5. Which of the following is an example of gene-environment interaction?
   a. Yeh Lien experiences flashing syndrome, which mostly occurs in those of Asian heritage.
   b. Alfonso gets food poisoning from eating undercooked meat.
   c. Ted gets diabetes, which runs in his family, because he eats too much sugary food.
   d. Samantha has a food allergy to shellfish.
   e. Jordan has an autoimmune disorder that causes him to lose hair.

Practice FRQs

1. Explain the two positions in the nature-nurture debate.

Answer (2 points)
   1 point: Nature refers to the contributions of heredity and inborn, biologically determined aspects of behavior and mental processes.
   2 points: Nurture refers to the contributions of environment and the way individuals are raised.

2. What does it mean to say that the heritability of height is 90 percent? What does that tell us about the contribution of genetics to any one person's height?

   2 points

Evolutionary Psychology: Understanding Human Nature

Module Learning Objectives

- Describe evolutionary psychologists' use of natural selection to explain behavior tendencies.
- Discuss evolutionary explanations for gender differences in sexuality and mating preferences.
- Summarize the key criticisms of evolutionary psychology, and describe how evolutionary psychologists respond.
- Describe the biopsychosocial approach to individual development.

How do evolutionary psychologists use natural selection to explain behavior tendencies?

Behavioral geneticists explore the genetic and environmental roots of human differences. Evolutionary psychologists instead focus mostly on what makes us so much alike. They use Charles Darwin's principle of natural selection to understand the roots of behavior and mental processes. Richard Dawkins (2007) calls natural selection "arguably the most momentous idea ever to occur to a human mind." The idea, simplified, is this:

- Organisms' varied offspring compete for survival.
- Certain biological and behavioral variations increase organisms' reproductive and survival chances in their particular environment.
- Offspring that survive are more likely to pass their genes to ensuing generations.
- Thus, over time, population characteristics may change.

To see these principles at work, let's consider a straightforward example in foxes.

Natural Selection and Adaptation

A fox is a wild and wary animal. If you capture a fox and try to befriend it, be careful. Stick your hand in the cage end, if the timid fox cannot flee, it may snap on your fingers. Russian scientist Dmitry Belyaev wondered how our human ancestors had domesticated dogs from their equally wild wolf forebears. Might he, within a comparatively short stretch of time, accomplish a similar feat by transforming the fearful fox into a friendly fox?
To find out, Belova set to work with 30 male and 100 female foxes. From their offspring he selected and mated the largest 5 percent of males and 20 percent of females. (He measured tameness by the foxes' responses to attempts to food, handle, and stroke them.) Over more than 30 generations of foxes, Belova and his successor, Lyudmila Tit, repeated that simple procedure. Forty years and 45,000 foxes later, they had a new breed of foxes that, in Thrush's (1999) words, are "docile, eager to please and, unmistakably domesticated.... Before our eyes, 'the Beast' has turned into 'beauty,' as the aggressive behavior of our breed's wild ancestors entirely disappeared." So friendly and eager for human contact are they, so inclined to whimper to attract attention and to lick people like affectionate dogs, that the cash-strapped institute seized on it as a racket—marketing its foxes to people as house pets.

Over time, traits that are selected confer a reproductive advantage on an individual or a species and will prevail. Animal breeding experiments manipulate genetic selection and show its power. Dog breeders have given us shepherd dogs that herd, retrievers that retrieve, trackers that track, and pointers that point (Froom et al., 1997). Psychologists, too, have bred animals to be secure or reactive, quick learners or slow.

Does the same process work with naturally occurring selection? Does natural selection explain our human tendencies? Nature has indeed selected advantageous variations from the new gene combinations produced at each human conception and the mutations (random errors in gene replication) that sometimes result. But the light genetic leash that predisposes a dog's retrieving, a cat's pouncing, or an ar's nest building is looser on humans. The genes selected during our ancestral history provide more than a long leash; they endow us with a great capacity to learn and therefore to adapt to life in varied environments, from the tundra to the jungle. Genes and experience together wire the brain. Our adaptive flexibility in responding to different environments contributes to our fitness—our ability to survive and reproduce.

Evolutionary Success Helps Explain Similarities

Although our person-to-person differences grab attention, we humans are also strikingly alike. As brothers and sisters in one great human family, we all wake and sleep, think and speak, hunger and thirst. We smile when happy and favor what's familiar more than what is foreign. We return favors, fear snakes, grieve death, and, as social animals, have a need to belong. Beneath our differing skin, we all are kin. Evolutionary psychologist Steven Pinker (2002, p. 73) has noted that it is no wonder our emotions, drives, and reasoning have a "common logic across cultures." Our shared human traits were shaped by natural selection acting over the course of human evolution.

Our Genetic Legacy

Our behavioral and biological similarities arise from our shared human genome, our common genetic profile. No more than 5 percent of the genetic differences among humans arise from population group differences. Some 95 percent of genetic variation exists within populations (Rosenberg et al., 2002). The typical genetic difference between two Inuit of the same kind of people, or between two Kenyans is much greater than the average difference between the two groups. Thus, if a worldwide catastrophe only Icelander Kenyans survived the human species would suffer only "a trivial reduction" (in its genetic diversity (Leventow, 1982).

And how did we develop this shared human genome? At the dawn of human history, our ancestors faced certain questions: Who is my sed? Who takes care of me? What food should I eat? To whom should I love? Some individuals answered those questions more successfully than others. For example, women who experienced nausea in the first critical first months of pregnancy were predisposed to avoid certain bitter, strongly flavored, and novel foods. Avoiding such foods has survival value, since they are the very foods most often toxic to embryonic development (Schmitt & Picker, 2004). Early humans disposed to eat nourishing rather than poisonous foods survived to contribute their genes to later generations. Those who desired leopards' "nice to pet" often did not.

Similarly successful were those whose mate helped them produce and nurture offspring. Over generations, the genes of individuals not so disposed tended to be lost from the human gene pool. As success-enhancing genes continued to be selected, behavioral tendencies and thinking and learning capacities emerged that prepared our Stone Age ancestors to survive, reproduce, and send their genes into the future, and into you.

Across our cultural differences, we even share a "universal moral grammar," notes evolutionary psychologist Marc Hauser (2006, 2009). Men and women, young and old, liberal and conservative, living in Sydney or Seoul, all respond negatively when asked, "If a lethal gas is leaking into a vent and is headed toward a room with seven people, is it okay to push someone into the vent—saving the seven but killing the one?" And they all respond more approximately when asked if it is okay to allow someone to fall into the vent, again sacrificing one life but saving seven. Our shared moral instincts survive from a distant past where we lived in small groups in which direct harm-doing was punished, argues Hauser. For all such universal human tendencies, from our intense need to give parental care to our shared fears and lusts, evolutionary theory proposes a one-stop shopping explanation (Schloss, 2009).

As an inheritor of this prehistoric genetic legacy, we are predisposed to behave in ways that promoted our ancestors' survival and reproducing. But in some ways, we are biologically prepared for a world that no longer exists. We love the tastes of sweets and fats, which prepared our ancestors to survive famines, and we breed our cats from school cafeterias, fast-food outlets, and vending machines. With famine now rare in Western cultures, obesity is truly a growing problem. Our natural dispositions, rooted deep in history, are mismatched with today's junk-food environment and today's threats such as climate change (Coleman & Dettman, 2003).

Evolutionary Psychology Today

Darwin's theory of evolution has been an organizing principle for biology for a long time. Jared Diamond (2001) notes, "Virtually no contemporary scientists believe that Darwin was basically wrong." Today, Darwin's theory lives on in the so-called Darwinian revolution in psychology. In concluding On the Origin of Species, Darwin anticipated this, foreseeing "open fields for far more important researches. Psychology will be based on a new foundation" (1859, p. 346).

In modules to come, we'll address questions that intrigue evolutionary psychologists, such as why infants start to fear strangers about the time they become mobile. Why are birds bigger and fatter, so much less likely than unrelated birds to abuse and murder the children with whom they share a home? Why do so many more people have phobias about spiders, snakes, and heights than about animal dangers, such as guns and electricity? And why do we fear air travel so much more than driving?

To see how evolutionary psychologists think and reason, let's pause now to explore their answers to these questions: How are men and women alike? How and why does men's and women's sexuality differ?

An Evolutionary Explanation of Human Sexuality

How might an evolutionary psychologist explain gender differences in sexuality and mating preferences?

Having faced many similar challenges throughout history, men and women have adapted in similar ways. Whether male or female, we eat the same foods, avoid the same predators, and perceive, learn, and remember similarly. It is only in those domains where we have faced differing adaptive challenges—most obviously in behaviors related to reproduction—that we differ, say evolutionary psychologists.
Gender Differences in Sexuality

And differ we do. Consider men and women's sex drives, who think more about sex? Menstruates more often? Initiates more sex? Views more pornography? The answers worldwide: no, no, and no (Baumeister et al., 2001; Lippa, 2009; Peterson & Hyde, 2005). No surprise, then, that an international survey of more than 200,000 people in 53 nations, men and women, all strongly agreed that I have a strong sex drive and it doesn't make much to get me excited (Lippa, 2008).

Indeed, with few exceptions anywhere in the world, reported cross-cultural psychologist Marshall Segal and his colleagues (1990, p. 245), "males are more likely than females to initiate sexual activity." Men also have a lower threshold for perceiving warm responses as a sexual come-on. In study after study, men more often than women attribute a woman's friendliness to sexual interest (Abbey, 1987; Johnson, 1991). Mistaking women's friendliness as a come-on helps but does not excuse—men's greater sexual aggressiveness (Kollars & Gross, 2007). The uncertain results can run from sexual harassment to date rape.

Natural Selection and Mating Preferences

Evolutionary psychologists use natural selection to explain why—worldwide—women's approach to sex is usually more relational, and men's more reproductive (Schmitt, 2005, 2007). The explanation goes like this: While a woman usually produces and nurses one infant at a time, a male can spread his genes through other females. Our natural settings are our gene's way of reproducing themselves. In our ancestral history, women most often sent their genes into the future by pairing widely, men by pairing tightly. "Humans are living fossils—collections of mechanisms produced by prior selection pressures," said evolutionary psychologist David Buss (1995).

And what do heterosexual men and women find attractive in a mate? Some desired traits, such as a woman's youthful appearance, cross place and time (Buss, 1994). Evolutionary psychologists say that men, who came to be drawn to healthy, fertile, attractive women—women with smooth skin and a youthful shape suggesting many childbearing years to come—stood a better chance of passing their genes into the future. And sure enough, men feel most attracted to women whose waist-to-hip ratio (thanks to their genes or their surroundings) are roughly 0.7, a third narrower than their hips—a sign of future fertility (Peiloux et al., 2010). Moreover, past evolutionary psychologists predict, men are most attracted to women whose ages in the ancestral past (when evolution began later than today would be) was associated with peak fertility (Kennic et al., 2009). Thus, teen boys are most excites by a woman several years older than themselves, whereas men prefer women around their own age, and older men prefer younger women. This pattern consistently appears across European single ads, Indian matrimonial ads, and marriage records from North and South America, Africa, and the Philippines (Singh, 1988; Singh & Randall, 1983).

Women, in turn, prefer stick-around dads over likely dads. They are attracted to men who seem mature, dominant, bold, and affluent, with a potential for long-term mating and investment in their joint offspring (Gangestad & Simpson, 2000; Singh, 1986). In one study of hundreds of Walsh pedestrians, men catted a woman to see if she was Sexually attractive whether picture at a wheel of a humble Ford Fiestas or a swanky Bentley. Women, however, found the man more attractive if he was in the luxury car (Dunn & Searle, 2010). In another study, men were skillfully discerned which men most liked looking at baby pictures, and they tasted those who were higher in potential long-term mates (Roney et al., 2006). From an evolutionary perspective, such attitudes construe a man's capacity to support and protect a family (Buss, 1996, 2009; Geary, 1998).

Thinking Critically About

The Evolutionary Perspective on Human Sexuality

What are the key criticisms of evolutionary psychology, and how do evolutionary psychologists respond?

Evolutionary psychology says some critics, start with an effect (such as the gender sexuality difference and works backward to propose an explanation. They invite us to imagine a different result and reason backward. If men were uniformly loyal to their mates, might we not reason that the children of these commitments, survive and perpetuate their genes? Might not men also be better off bonded to one woman—both to increase their odds of reproduction and to keep her from the advances of competing men? Might not a ritualized bond—a marriage—also spare women from chronic mate-hunting? Such speculations are, in fact, evolutionary explanations for why humans tend to pair off monogamously (Gray & Anderson, 2011). One can hardly look at this explanation, which is, said paleontologist Stephen Jay Gould (1997), "more speculation [and] guesswork in the cocktail party milieu."

Some also worry about the social consequences of evolutionary psychology. Does it suggest a genetic determinism that strikes at the heart of progressive efforts to remake society? (Pace, 1999)? Does it undermine our moral responsibilities? (Buss, 2005, 2009)? Could it be used to rationalize "high-status men marrying a series of young, pretty women" (Looy, 2001)?

Others argue that evolutionary explanations blur the line between genetic legacy and social-cultural tradition. Show Allee, Agost and Wendy Wood (1992), Looy, 2001, a culture with gender inequality—a woman are providers and men are homemakers—and they will show you a culture where men strongly desire youth and domestic skills in their potential mates, and where women seek status and earning potential in their mates. Show Hazel and Wood a culture with gender equality, and they will show you a culture with ample gender differences in mate preferences.
When Galileo assembled evidence that the Earth revolved around the Sun, not vice versa, he did not offer irrefutable proof for his theory. Rather, he offered a coherent explanation of observations, such as the changing shadows cast by the Moon's mountains that made sense, that hung together. Darwin's theory of evolution likewise is a coherent explanation and explained things in a way view of natural history. It offers an organizing principle that unifies various observations.

Collins is not the only person of faith to find the scientific idea of human origins congenial with his spirituality. In the 18th century, St. Augustinow (quoted by Wilford, 1999) wrote, “The universe was brought into being in a less than fully formed state, but was gifted with forces and life forms.” Some 1600 years later, Pope John Paul II in 1996 welcomed a science accepted by scientists, following a series of breakthroughs in fields of knowledge, and the human and the creature. It boggles the mind—the entire universe peeling out of a thin Big Bang been the tiniest bit less, the universe would have collapsed back on itself. Had it met Sir Martin Rees has described just Six Numbers (1998), any one of which changed ever stronger or weaker, or had the weight of a carbon proton been a wee bit different, our universe just wouldn't have worked.

What caused this almost too-good-to-be-true, finely tuned universe? Why is there something rather than nothing? How did it come to be, in the words of Harvard-Smithsonian who had been expressly designed to produce intelligent, sentient beings? Is there a benevolent born and we just happen to be the lucky inhabitants of one that, by chance, was exactly tuned to give birth to us? Or does that idea violate Occam’s razor, the principle that the scientific principle is appropriate, suggested philosopher Ludwig Wittgenstein: “Where one cannot speak, thereof one must be silent” (1922, p. 189).

Rather than fearing science, we can welcome its enlarging our understanding and awakening our sense of awe. In The Fragile Species, Lewis Thomas (1978) described his utter amazement that the Earth in time gave rise to bacteria and eventually to Bech's Mass in B Minor. In a short 3 billion years, life on Earth has come from nothing to structures human brain. Arosa no difference from those in a rock somewhat formed dynamic entities—systems-as. Although we appear to have been created from dust, over eons of time, the end result is a priceless creature, one rich with potential beyond our imagining.

Before You Move On

ASK YOURSELF
How do evolutionary psychologists use natural selection to explain behavior tendencies?

TEST YOURSELF
How does the biopsychosocial approach explain our individual development?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 15 Review

How do evolutionary psychologists use natural selection to explain behavior tendencies?

- Evolutionary psychologists seek to understand how our traits and behavior tendencies are shaped by natural selection, as genetic variations increasing the odds of reproducing and surviving are most likely to be passed on to future generations.
- Some genetic variations arise from mutations (random errors in gene replication) and others from new gene combinations at conception.
- Humans share a genetic legacy and are predisposed to behave in ways that promoted our ancestors’ surviving and reproducing.
- Charles Darwin’s theory of evolution is an organizing principle in biology. He anticipated today’s application of evolutionary principles in psychology.

How might an evolutionary psychologist explain gender differences in sexual activity and mating preferences?

- Men tend to have a recreational view of sexual activity, whereas women tend to have a relational view.
- Evolutionary psychologists reason that men’s attraction to multiple healthy, fertile—appealing partners increases their chances of spreading their genes widely.
- Because women incubate and nurse babies, they increase their own and their children’s chances of survival by searching for mates with the potential for long-term investment in their joint offspring.

"The causes of why history forms evolve the mind of faith reasoning." —Stevens J. E. Skull, Please or Autism: Society and Religion in the Puzzles of Life, 1998

* * *
What are the key criticisms of evolutionary psychology, and how do evolutionary psychologists respond? 

- Critics argue that evolutionary psychologists (1) start with an effect and work backward to an explanation, (2) do not recognize social and cultural influences, and (3) absolve people from taking responsibility for their sexual behavior. 
- Evolutionary psychologists respond that understanding our predispositions can help us overcome them. They also cite the value of testable predictions based on evolutionary principles, as well as the coherence and explanatory power of those principles.

Multiple-Choice Questions 

1. Which of the following refers to an effect of life experience that leaves a molecular mark that affects gene expression? 
   a. Epigenetics 
   b. Adaptation 
   c. Evolution 
   d. Natural selection 
   e. Universal moral grammar

2. Which of the following best describes genetic mutation? 
   a. Random errors in gene replication 
   b. The study of the mind's evolution 
   c. The study of behavioral evolution 
   d. Raising on successful, inherited traits 
   e. Survival of the genetically successful

Practice FRQs 

1. Explain four of the important ideas behind natural selection. 

   Answer: 
   1 point: Organisms' varied offspring compete for survival. 
   1 point: Certain biological and behavioral variations increase an organism's reproductive and survival chances in a particular environment. 
   1 point: Offspring that survive are more likely to pass their genes to ensuing generations. 
   1 point: Over time, population characteristics may change.

2. Explain the three major influences on individual development, according to the biopsychosocial approach. (3 points)

   endocrine [EN-duh-kron] system, p. 90 
   hormones, p. 90 
   adrenal [ah-DREN-uhl] glands, p. 91 
   pituitary gland, p. 91 
   larynx [LAR-eenz], p. 94 
   electroencephalogram (EEG), p. 95 
   CT (computed tomography) scan, p. 95 
   PET (positron emission tomography) scan, p. 95 
   MRI (magnetic resonance imaging), p. 95 
   fMRI (functional MRI), p. 96 
   brainstorm, p. 97 
   medulla [meh-DUL-uh], p. 97 
   thalamus [THAL-uh-mus], p. 97 
   reticular formation, p. 98 
   cerebellum [ser-e-bell-uhm], p. 98 
   limbic system, p. 98 
   amygdala [ah-MIG-duh-lah], p. 99 
   hypothalamus [hi-POH-tha-luh-mus], p. 99 
   cerebral [ser-EE-bruhl] cortex, p. 104 
   glial cells (glia), p. 104 
   parietal lobes, p. 105 
   occipital lobes, p. 105 
   temporal lobes, p. 105 
   motor cortex, p. 105 
   somatosensory cortex, p. 105 
   association areas, p. 109 
   plasticity, p. 111 
   neurogenesis, p. 112 
   corpus callosum [kor-PUS kah-LOW-suhm], p. 114 
   split brain, p. 114 
   awareness, p. 118 
   cognitive neuroscience, p. 119 
   dual processing, p. 120 
   behavioral genetics, p. 124 
   environment, p. 124 
   cannabinoid system, p. 124 
   DNA (deoxyribonucleic acid), p. 124 
   genes, p. 124 
   genome, p. 124 
   identical twins, p. 125 
   fraternal twins, p. 125 
   molecular genetics, p. 129 
   heritability, p. 129 
   interaction, p. 131 
   epigenetics, p. 131 
   evolutionary psychology, p. 135 
   natural selection, p. 135 
   mutation, p. 136

Key Contributors to Remember 

Paul Broca, p. 110 
Carl Wernicke, p. 110

Roger Sperry, p. 114 
Michael Gazzaniga, p. 114

Charles Darwin, p. 135

Review Unit III