individual's greater survival and reproduction (Tooby & Cosmides, 1992). Although the idea of a domain-specific brain is not new to psychology, evolutionary psychologists tend to view most of the human mind as having function-specific modularity (Gallistel, 1995; Hirshfeld & Gelman, 1994).

One implication of design specificity is that evolutionary psychologists do not have to look for one big generalized adaptation that solves all the tasks of survival and reproduction. Just as no one physical organ solves all tasks for the human body, no one mental adaptation will solve all tasks of the human mind (Buss, 1999). Instead, evolutionary psychologists think that adaptations are designed to accomplish specific tasks and so expect them to be numerous. Evolutionary psychologists know to look for a large number of adaptations, each displaying a marked degree of functionality and design specificity.

There are other features that help evolutionary psychologists to identify adaptations. Sometimes, these features seem at odds with one another. For example, adaptations are expected to be universal, in that all people everywhere share the same basic human nature (though see Brown, 1991, on facultative and conditional adaptations). At the same time, adaptations are expected to be interactive, in that it takes exposure to certain environments (such as the skin friction needed to activate callous-producing adaptations) for them to become activated and have an impact on the individual's psychology. Adaptations will also be complex, usually because they have been created from previous adaptations from earlier in the species' phylogenetic history (i.e., they are exaptations; Andrews, Gangestad, & Matthews, 2002) and because evolution rarely produces optimal phenotypic designs (in part because of a lack of useful genotypic variation). At the same time, adaptations are expected to be efficient or economical, in the sense that little that is energetically wasteful is retained in an adaptation's structure over evolutionary time (Williams, 1966). Thus, there are many potential clues to psychological adaptation—including clues from heuristic theories and clues from the special-design features of functionality, modularity, universality, interactivity, complexity, and efficiency.

Still, how can evolutionary psychologists formally evaluate whether a given adaptation actually exists? Typically, evolutionary psychologists build the case for adaptation explanations both theoretically and empirically, using persuasive reasoning and providing compelling pieces of evidence (Andrews et al., 2002; Holcomb, 1998; Ketelaar & Ellis, 2000). However, there is a more formal process for this type of evaluation, a process psychologists refer to as establishing construct validity through nomological networks of evidence (Campbell & Fiske, 1959; Cronbach & Meehl, 1955).

CONSTRUCT VALIDITY, NOMOLOGICAL NETWORKS, AND PSYCHOLOGICAL ADAPTATIONS

When psychologists conduct research studies, they often are interested in constructs that are not directly observable. Constructs such as love, extraversion, conservatism, and depression must be inferred from psychological measurements; they cannot be seen directly (Campbell & Fiske, 1959). Nearly 50 years ago, Cronbach and Meehl (1955) published a seminal article in which they outlined three essential steps for establishing the validity of psychological constructs. First, a researcher interested in a construct must articulate the concepts that are the theorized components of the construct, as well as their expected interrelations. In other words, the researcher must use a theory to decide what the construct is (i.e., which concepts belong in the construct) and what it is not. Second, the researcher must develop ways to measure the proposed concepts. Measurement may include survey findings, behavioral measures, experimental results, systematic

observations, case studies, and so forth. Third, the researcher must empirically test the hypothesized relations among the concepts. If the relations map onto the theoretical expectations, the construct is considered valid.

Establishing construct validity is normally an ongoing process; construct validity is never fully established with a single set of observations or correlations. Instead, researchers build a *nomological network* of evidence that is continuously constructed and pruned as new evidence comes along. Although nothing in science is ever "True" with a capital *T* (Ketelaar & Ellis, 2000), by using an elaborated nomological network based on well-reasoned theories and filled with abundant empirical evidence, psychologists can make compelling arguments for the valid existence of unseeable psychological constructs.

In line with Cronbach and Meehl's (1955) outline, evolutionary psychologists often develop theories, delineate concepts, and measure the relationships among concepts in order to argue for the existence of psychological adaptations (Holcomb, 1998; Ketelaar & Ellis, 2000). In essence, they build nomological networks of evidence to evaluate whether a given adaptation can be considered a valid psychological construct. Perhaps more than other psychologists, evolutionary psychologists use a wide variety of evidentiary forms, ranging from survey studies and behavioral experiments, to findings in genetics and medicine, to cross-species and cross-cultural comparisons, to ethnographies of foraging societies and theoretical computer modeling (Barkow et al., 1992; Buss, 1999).

We provide in Figure 1 a simple schematic of the eight basic modes of evidence most commonly used by evolutionary psychologists. We chose this interdisciplinary categorization scheme because it covers a broad spectrum of evolution-relevant research, because each category represents traditional subdisciplines within evolutionary science, and because individual evolutionary researchers often focus their empirical investigations on only one or two of these eight basic modes.

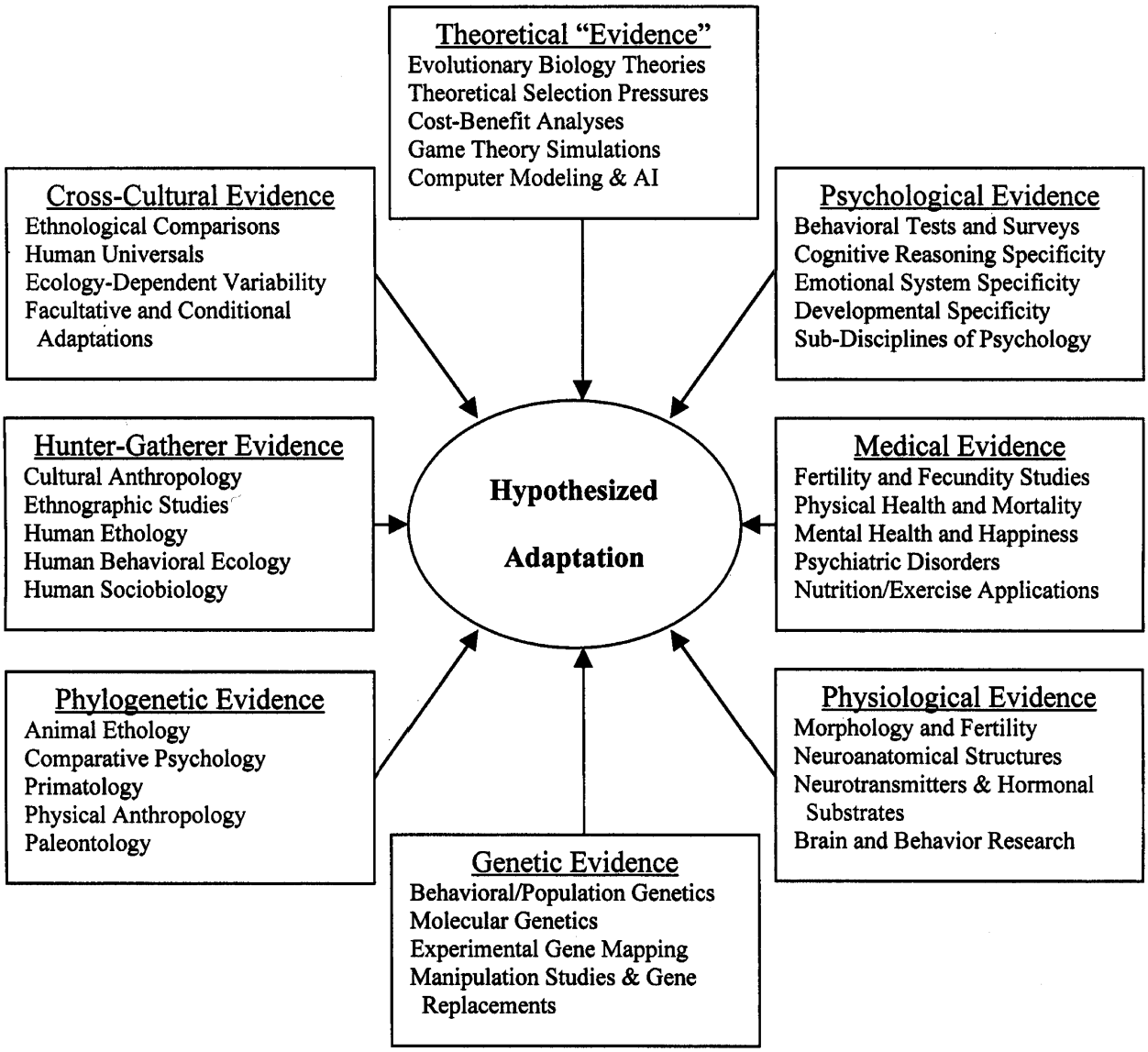

Fig. 1. Schematic representation of the different forms of evidence used to evaluate the validity of psychological adaptations. AI = artificial intelligence.

Ultimately, other breakdowns of evolutionary disciplines are viable (e.g., cross-species and phylogenetic evidence might be in different boxes). We find our schematic exceptionally useful in our research and teaching of evolutionary psychology, particularly in generating new ideas for future research studies and for evaluating the quality of evidence for adaptation.

The center of Figure 1 represents a hypothesized psychological adaptation. Evolutionary psychologists can argue for the existence of this adaptation by adding to the nomological network of evidence around the construct, and interrelating the evidence empirically. As we mentioned earlier, evolutionary psychologists frequently start with theories—often from the core principles of evolutionary biology—that heuristically guide their attention toward potential psychological adaptations (see the Theoretical "Evidence" box in Fig. 1). This is a crucial part of the construct-validity approach in general: One must have a theory from which to generate and develop an initial nomological network of hypothetically interrelated findings (Cronbach & Meehl, 1955).

Common theories used by evolutionary psychologists include inclusive-fitness theory, sexual selection theory, parental investment theory, and parent-offspring conflict theory (Buss, 1999; Cartwright, 2000). If a hypothesized adaptation flows directly from a theory under the general paradigm of evolution (see Ketelaar & Ellis, 2000), evolutionary psychologists can express more confidence in the adaptation's existence. Other "theoretical" evidence may be gleaned from detailed cost-benefit analyses, computer models, or game-theory simulations of the adaptation (Maynard Smith, 1977). Within the field of evolutionary psychology, artificial intelligence (AI) and model building have become increasingly important evidence for adaptation (Kohler & Gumerman, 2000; Tooby & DeVore, 1987).

As seen in the Psychological Evidence box of Figure 1, evolutionary psychologists use direct empirical evidence from the many subdisciplines of psychological science to evaluate whether adaptations exist. For example, evidence of adaptation has been marshaled from psychological studies of human sociality, development, family dynamics, aesthetics, morality, language, emotion, personality, culture, and consciousness (see Buss, 1999; Cartwright, 2000; Simpson & Kenrick, 1997). In general, if a given psychological attribute demonstrates design specificity, and is linked with function, this may be evidence of human adaptation.

Evolutionists sometimes invoke medical science as evidence of adaptation (see Medical Evidence box). They look at the modern fertility, physical health, and mental well-being consequences of certain psychological attributes (Trevathan, Smith, & McKenna, 1999). It is often assumed that morphologies and behaviors that lead to better health and more prolific reproduction are probably linked to humans' evolved psychology. Evolutionary psychologists also seek out specific physiological substrates of adaptations (see Physiological Evidence box). If a psychological phenomenon is linked to specific physical structures, locations and neurotransmitters within the brain, or hormone levels in the blood, evolutionists may possess additional evidence that the attribute results from psychological adaptation.

Evolutionary psychologists occasionally rely on genetics to make a case for human adaptation (see Genetic Evidence box in Fig. 1). Although it is true that most evolutionary psychologists assume that all people share the same basic human nature (Tooby & Cosmides, 1992), evidence from population and quantitative genetics suggests that there are some genetic differences among individuals that may be linked to adaptive variation. At the same time, many molecular geneticists are looking at specific genes in hopes of identifying humans' common genetic heritage, against which individual genes linked to diseases and to normal adaptive variations can be mapped (Ridley, 2000).

As schematically portrayed in the Phylogenetic Evidence box, evolutionary psychologists rely heavily on cross-species, comparative, and ethological analyses to evaluate adaptations (Harvey & Purvis, 1991; Tinbergen, 1963). If paleontological evidence suggests that an attribute had a logical development across human phylogenetic history, or is homologous across modern species (especially primates), this can be used as evidence of adaptation (Trivers, 1985). Using cross-species comparisons to examine analogous adaptations is also common (Alcock, 1993).

As shown in the Hunter-Gatherer Evidence box, evidence generated by anthropologists who study specific hunter-gatherer cultures is used by evolutionary psychologists when evaluating adaptations (e.g., Hill & Hurtado, 1996). By looking at modern cultures that still practice a "natural" foraging way of life (Lee & Daly, 2000), evolutionary psychologists try to build a portrait (albeit a sketchy one) of humans' ancestral past and the selective pressures that resided in it (Foley, 1996). Related fields that generate evidence include human ethology (e.g., Eibl-Eibesfeldt, 1989), behavioral ecology (Krebs & Davies, 1997), and sociobiology (Wilson, 1975).

Finally, evolutionary psychologists frequently employ cross-cultural research (see Cross-Cultural Evidence box) to ethnologically determine whether certain attributes are adaptations (Brown, 1991). Often, evolutionary psychologists study a range of cultures, from foraging to agricultural to modern industrial. If a psychological attribute shows up in every culture, or reliably emerges given exposure to predictable ecological stimuli, then evolutionists may possess evidence of psychological adaptation.

Carrying out the task of identifying all human psychological adaptations will most certainly be difficult, and will be fraught with many pitfalls and errors (Mayr, 1983). In the end, whether evolutionary biology plays a fundamental role in a given psychological attribute will be determined by cross-disciplinary integration in the form of nomological networks of evidence. This basic approach has long been used by traditional psychologists to provide evidence for all kinds of psychological attributes that one cannot visibly see, but nonetheless exist (Cronbach & Meehl, 1955). Because of the interdisciplinary nature of evolutionary psychology, we think construct-validation techniques, including nomological networks, will be particularly suited for the task of evaluating whether a given human attribute represents a psychological adaptation.

We would like to suggest a tentative set of standards for evaluating nomological networks of evidence for psychological adaptation. In our view, there are two important dimensions along which nomological networks can vary—evidentiary breadth and evidentiary depth. For example, some nomological networks might include only one box of evidence from Figure 1, whereas others might possess evidence from all eight boxes. In practice, the latter level of breadth will rarely be reached, in part because evolutionary psychology is a relatively young science. We propose, on the basis of traditional norms for evaluating the validity of measuring psychological constructs (Whitley, 1996), that having one box of adaptation evidence should be considered a "minimal" level of evidentiary breadth. Two or three boxes in a nomological network should be considered "moderate" evidentiary

breadth. Four or five boxes of evidence should be considered "extensive" evidentiary breadth, and six or more boxes should be considered "exemplary" evidentiary breadth.

Nomological networks vary not only in breadth, but also in evidentiary depth. It would be problematic, however, to evaluate the depth of evidence by simply totaling the number of supportive research findings within each box of Figure 1. The quality of a research study depends on several factors, including whether multiple modes of measurement are used, methodological rigor and control are present, and sampling biases have been avoided. For example, a single psychophysiological study based on a representative national sample might be considered of higher quality than dozens of self-report survey studies using convenience samples of college students. We believe it is best to evaluate the depth of a nomological network by looking at the evidence across all boxes and making a judgment as to whether the overall depth is "minimal" (i.e., boxes generally have single studies with one mode of measurement, poor methodological control, and unrepresentative sampling), "moderate" (i.e., boxes generally have at least two studies with more than one mode of measurement, good levels of control, and good sampling techniques), "extensive" (i.e., boxes generally have numerous studies with more than two modes of measurement, high levels of control, and high sampling quality), or "exemplary" (i.e., boxes generally have dozens of studies with multiple modes of measurement, highest levels of control, and true representative sampling). Again, this nomenclature for describing nomological networks of evidence is only a tentative guideline and is based on traditional norms for evaluating the validity of psychological constructs (Whitley, 1996). We turn next to reviewing some examples of our approach for evaluating evidence of psychological adaptation, beginning with an example that has evidence from nearly every box of Figure 1.

PREGNANCY SICKNESS AS A PSYCHOLOGICAL ADAPTATION

One example of a potential adaptation is pregnancy sickness—the tendency for women to avoid certain foods, feel nauseous, and get sick to their stomachs early in pregnancy. Evolutionary psychologists do not typically look at a specific human attribute like pregnancy sickness and reflexively proclaim that it is the result of a biological adaptation (though critics often portray evolutionary psychology this way; H. Rose & Rose, 2000). Rather, evolutionary psychologists tend to look at an attribute and ask a series of questions about fitness enhancement and design specificity. Profet (1988, 1992) asked these questions about pregnancy sickness: Why do women get sick early in pregnancy and not later? Why do women find certain foods more revolting than others? Why get sick at all? Why would evolution produce such a seemingly costly behavior as keeping vital nutrients away from a delicately forming embryo? What are the proximate, ontogenetic, phylogenetic, and ultimate origins of this attribute?

Profet (1988, 1992) began her investigation into whether pregnancy sickness is an adaptation by noting that certain plant foods contain toxins—specifically, teratogens—that are not especially harmful to adults, but that cause birth defects and induce abortions when pregnant women eat them. This finding provided her with a theoretically powerful selection pressure. That is, natural selection would have selected against ingestion of these foods during pregnancy. So any tendency not to ingest these toxins during pregnancy, if it had a genetic basis, would have had a chance at being retained in the human genome over long stretches of time. Thus, Profet had outlined a selection pressure that was theoretically strong enough to have forged a psychological adaptation causing pregnancy sickness. In essence, she had filled the Theoretical "Evidence" box of Figure 1 with a rationale for why pregnancy sickness may be an adaptation.

Profet (1988, 1992) also found numerous medical studies showing that women who experience more severe pregnancy sickness, and as a result consume far less teratogens, tend to have fewer miscarriages and fewer babies with birth defects compared with women who have milder pregnancy sickness. So in the modern environment, this hypothesized adaptation was documented as being directly linked with the fertility of the mother, and the health and future well-being of the developing embryo. This was clear evidence of fitness enhancement: Pregnancy sickness leads to differential reproductive success for those who experience it. Because these studies were numerous and of high quality, Profet had strong evidence in the Medical Evidence box to support pregnancy sickness as an adaptation.

Next, Profet (1988, 1992) noted that women with pregnancy sickness do not avoid all foods. They selectively avoid only certain types of foods. They especially avoid foods that are bitter or pungent, highly flavored, and novel—foods that normally contain the most teratogens. For example, women with pregnancy sickness tend to avoid toxin-containing substances like coffee, cabbage, and pepper. Profet had found strong evidence of design-specific psychology (Psychological Evidence box). The adaptation appears to have been tailored by natural selection for the specific purpose of avoiding teratogens, as women specifically avoid only toxin-containing foods.

Furthermore, Profet (1988, 1992) documented that pregnancy sickness typically begins only after the embryo has started forming its major organ systems, about 3 weeks after conception, exactly when it is most susceptible to the toxins present in bitter foods. Conversely, pregnancy sickness wanes when the embryo's organs are nearly complete and the absolute need for nutrients grows. Again, the hypothesized adaptation was showing signs of special design, this time through developmental specificity. The adaptation appeared designed to turn on and off at specific times, and seemed to solve one specific reproductive task but not others.

In her review of the literature on pregnancy sickness, Profet (1988, 1992) found that women's sense of smell becomes hypersensitive during pregnancy, and then less sensitive thereafter—more evidence of design specificity. This also suggested that pregnancy sickness might influence women's behavior by changing the physiology of their ability to smell. Indeed, Profet laid out a physiological pathway, from specific areas of the brain to the olfactory system of the nose, by which pregnancy sickness likely works. She had provided evidence in the Physiological Evidence box of Figure 1.

Humans have spent most of their evolutionary history living a nomadic lifestyle as hunters and gatherers. Human adaptations are designed to function in a type of culture where wild plants are eaten every day and wild game is killed on occasion. Profet (1988, 1992) noted that wild plants, not the processed foods eaten in modern environments, naturally contain very high levels of toxins. This meant that in the evolutionary past, there would have been strong selective pressures in favor of an adaptation to avoid toxin-containing plants while pregnant. This information gave Profet evidence in the Hunter-Gatherer Evidence box.

Profet (1988, 1992) also found that pregnancy sickness is a cross-cultural universal. Not every pregnant woman experiences all its

symptoms, but in every culture of which she was aware, Profet found that most women experience some symptoms—such as nausea, vomiting, or food aversions. Indeed, many cultures have created formal rituals surrounding pregnancy that function to decrease the digestion of plant toxins. For example, many hunting-and-gathering cultures in Africa and Oceania practice ritualistic clay eating during pregnancy. The types of clay pregnant women eat tend to detoxify the body and lead to a reduction in birth defects and abortions. Thus, evidence of pregnancy sickness as an adaptation was present in the Cross-Cultural Evidence box.

Profet (1988, 1992) placed pregnancy sickness in a cross-species perspective by relating the way humans naturally collect food to the way other animals collect food (Phylogenetic Evidence box). For example, species that frequently eat many different and new types of plants would be at extreme risk for ingesting plant toxins during pregnancy. Humans are a classic example of this type of food collector, as people are experimental omnivores that eat both plants and animals, and in their natural foraging habitat frequently eat new plant foods.

The nomological network of evidence identified and interrelated by Profet (1988, 1992) suggests that women possess an adaptation designed to protect their developing child from toxins. It is functional or fitness enhancing in that it solves the problem of avoiding toxins that can hurt a developing embryo. It is design-specific in that it emerges at specific times and serves as a solution to only this problem. Of course, the final evidence will come from molecular geneticists who find the genes associated with this adaptation, thereby filling the only box of evidence left unfilled by Profet. At this point, however, there is quite compelling evidence that the pregnancy-sickness phenotype is ultimately caused by an adaptation residing somewhere in the human female genotype (see also Flaxman & Sherman, 2000; Huxley, 2000). According to the tentative guidelines described earlier for evaluating the quality of evidence, the nomological network of pregnancy sickness as a psychological adaptation has both exemplary breadth and exemplary depth.

INCEST AVOIDANCE AS A PSYCHOLOGICAL ADAPTATION

Incest avoidance is the tendency for people to avoid sex with their own parents, children, or siblings. The nomological evidence for incest avoidance as a human adaptation is also rather extensive (see, e.g., Brown, 1991). In the Theoretical "Evidence" box can be placed findings indicating that mating with close kin tends to lead to recessive alleles becoming dominant—usually having deleterious effects on fitness. Indeed, several medical studies have shown that about 40% of incest-produced children have severe disabilities, or do not survive at all (filling the Medical Evidence box).

Brown (1991) noted that animals in the wild rarely mate with their parents or siblings, providing evidence in the Phylogenetic Evidence box suggesting that incest avoidance emerged early in human evolutionary history. Several studies document that being raised with opposite-sex peers before age 6 adaptively intensifies incest avoidance (Brown, 1991), providing evidence of developmental design specificity in the Psychological Evidence box. This effect also has been documented in numerous modern cultures (Cross-Cultural Evidence box), including Arab, Chinese, and Israeli cultures. Ethnographies consistently portray a foraging life in which incest is almost totally absent (Hunter-Gatherer Evidence box). There also have been studies documenting the physiological and pheromonal substrates of incest avoidance (Physiological Evidence box). Overall, we conclude that the nomological network of evidence for incest avoidance as a psychological adaptation has exemplary evidentiary breadth and extensive evidentiary depth.

MEN'S SHORT-TERM DESIRE FOR SEXUAL VARIETY AS A PSYCHOLOGICAL ADAPTATION

Schmitt and his colleagues (2003) recently suggested that men who pursue a short-term mating strategy tend to adaptively desire sexual variety in the form of large numbers of sex partners. Men who are long-term maters, and women who are short-term or long-term maters, tend not to desire large numbers of partners. Schmitt et al. marshaled a wide range of evidence in support of this adaptation in men's short-term mating psychology. For example, they documented across 10 major cultural regions that men universally desire larger numbers of partners than women (i.e., Cross-Cultural Evidence). Dozens of behavioral experiments, survey studies, and naturalistic observations confirm this fundamental finding (i.e., Psychological Evidence). Filling in the Theoretical "Evidence" box, they detailed the specifics of parental-investment theory, which provides the foundational logic for predicting men will express more promiscuous desires than women (see Trivers, 1985, for a review). In the Phylogenetic Evidence box, they noted that nearly all tests across nonhuman animal species support the view that the lesser-investing parents of a species (i.e., males within the human species) tend to pursue larger numbers of mating partners than the more-investing parents. According to several psychophysiological studies, testosterone and certain morphological characteristics may play key roles in the manifestation of this adaptation. Studies involving genetics, foraging cultures, and medical evidence, however, are relatively lacking within the nomological network of evidence for this adaptation. Overall, we view the evidence in favor of this adaptation as having only extensive evidentiary breadth and perhaps moderate evidentiary depth.

EASILY LEARNED FEAR OF SNAKES AS A PSYCHOLOGICAL ADAPTATION

Öhman and Mineka (2003) reviewed several lines of evidence that suggest humans possess a psychological adaptation to easily learn a fear of snakes. They detailed a wide range of psychological studies (Psychological Evidence box), cross-species comparisons (especially primate studies; Phylogenetic Evidence box), and potential physiological substrates (Physiological Evidence box) that converge to form a nomological framework that has, in our view, moderate levels of both evidentiary breadth and evidentiary depth.

CONCLUSIONS

Pregnancy sickness, incest avoidance, men's short-term desire for sexual variety, and an easily learned fear of snakes are just four examples of human adaptations that can be embedded within nomological networks of evidence. There are many others (see Bock & Cardew, 1997; Buss et al., 1998; Cartwright, 2000). Profet's (1988, 1992) studies on pregnancy sickness may be especially important and enlightening because she utilized almost all the "boxes" from our heuristic framework (Fig. 1) in her evidentiary analysis. In our view,

this was exemplary. Evolutionary psychologists too often focus on only one evidentiary box, working solely with college undergraduates, foragers, genetics, or cross-species studies, for instance. Even so, despite a very limited nomological network of evidence, many evolutionary psychologists make broad and unwarranted claims about the positive identification of human adaptations. It is our contention that psychological science would be better served if evolutionary researchers think outside their usual "box" and that, as a field, evolutionary psychology should expend more scholarly effort building cross-disciplinary networks of evidence for adaptation.

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