5. Which of the following is an example of gene-environment interaction?

a. Yeh Lin experiences flushing 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.

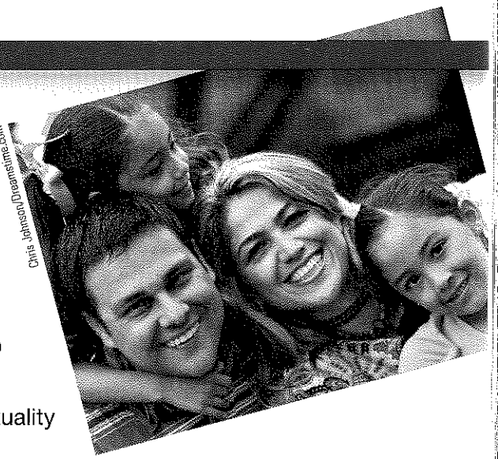
1 point: Nurture refers to the contributions of environment and the way individuals are raised.

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)

Module 15

Evolutionary Psychology: Understanding Human Nature


Chris Johnson/Dreamstime.com

Module Learning Objectives

- **15-1** Describe evolutionary psychologists' use of natural selection to explain behavior tendencies.
- **15-2** Discuss evolutionary explanations for gender differences in sexuality and mating preferences.
- **15-3** Summarize the key criticisms of evolutionary psychology, and describe how evolutionary psychologists respond.
- **15-4** Describe the biopsychosocial approach to individual development.

15-1 How do evolutionary psychologists use natural selection to explain behavior tendencies?

Behavior 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.

evolutionary psychology the study of the evolution of behavior and the mind, using principles of natural selection.

natural selection the principle that, among the range of inherited trait variations, those contributing to reproduction and survival will most likely be passed on to succeeding generations.

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 and, if the timid fox cannot flee, it may snack 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?


Eric Isselée/Shutterstock

To find out, Belyaev set to work with 30 male and 100 female foxes. From their offspring he selected and mated the tamest 5 percent of males and 20 percent of females. (He measured tameness by the foxes' responses to attempts to feed, handle, and stroke them.) Over more than 30 generations of foxes, Belyaev and his successor, Lyudmila Trut, repeated that simple procedure. Forty years and 45,000 foxes later, they had a new breed of foxes that, in Trut'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 herd'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 a way to raise funds—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 powers. Dog breeders have given us sheepdogs that herd, retrievers that retrieve, trackers that track, and pointers that point (Plomin et al., 1997). Psychologists, too, have bred animals to be serene or reactive, quick learners or slow.

mutation a random error in gene replication that leads to a change.

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 tight genetic leash that predisposes a dog's retrieving, a cat's pouncing, or an ant'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 Icelandic villagers or between two Kenyans is much greater than the *average* difference between the two groups. Thus, if after a worldwide catastrophe only Icelanders or Kenyans survived, the human species would suffer only "a trivial reduction" in its genetic diversity (Lewontin, 1982).

And how did we develop this shared human genome? At the dawn of human history, our ancestors faced certain questions: Who is my ally, who my foe? What food should I eat? With whom should I mate? Some individuals answered those questions more successfully than others. For example, women who experienced nausea in the critical first three 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 & Pilcher, 2004). Early humans disposed to eat nourishing rather than poisonous foods survived to contribute their genes to later generations. Those who deemed leopards "nice to pet" often did not.

Similarly successful were those whose mating 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 approvingly when asked if it's 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 inheritors of this prehistoric genetic legacy, we are predisposed to behave in ways that promoted our ancestors' surviving and reproducing. But in some ways, we are biologically prepared for a world that no longer exists. We love the taste of sweets and fats, which prepared our ancestors to survive famines, and we heed their call 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 (Colarelli & Dettman, 2003).

FYI

Despite high infant mortality and rampant disease in past millennia, not one of your countless ancestors died childless.

Evolutionary Psychology Today

Darwin's theory of evolution has been an organizing principle for biology for a long time. Jared Diamond (2001) noted, "Virtually no contemporary scientists believe that Darwin was basically wrong." Today, Darwin's theory lives on in the *second Darwinian revolution:* the application of evolutionary principles to 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 biological fathers so much less likely than unrelated boyfriends 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 more dangerous threats, 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 two questions: How are men and women alike? How and why does men's and women's sexuality differ?

FYI

Those who are troubled by an apparent conflict between scientific and religious accounts of human origins may find it helpful to recall from Module 2 that different perspectives of life can be complementary. For example, the scientific account attempts to tell us *when* and *how;* religious creation stories usually aim to tell about an ultimate *who* and *why.* As Galileo explained to the Grand Duchess Christina, "The Bible teaches how to go to heaven, not how the heavens go."

An Evolutionary Explanation of Human Sexuality

15-2 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.

What evolutionary psychologists study Each word's size in this "word cloud" shows how frequently it has appeared in evolutionary psychology article titles. (Derived by Gregory Webster, Peter Jonason, and Tatiana Schember [2009] from all articles published in *Evolution and Human Behavior* between 1979 and 2008.) Webster, G. D., Jonason, P. K., & Schember, T. O. (2009). Hot topics and popular papers in evolutionary psychology: Analyses of title words and citation counts in *Evolution and Human Behavior*, 1979–2008. *Evolutionary Psychology, 7*, 348–362.

Gender Differences in Sexuality

And differ we do. Consider men's and women's sex drives. Who thinks more about sex? Masturbates more often? Initiates more sex? Views more pornography? The answers worldwide: *men, men, men,* and *men* (Baumeister et al., 2001; Lippa, 2009; Petersen & Hyde, 2009). No surprise, then, that in one BBC survey of more than 200,000 people in 53 nations, men everywhere more strongly agreed that "I have a strong sex drive" and "It doesn't take much to get me sexually excited" (Lippa, 2008).

Indeed, "with few exceptions anywhere in the world," reported cross-cultural psychologist Marshall Segall and his colleagues (1990, p. 244), "males are more likely than females to initiate sexual activity."

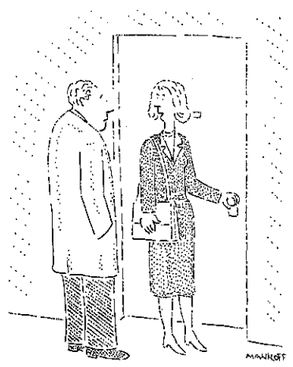
Men also have a lower threshold for perceiving warm responses as a sexual come-on. In study after study, men more often than women attribute a woman's friendliness to sexual interest (Abbey, 1987; Johnson et al., 1991). Misattributing women's cordiality as a come-on helps explain—but does not excuse—men's greater sexual assertiveness (Kolivas & Gross, 2007). The unfortunate results can range 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 recreational (Schmitt, 2005, 2007). The explanation goes like this: While a woman usually incubates and nurses one infant at a time, a male can spread his genes through other females. Our natural yearnings are our genes' way of reproducing themselves. In our ancestral history, women most often sent their genes into the future by pairing wisely, men by pairing widely. "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 were drawn to healthy, fertile-appearing women—women with smooth skin and a youthful shape suggesting many childbearing years to come—stood a better chance of sending their genes into the future. And sure enough, men feel most attracted to women whose waists (thanks to their genes or their surgeons) are roughly a third narrower than their hips—a sign of future fertility (Perilloux et al., 2010). Moreover, just as evolutionary psychology predicts, men are most attracted to women whose ages in the ancestral past (when ovulation began later than today) would be associated with peak fertility (Kenrick et al., 2009). Thus, teen boys are most excited by a woman several years older than themselves, mid-twenties men prefer women around their own age, and older men prefer younger women. This pattern consistently appears across European singles ads, Indian marital ads, and marriage records from North and South America, Africa, and the Philippines (Singh, 1993; Singh & Randall, 2007).

Women, in turn, prefer stick-around dads over likely cads. 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, 1995). In one study of hundreds of Welsh pedestrians, men rated a woman as equally attractive whether pictured at a wheel of a humble Ford Fiesta or a swanky Bentley. Women, however, found the man more attractive if he was in the luxury car (Dunn & Searle, 2010). In another experiment, women skillfully discerned which men most liked looking at baby pictures, and they rated those men higher as potential long-term mates (Roney et al., 2006). From an evolutionary perspective, such attributes connote a man's capacity to support and protect a family (Buss, 1996, 2009; Geary, 1998).



"I had a nice time, Steve. Would you like to come in, settle down, and raise a family?"

There is a principle at work here, say evolutionary psychologists: Nature selects behaviors that increase the likelihood of sending one's genes into the future. As mobile gene machines, we are designed to prefer whatever worked for our ancestors in their environments. They were predisposed to act in ways that would produce grandchildren—had they not been, we wouldn't be here. And as carriers of their genetic legacy, we are similarly predisposed.

Without disputing nature's selection of traits that enhance gene survival, critics see some problems with this explanation of our mating preferences. They believe that the evolutionary perspective overlooks some important influences on human sexuality (see Thinking Critically About: The Evolutionary Perspective on Human Sexuality).

Thinking Critically About

The Evolutionary Perspective on Human Sexuality

15-3 What are the key criticisms of evolutionary psychology, and how do evolutionary psychologists respond?

Evolutionary psychology, say some critics, starts 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 committed, supportive fathers would more often survive to perpetuate their genes? Might not men also be better off bonded to one woman—both to increase their odds of impregnation and to keep her from the advances of competing men? Might not a ritualized bond—a marriage—also spare women from chronic male harassment? Such suggestions are, in fact, evolutionary explanations for why humans tend to pair off monogamously (Gray & Anderson, 2010). One can hardly lose at hindsight explanation, which is, said paleontologist Stephen Jay Gould (1997), mere "speculation [and] guesswork in the cocktail party mode."

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 (Rose, 1999)? Does it undercut moral responsibility (Buller, 2005, 2009)? Could it be used to rationalize "high-status men marrying a series of young, fertile women" (Looy, 2001)?

Others argue that evolutionary explanations blur the line between genetic legacy and social-cultural tradition. Show Alice Eagly and Wendy Wood (1999; Eagly, 2009) a culture with gender inequality—where men are providers and women are homemakers—and they will show you a culture where men strongly desire youth and domestic skill in their potential mates, and where women seek status and earning potential in their mates. Show Eagly and Wood a culture with gender equality, and they will show you a culture with smaller gender differences in mate preferences.

Much of who we are is *not* hard-wired, agree evolutionary psychologists. "Evolution forcefully rejects a genetic determinism," insists one research team (Confer et al., 2010). Evolutionary psychologists reassure us that men and women, having faced similar adaptive problems, are far more alike than different, and that humans have a great capacity for learning and social progress. Indeed, natural selection has prepared us to flexibly adjust and respond to varied environments, to adapt and survive, whether we live in igloos or tree houses. Further, they agree that cultures vary, cultures change, and cultural expectations can bend the genders. If socialized to value lifelong commitment, men may sexually bond with one partner; if socialized to accept casual sex, women may willingly have sex with many partners.

Evolutionary psychologists acknowledge struggling to explain some traits and behaviors such as same-sex attraction and suicide (Confer et al., 2010). But they also point to the explanatory and predictive power of evolutionary principles. Evolutionary psychologists predict, and have confirmed, that we tend to favor others to the extent that they share our genes or can later return our favors. They predict, and have confirmed, that human memory should be well-suited to retaining survival-relevant information (such as food locations, for which females exhibit superiority). They predict, and have confirmed, various other male and female mating strategies.

Evolutionary psychologists also remind us that the study of how we came to be need not dictate how we ought to be. Understanding our propensities sometimes helps us overcome them.

> "It is dangerous to show a man too clearly how much he resembles the beast, without at the same time showing him his greatness. It is also dangerous to allow him too clear a vision of his greatness without his baseness. It is even more dangerous to leave him in ignorance of both." -Blaise Pascal, Pensées, 1659

"Is it not stirring to understand how the world actually works—that white light is made of colors, that color measures light waves, that transparent air reflects light . . . ? It does no harm to the romance of the sunset to know a little about it." -CARL SAGAN, *SKIES OF OTHER WORLDS*, 1988

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 for a variety of observations, such as the changing shadows cast by the Moon's mountains. His explanation eventually won the day because it described and explained things in a way that made sense, that hung together. Darwin's theory of evolution likewise is a coherent 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 fifth century, St. Augustine (quoted by Wilford, 1999) wrote, "The universe was brought into being in a less than fully formed state, but was gifted with the capacity to transform itself from unformed matter into a truly marvelous array of structures and life forms." Some 1600 years later, Pope John Paul II in 1996 welcomed a science-religion dialogue, finding it noteworthy that evolutionary theory "has been progressively accepted by researchers, following a series of discoveries in various fields of knowledge."

Meanwhile, many people of science are awestruck at the emerging understanding of the universe and the human creature. It boggles the mind—the entire universe popping out of a point some 14 billion years ago, and instantly inflating to cosmological size. Had the energy of this Big Bang been the tiniest bit less, the universe would have collapsed back on itself. Had it been the tiniest bit more, the result would have been a soup too thin to support life. Astronomer Sir Martin Rees has described *Just Six Numbers* (1999), any one of which, if changed ever so slightly, would produce a cosmos in which life could not exist. Had gravity been a tad bit 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 astrophysicist Owen Gingerich (1999), "so extraordinarily right, that it seemed the universe had been expressly designed to produce intelligent, sentient beings"? Is there a benevolent superintelligence behind it all? Have there instead been an infinite number of universes born and we just happen to be the lucky inhabitants of one that, by chance, was exquisitely fine-tuned to give birth to us? Or does that idea violate *Occam's razor,* the principle that we should prefer the simplest of competing explanations? On such matters, a humble, awed, scientific silence is appropriate, suggested philosopher Ludwig Wittgenstein: "Whereof 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 (1992) described his utter amazement that the Earth in time gave rise to bacteria and eventually to Bach's Mass in B Minor. In a short 4 billion years, life on Earth has come from nothing to structures as complex as a 6-billion-unit strand of DNA and the incomprehensible intricacy of the human brain. Atoms no different from those in a rock somehow formed dynamic entities that became conscious. Nature, says cosmologist Paul Davies (2007), seems cunningly and ingeniously devised to produce extraordinary, self-replicating, information-processing systems—us. 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.

"The causes of life's history [cannot] resolve the riddle of life's meaning." -STEPHEN JAY GOULD, *ROCKS OF AGES: SCIENCE AND RELIGION IN THE FULLNESS OF LIFE*, 1999

Before You Move On

▶ ASK YOURSELF

How have your heredity and your environment influenced who you are today? Can you recall an important time when you determined your own fate in a way that was at odds with pressure you felt from either your heredity or your environment?

▶ 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.

* * *

In this unit we have glimpsed an overriding principle: Everything psychological is simultaneously biological. We have focused on how our thoughts, feelings, and actions arise from our specialized yet integrated brain. In modules to come, we will further explore the significance of the biological revolution in psychology.

From nineteenth-century phrenology to today's neuroscience, we have come a long way. Yet what is unknown still dwarfs what is known. We can describe the brain. We can learn the functions of its parts. We can study how the parts communicate. But how do we get mind out of meat? How does the electrochemical whir in a hunk of tissue the size of a head of lettuce give rise to elation, a creative idea, or that memory of Grandmother?

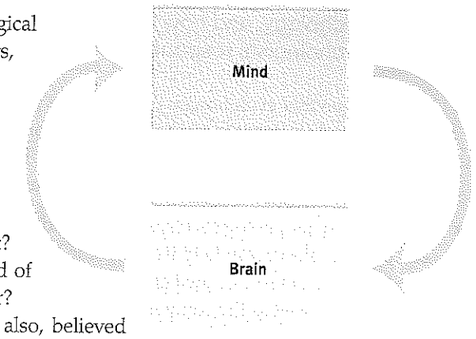


Figure 15.2
Mind and brain as holistic system In Roger Sperry's view, the brain creates and controls the emergent mind, which in turn influences the brain. (Think vividly about biting into a lemon and you may salivate.)

Much as gas and air can give rise to something different—fire—so also, believed Roger Sperry, does the complex human brain give rise to something different: *consciousness.* The mind, he argued, emerges from the brain's dance of ions, yet is not reducible to it. Cells cannot be fully explained by the actions of atoms, nor minds by the activity of cells. Psychology is rooted in biology, which is rooted in chemistry, which is rooted in physics. Yet psychology is more than applied physics. As Jerome Kagan (1998) reminded us, the meaning of the Gettysburg Address is not reducible to neural activity. Communication is more than air flowing over our vocal cords. Morality and responsibility become possible when we understand the mind as a "holistic system," said Sperry (1992) (**FIGURE 15.2**). We are not mere jabbering robots.

The mind seeking to understand the brain—that is indeed among the ultimate scientific challenges. And so it will always be. To paraphrase cosmologist John Barrow, a brain simple enough to be understood is too simple to produce a mind able to understand it.

Module 15 Review

15-1 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), 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.

15-2 How might an evolutionary psychologist explain gender differences in sexuality and mating preferences?

- Men tend to have a recreational view of sexual activity; women tend to have a relational view.
- Evolutionary psychologists reason that men's attraction to multiple healthy, fertile-appearing 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.

15-3 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.

15-4 What is included in the biopsychosocial approach to individual development?

- Individual development results from the interaction of biological, psychological, and social-cultural influences.
- Biological influences include our shared human *genome*; individual variations; prenatal environment; and sex-related genes, hormones, and physiology.
- Psychological influences include gene-environment interactions; the effect of early experiences on neural networks; responses evoked by our own characteristics, such as gender and personality; and personal beliefs, feelings, and expectations.
- Social-cultural influences include parental and peer influences; cultural traditions and values; and cultural gender norms.

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. Passing on successful, inherited traits
e. Survival of the genetically successful

3. Which of the following is true regarding the initiation of sexual activity?

a. Men are more likely to initiate sexual activity than women.
b. Women are more likely to initiate sexual activity than men.
c. The initiation of sexual activity for both men and women correlates with how many television sitcoms they viewed as children.
d. Men and women are equally likely to initiate sexual activity.
e. Who initiates sexual activity is largely determined by culture.

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)

Unit III Review

Key Terms and Concepts to Remember

biological psychology, p. 77
neuron, p. 78
dendrites, p. 78
axon, p. 78
myelin [MY-uh-lin] sheath, p. 78
action potential, p. 78
refractory period, p. 79
threshold, p. 80
all-or-none response, p. 80
synapse [SIN-aps], p. 80
neurotransmitters, p. 80
reuptake, p. 80
endorphins [en-DOR-fins], p. 82
agonist, p. 82
antagonist, p. 83
nervous system, p. 86
central nervous system (CNS), p. 86
peripheral nervous system (PNS), p. 86
nerves, p. 86
sensory (afferent) neurons, p. 86
motor (efferent) neurons, p. 86
interneurons, p. 87
somatic nervous system, p. 87
autonomic [aw-tuh-NAHM-ik] nervous system (ANS), p. 87
sympathetic nervous system, p. 87
parasympathetic nervous system, p. 87
reflex, p. 89
endocrine [EN-duh-krin] system, p. 90
hormones, p. 90
adrenal [ah-DREEN-el] glands, p. 91
pituitary gland, p. 91
lesion [LEE-zhuhn], 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
brainstem, p. 97
medulla [muh-DUL-uh], p. 97
thalamus [THAL-uh-muss], p. 97
reticular formation, p. 98
cerebellum [sehr-uh-BELL-um], p. 98
limbic system, p. 98
amygdala [uh-MIG-duh-la], p. 99
hypothalamus [hi-po-THAL-uh-muss], p. 99
cerebral [seh-REE-bruhl] cortex, p. 104
glial cells (glia), p. 104
frontal lobes, p. 105
parietal [puh-RYE-uh-tuhl] lobes, p. 105
occipital [ahk-SIP-uh-tuhl] lobes, p. 105
temporal lobes, p. 1050
motor cortex, p. 105
somatosensory cortex, p. 107
association areas, p. 109
plasticity, p. 111
neurogenesis, p. 112
corpus callosum [KOR-pus kah-LOW-sum], p. 114
split brain, p. 114
consciousness, p. 118
cognitive neuroscience, p. 119
dual processing, p. 120
behavior genetics, p. 124
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chromosomes, 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