EVOLUTIONARY PSYCHOLOGY 101

Glenn Geher, PhD

“At long last, a readable, accessible, user-friendly introduction to evolutionary psychology written by a rising star in the field. This book, filled with a broad array of fascinating topics, is bound to further whet the appetite of a growing number of students who have been inspired by this provocative, yet eminently testable approach to human behavior.”

Gordon G. Gallup, Jr., PhD
University at Albany

“A frolicking, down-to-earth, and informative introduction to the ever-evolving and controversial field of evolutionary psychology.”

Scott Barry Kaufman, PhD
Author, Ungifted: Intelligence Redefined

This is a concise and reader-friendly survey of the burgeoning field of evolutionary psychology (EP) and the controversies that surround it. Firmly grounded in the theoretical and research literature of EP, the book addresses the core theories, approaches, applications, and current findings that comprise this discipline.

It is unique in its interdisciplinary focus, which encompasses EP’s impact within the field of psychology and on other academic disciplines. Written in a lively, engaging style by an eminent evolutionary psychologist, the text examines psychological processes that facilitate human survival and those that may lead to reproductive benefits—sometimes even at a cost to survival. It covers a rich body of literature that provides insights into the role of sexual selection in shaping such human characteristics as the capacity for language, art, and music.

The text presents current evolution-based research on key behavioral domains within EP such as childhood development, courtship, intrasexual competition, sex, pair-bonding, parenting, familial relations, nonfamilial relations, aggression, and altruism. Considering the potential of EP to mitigate some of our greatest social problems, the book examines the ways in which EP can be applied to society and our understanding of such large-scale human areas as religion. It also offers a thoughtful, balanced approach to controversies in EP, such as those surrounding genetic determinism, racism, and sexism.

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Glenn Geher, PhD, is professor and chair of psychology at the State University of New York at New Paltz. He is also director of the university’s interdisciplinary Evolutionary Studies program, which was recently, along with a sister program at Binghamton University, awarded a large grant from the National Science Foundation. Dr. Geher is a past president of the Northeastern Evolutionary Psychology Society, the world’s second largest society dedicated to the study of human behavior from an evolutionary perspective. He has published 30 scholarly books, book chapters, and articles on evolutionary psychology, including Mating Intelligence, coedited with Geoffrey Miller. Dr. Geher also writes a popular blog for the international Evolutionary Studies Consortium, “Building Darwin's Bridges.” He was awarded the SUNY New Paltz Alumni Association’s Distinguished Teacher of the Year Award in 2007 as well as the SUNY Chancellor’s Excellence in Teaching Award in 2008.
For Kathy, my life’s solid rock.
And for Andrew and Megan—who make each day shine like the sun.
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Since its emergence in the late 1980s and early 1990s, the field of evolutionary psychology has captured the imaginations and passions of scholars and laypeople across the world. Often peppered with a dash of controversy, this approach to psychology may be seen as having more potential than any other area of the behavioral sciences to help us understand who we really are.

The basic claims of evolutionary psychologists are, in fact, modest when one considers that they are rooted in the highly accepted premises of modern evolutionary theory. At its core, evolutionary psychology is an approach to human behavior that takes evolutionary theory into account. Often, this means that behavioral patterns are examined in terms of how such patterns might have provided survival and/or reproductive benefits to our ancestors in the African savanna. For example, our preferences for sweet foods and fatty meats seem to tell of a time in human evolution when famine was common, and having a preference for fatty meats would have encouraged early hominids to make food choices that would have provided them an edge in the competition to survive. We now know these same food preferences well—as the preferences that lead to epidemic rates of obesity under the decidedly nonfamine conditions that typify modern societies.
In addition to studying psychological processes that clearly lead to survival, evolutionary psychologists are interested in processes that may lead to reproductive benefits—sometimes even at a cost to survival. In fact, this broad mechanism of evolutionary change, referred to as sexual selection, may well be the dominant force in helping us understand many uniquely human characteristics, such as our capacity for language, art, and music. In a recent exploration of male English poets, Dan Nettle found that those with poems rated highest in quality had significantly more sex partners than those poets whose work was just so-so (Nettle & Clegg, 2006). If evolution is all about survival, why do people spend countless hours writing novels, learning instruments, and climbing the world’s highest peaks? A rich body of literature in evolutionary psychology provides important insights into the role of sexual selection in having shaped the human mind.

Beyond addressing primary mechanisms of evolution as they pertain to human behavior, this book will summarize current research on many of the important content areas that have been elucidated by the work of evolutionary psychologists. These areas include child development, courtship, intrasexual competition, sex, pair-bonding, parenting, aggression, and altruism—all areas of human functioning that have been greatly illuminated by modern evolutionary psychology. These chapters provide a summary of how these domains of human functioning have been studied by evolutionary psychologists.

Given this area’s penchant for getting people to think deeply about who we are, a final section of this book deals with applications of evolutionary psychology to many important personal and social issues. This section also addresses content regarding the many controversies that surround this field. Further, a final chapter addresses thoughts about the future of evolutionary psychology. As stated in Garcia et al. (2011), the future of evolutionary psychology is unclear. One possible future for this field is that it connects the islands of the “Ivory Archipelago” (Wilson, 2007)
with its powerful framework and its tendency to cut across traditional academic boundaries. On the other hand, as challenges to the field show up repeatedly in scholarly circles, evolutionary psychology may be on a course toward increased controversy and intellectual alienation. This book ends with a discussion of the possible future of evolutionary psychology.
In 2009, Scott Barry Kaufman, my long-time collaborator, coauthor, and long-lost other brother, talked with me about this exciting new series being published by Springer—the Psychology 101 Series—and he talked about this really cool guy, James C. Kaufman (no immediate genetic relation), who was editing the series and whom Scott knew from graduate school at Yale. “Glenn, you’ve got to write *Evolutionary Psychology 101!* I spoke with James about it and he’s psyched about the idea!” I like how Scott operates! I want to give him huge thanks for helping initiate the process that led to the book you now hold in your hands.

So Scott introduced me to the good James C. Kaufman, who immediately struck me as just as positive, forward-thinking, and resourceful as Scott led me to believe. James put me in touch with Springer editor Nancy S. Hale, and soon thereafter, this book got off the ground. Both James and Nancy have shown the kind of supportive and clear guidance that typifies the best of collaborators on any project. I am deeply appreciative of their efforts.

My interest in evolutionary psychology emerged based on an undergraduate class I took on animal behavior in the psychology department at the University of Connecticut in 1990, taught by Benjamin Sachs. This course was amazing—it was the first and only course I took as an undergraduate that made me see the interrelationship between many disparate phenomena. Why do South American coqui frogs call the way they do? Why are male
elephant seals so much larger than their female counterparts? Why do female rats seem to try to physically prevent males from sexual access, even during the peak of their ovulatory cycle? It was amazing how the evolutionary perspective helped us understand all these phenomena within a single framework. After I took that course, Dr. Sachs let me work in his rat lab, focusing on the mating behavior of rats. Without question, it was these experiences that started my thinking on how evolution holds the key to understanding what behavior is all about. Many thanks, Dr. Sachs!

In graduate school at the University of New Hampshire (UNH), my two advisers, Jack Mayer and Becky Warner, played significant roles in helping me develop as a social scientist. Neither scholar is an evolutionary psychologist per se, but both were highly supportive of my interest in evolutionary psychology, and my ability to integrate evolutionary-based concepts into my research was fostered as a result. Many thanks to Jack and Becky, who strongly supported my intellectual trajectory!

Also while I was in graduate school, it’s noteworthy that David Buss, then at the University of Michigan, came to UNH to give a talk on his then-new book, *The Evolution of Desire*. Like me, he was studying issues of human intimate relationships—but he called it “human mating”—and he focused fully on evolutionary accounts in explaining his data and research in general. That was it for me—I was hooked. His vision and approach to psychology allowed me to see for the first time how the integrative approach that Ben Sachs took in the study of nonhumans could be applied to human behavior. That’s when I formally realized that evolutionary psychology is, for me, the only way to go!

My wife, Kathy, has been not only supportive in discussing topics related to evolutionary psychology but she’s also consistently been supportive of this book project, allowing me to grab pockets of time here and there to write. Thanks, Kathy, for always being so supportive and awesome! Our life is a balancing act—and you make all the great things we have possible.
ACKNOWLEDGMENTS

Our kids, Megan and Andrew, also have been supportive—and lots and lots of fun! As a regular at the NorthEastern Evolutionary Psychology Society (NEEPS), Megan, my best buddy, has always been helpful in discussing this field with me and has played a major role in helping me edit the references! I also note that most of this book was written under extremely fun conditions—in our Wii room while sitting on a beanbag chair next to my son and best friend, Andrew, while he mastered levels on Super Mario Bros.!

This project, like any large project, is always the result of lots of blood, sweat, and elbow grease, and the support of the many people in my life has been pivotal in allowing me to write this book on top of everything else I’ve got going on at any given time. I’d like to specifically acknowledge the help of Dan Lynn, biology teacher extraordinaire, whose comments on early drafts of this book helped me very much in keeping things on task—thanks, Dan! Further, the group who has supported me through this project includes the great undergraduate students at SUNY New Paltz, the incredible Evolutionary Psychology Lab at New Paltz, the folks associated with the Evolutionary Studies (EvoS) program, my colleagues in the psychology department, the always-awesomely cool NEEPS, and more. In particular, huge thanks go to star graduate student and assistant, Briana Tauber, for extraordinary editorial support for this project and for helping with so many of the details that relate to pretty much all of my work! Largely due to the fact that I’m surrounded by a battery of smart, helpful, and community-oriented people in multiple life domains have I been able to produce this book—and I truly appreciate having such wonderful people in my life.
Creativity 101
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Genius 101
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IQ Testing 101
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Leadership 101
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Evolutionary Psychology 101
Introducing Evolutionary Psychology

Evolutionary psychology is, essentially, the application of evolutionary principles to questions of human behavior. Soon after Darwin discovered the principles of biological evolution, he started to think and write about how the principles of natural selection can help us understand the nature of behavior—beyond exclusively applying evolution to understanding physical features of life forms. In his books on this topic, including *The Expression of Emotion in Man and Animals* (1872), he considered behavioral patterns of humans and other animals as serving ultimate functions related to facilitating reproductive success. Behavior and underlying psychological processes are likely the result of evolutionary forces, such as natural selection.

This idea stewed within academic circles for decades. This introductory chapter discusses the history of evolutionary thinking within the behavioral and social sciences, as well as the basic principles of evolution that are fundamental to understanding the nature of human behavior.
What Is Evolutionary Psychology?

**KEY TERMS**

- Adaptation
- Cultural evolution
- Environment of evolutionary adaptedness (EEA)
- Evolutionary mismatch
- Genetic drift
- Meme
- Multilevel selection
- Natural selection
- Organic evolution
- Reproductive success
- Selfish gene
- Sexual selection
- Sociobiology
- Spandrel
- Trade-off
Let’s start with a puzzle. Think about how the following phenomena are connected to one another:

- Emperor penguins have been shown to shove a fellow emperor penguin into the water to test if seals or other predators are in the area (Marchand & Higgins, 1990).
- The seed of a maple tree comes in a tidy package that resembles an outstanding helicopter blade—and in early spring, the wind can carry these seeds quite a distance (Darke, 2002).
- The single best statistical predictor of filicide (killing one’s child) in humans is status as a step-parent (rather than as a biological parent; Daly & Wilson, 1988).
- When a male lion takes over the harem of another male, he kills all cubs sired by the ousted male. Next, each adult female quickly copulates with the new male, often forcing abortions of fetuses sired by the first male (Packer & Pusey, 1983).
- The human expression of happiness, a smiling face, is interpreted unmistakably and accurately across the globe—regardless of the cultural background of the person smiling or of the person rating the smile (Ekman & Friesen, 1968).

So here we have it. On the surface, these phenomena are strikingly unrelated. Penguins pushing each other. Maple seeds falling in spring. Parents killing their children. Lionesses copulating with murderous lions. The universal nature of the human smile. What’s going on here?

Clearly, the nature of this book gives away part of the answer. Evolution sheds important light on all these phenomena. What’s amazing about evolutionary psychology, compared to other approaches to understanding the human mind and behavior, is that the evolutionary approach has the power, as you’ll soon see, to integrate phenomena across any and all behavioral domains—and even across species.

Let’s look at how this conception of evolutionary psychology (and of evolutionary theory more generally) helps us understand
our puzzle. A core idea in evolutionary theory pertains to reproductive success (RS). This is the idea that life forms evolved a host of features that facilitate the ability of the organism to reproduce. From this perspective, survival is actually a detail. Survival, from the perspective of evolution, is a tool that ultimately works toward reproduction (the reasoning behind this will be elucidated as this chapter progresses). A simple understanding of evolution is the idea that organisms that exist must exist because their ancestors had features that led to RS (otherwise the organism in question couldn’t exist). So any features of a species that are species typical may well have the ultimate purpose of increasing RS.

This stripped-down account of evolution is actually remarkably powerful. Why do emperor penguins sometimes shove conspecifics (members of their own species) to a bloody death into the teeth of killer seals? Well, if you’re the penguin who shoves, you learn some extraordinary information that will be very helpful in your own survival and ultimate RS. In terms of the maple seeds, think about optimal dissemination of one’s genes. The helicopter design of the seed pod in maples, loved by children across continents, was clearly shaped by millions of years of evolution to help trees disseminate their seeds broadly—increasing the RS of the trees themselves. Once we think of organisms as designed to increase their own RS, it becomes immediately apparent that step-parents would be more likely to harm offspring than biological parents (it doesn’t help a step-parent’s RS to invest time and energy into the offspring of a conspecific). Similarly, lions that kill the cubs of male competitors seem to be acting out an evolutionary design that facilitates their own RS at the cost of the RS of the competing male. And why is smiling so universally understood in our species? Because accurate detection of emotion is a core feature of succeeding in the social worlds in which we find ourselves as humans—and succeeding socially, in a highly social species such as ours, is ultimately a core feature of succeeding in the evolutionary currency of RS.
What is Evolution?

Before we get into the details of how evolution pertains to human behavior and the human mind, we need to define how the term evolution is used in this book. Importantly, note that evolution is actually broader than you might think. People typically see evolution in terms of evolution of life—or how organisms (such as you or me) came to exist across millions of generations and billions of years. Granted, that is pretty broad. However, the evolution of life is actually a subset of the broader concept of evolution proper. Evolution pertains to how any kind of entity changes across time. Across time, entities change. Some aspects of entities remain unchanged. Some changes are dramatic (such as the change from a caterpillar to a butterfly—a full metamorphosis that happens in a matter of weeks).

Importantly, life forms are not the only kinds of entities that evolve. This book evolved dramatically—from an idea, to a written proposal, to a rewritten proposal, to a draft, to a second draft, to a third draft, and so forth. In the 1980s, personal computers were rare, and they could handle only a very small number of computations relative to what exists now. In the 1990s, personal computers became more common and advanced, and the Internet came on the scene in a big way. Between 2000 and 2010, computers become commonplace, and advances in speed and abilities of personal computers were extraordinary. Various satellite technologies (cell phones, Facebook, etc.) emerged in a dramatic fashion. These days, it’s clear that technology continues to advance at a rate that is hard to grasp for minds like ours. Technology evolves.

Much of this chapter will be about defining evolution. Perhaps the most basic and applicable definition came from renowned biologist George Williams, who wrote that evolution is nothing more than a “statistical bias in the rate of perpetuation of alternatives” (1966, p. 22). In short, alternative forms of any kind of entity exist. Some are, for any number of reasons, more likely to replicate than others. By definition, these
“likely-to-replicate” forms exist in relatively high frequencies in the future—and that’s it. As you can see, this conception of evolution is bigger than life itself!

**Darwin’s Big Idea**

Born on February 12, 1809, Charles Darwin was destined for greatness. His interest in the natural world started in his childhood in England. Having been raised in a family with a great deal of money and a deep history of academic curiosity, Darwin was well positioned to discover the basic principles of evolution. Importantly, Darwin wasn’t the first to discover evolution itself (the idea that species may have evolved from prior species with similar qualities, and that multiple life forms may have a common ancestor). Several naturalists before him had suggested this kind of thing. Rather, in his detailed and comprehensive account of the origins of life, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (Darwin, 1859), Darwin proposed a likely mechanism of evolution of life. In other words, he articulated *how* evolution was possible.

Importantly, Darwin’s great contribution to our understanding of the universe primarily focuses on the evolution of life (or organic evolution)—but, clearly, the basic premises he articulated are applicable more broadly. In fact, the basic ideas of evolution are fully applicable across all areas studied within any university (see Wilson, 2007).

In any case, we can thank Darwin for helping us understand the primary mechanisms underlying evolution. The primary mechanism that he described was *natural selection*—which, like most solid academic terms, actually means what it says, as we’ll soon see.

In his famous journey around the world as the naturalist on the HMS *Beagle*, Darwin explored the flora (plant life) and fauna (animal life) up and down South America and, famously, into the Galapagos Islands. Darwin had many great insights—but his big idea had to do with connections across everything he
saw. How do the beaks of the finches of the Galapagos Islands, the courtship behaviors of the blue-footed boobies, the fossilized remains of ancient glyptodonts, and the cultural features of nonwesternized societies in the Amazon forests relate to one another? Darwin’s big idea was that they all related to one another strongly, and that all these life forms likely came from some common ancestor. Now that’s a big idea!

The specific mechanism of evolution that hit Darwin in his journey was that of natural selection—the idea that features of organisms that are adaptive, or that somehow help with the survival and/or reproduction of the organism, are selected and retained as part of the species. So these features that help an organism survive and reproduce are selected naturally. While we’ll get into the details of natural selection later in this chapter, this is pretty much it.

Further, and importantly, Darwin understood the idea of fitness—how well (in Darwinian terms) the features of an organism fit the environment of an organism. This idea is best explicated with Darwin’s observations regarding the beaks of the finches of the Galapagos Islands. What struck him were the important similarities and differences across the different species he found there. While the many different species of finches he found were similar to one another in most morphological (bodily) features, he noted pronounced differences in the beaks of the different species. The beaks of finches on the rocky coast were long (like beaks of many shore birds), ideal for picking out food in crevices between rocks. Beaks of finches in the inland rain forests were shorter and stronger, ideal for picking insects from the bark of trees, and so forth. The beaks of these different finches fit their particular environments. This is a prime example of Darwin’s use of the term fitness. We’ll turn back to Darwin’s ideas on fitness when we consider the details of natural selection later in this chapter. For now, realize that Darwinism is extremely environmentalist—that is, this perspective underscores the nature of an organism’s environment as shaping the nature of that organism and its species.
In 1976, Richard Dawkins, perhaps the world’s best-known living scientist, published *The Selfish Gene*—a landmark book that made Darwin’s ideas accessible to a broad audience, and one that set the stage for the field of evolutionary psychology—and the idea that behavioral patterns (like any morphological features) are primarily the result of evolutionary forces.

Importantly, in this treatise on evolution, Dawkins didn’t refute anything that Darwin said. In fact, he comes across as a full-blooded Darwinist. What was great about this book was how accessible it was for a (then) modern audience—and the seeds planted by this book have played an important role in influencing so much of modern-day evolutionary psychology. In essence, Dawkins’ book was a fantastic summary and presentation of Darwin’s ideas on the nature of evolution.

The concept of the *selfish gene* is the idea that genes are the basic replicating unit of all life forms, and that we can understand the nature of life by understanding conceptual properties of genes. Genes code for specific organisms—and through reproduction, genes replicate. So Dawkins’ angle addresses the issue of which genes replicate and which do not. In his reasoning, Dawkins concludes that good replicator genes have the qualities of:

- Fecundity (being able to make a lot of replications of themselves in a lifetime)
- Longevity (being able to lead a long life, which increases replication [or reproducing] opportunities)
- Fidelity (being able to oversee the protein-creation process [or RNA synthesis—the specific task of genes] with accuracy, so that the genes of the next generation contain few copying errors)

Given a broader perspective on evolution, we can actually take this angle beyond genes and apply it to any replicating entities. Replicating entities that reproduce a lot, that last for a long time,
and that replicate accurately will, by definition, be more likely to exist in the future compared to alternative entities (in gene terms, variants or alternative forms are called alleles).

This is the basic idea of evolution. For this reason, it does not make sense to talk about evolution proper as true or false—by definition, logically, replicating entities will be more prevalent in the future than nonreplicating entities! It’s this simple and elegant presentation of evolution that may serve as Dawkins’ greatest scholarly contribution to the world.

The concept of the selfish gene is this same concept regarding replicating entities. The idea is that genes that code for qualities that facilitate their own replication are, by definition, more likely to exist in the future (and to come to characterize a particular species) compared with alleles or alternative genes. Thus, genes that effectively lead to their own replication (such as those that are selfish) are likely to be selected to exist in the future. This is what the word selfish means in the context of The Selfish Gene.

**SPECIES FROM THE PERSPECTIVE OF EVOLUTIONARY PSYCHOLOGY**

An important implication of Darwin’s ideas (and Dawkins’ summary of these ideas) pertains to the nature of species. Interestingly, the truly Darwinist understanding of the place of species in the broader landscape of evolution is perhaps the single most misunderstood concept in all of academia!

People often think that evolution is all about species. But it’s not. Species exist—and they are the result of evolution—but, importantly, species are artifacts of evolution! Consider two different genes: one that has the effect of increasing the organism’s ability to find a mate, and the other primarily devoted to the species. It doesn’t help the organism find a mate, but it helps the organism work with conspecifics to help these conspecifics find
mates. The first gene is for the good of the gene (via being for the good of the organism). The second is for the good of the species. All things equal, which gene is more likely to lead to having itself replicated? Well, the first gene is a good candidate for replication. It helps the organism itself mate and ultimately reproduce. The second one inhibits the organism from reproducing, but helps others in the species (who may or may not have this same allele) mate and reproduce. The second gene is less likely to actually get itself replicated into the future. In fact, it’s very likely to lead to its own demise, as individuals with this variant of the gene are likely to not reproduce themselves and are likely to help others reproduce instead (likely with the other variant). You can see from this example how the first gene (that is for the good of the individual) is likely to be selected and to become part of the species. The second gene (that is for the good of the species) is actually not likely to become a species-typical gene!

In short, genes that come to typify a species are not genes that are primarily designed to help the species! Genes that are primarily designed to facilitate the RS of the individual are genes that come to typify a species. This is why emperor penguins have a behavioral propensity to push conspecifics into the water to test for predators—and why male lions kill the offspring of competing males when taking over a harem. These examples are cold, nasty, and unpleasant. Importantly, as you’ll see in this book, human behavior only includes some of this kind of stuff! That said, it’s important to understand this early on. Darwin talked about species, but evolution is not about species. Evolution is about the replication of qualities that benefit individuals, and species are borne of this process.

As such, phrases such as “for the good of the species” or “to the betterment of the species” totally and unequivocally mischaracterize anything that Darwin was trying to say. Evolutionary psychology is not about qualities that primarily benefit the human species.

In fact, with this all said, note that in evolutionary psychology, the issue of species is almost always irrelevant, especially if focusing exclusively on humans. Human evolutionary
psychology focuses on the adaptations and psychological features of humans that are the products of evolutionary forces, with a large focus on how these adaptations helped our ancestors survive and reproduce, and with just about zero focus on how these adaptations helped our ancestors help the species of humans become successful as a species per se. As such, as I often tell my students, you might even want to avoid the word species in work that you present related to evolutionary psychology—it’s almost always inappropriately placed and misguided given the nature of the field.

BASIC EVOLUTIONARY CONCEPTS: NATURAL SELECTION, HERITABILITY, MUTATION, ADAPTATION, FITNESS, AND REPRODUCTIVE SUCCESS

Any forces that lead entities to change over time are evolutionary in nature. The big one that made Darwin’s legacy is natural selection, which, as briefly described prior, is simply the idea that some qualities of organisms are more likely to be selected by nature (naturally) than others. The best way to think about natural selection is mathematical. Imagine a population of individuals. Half of them have a gene that has the effect of increasing vigilance regarding predators. Such individuals with this variant of the gene are very wary of predators and tend to be overconcerned at times—jumping at moving shadows, and the like. The other members of the population do not have this same predator vigilance gene. They are all quite relaxed! Well, suppose there are actually many predators in the environment. Which kinds of individuals are likely to exist more in the future? Given the fact that there are real predatory threats, it’s adaptive to be hyper-vigilant. As I’ve presented this scenario, the individuals with the predator vigilance gene are
more likely to survive. Of course, being more likely to survive corresponds to being more likely to reproduce (as corpses are poor at reproducing). So let’s think like geneticists and look ahead some generations. The next generation will likely have a higher proportion than the parent generation of individuals with the predator vigilance gene. Maybe it’ll be 55% to 45% in terms of the ratio within the population. It could even be a smaller difference to still lead to important evolutionary change. Evolution of life forms takes many generations—and small differences in the RS rates of different alleles can lead to large changes over many generations.

Imagine things playing out in this same predator-rich environment 100 generations from now. Well, now we may actually see all organisms displaying the predator vigilance associated with that particular variant of that gene. The other form was not selected naturally, so it bit the evolutionary dust, as it were. The form of the gene associated with hypervigilance, on the other hand, is naturally selected—and, as stated prior, this phrase simply means what it says!

Natural selection is often discussed in terms of heritability or heritable qualities of organisms. These are qualities of organisms that are at least partly determined simply by genetics. Some aspects of organisms show strong heritability (e.g., the physical size of the organism relative to conspecifics) and other features show relatively low heritability (whether you’re a Mets fan or a Yankees fan, for instance, is not likely coded in your genes). Natural selection tends to act on features of organisms that are at least partly heritable. Importantly, and interestingly, behavioral geneticists have found that most behavioral traits in humans (and other organisms) show some level of heritability (see Miller, 2007). So natural selection has a lot to work with, even when we’re talking about human behavioral patterns.

Natural selection is also often discussed in terms of mutations, or random changes to genes in the replicating process. With any replicating process, there is the possibility of inaccuracy. If you photocopy an article, you may well have to do it a
second time because you didn’t have the paper placed correctly, the print was not dark enough, and so forth. The same is true of gene replication. An error in the process is referred to as a mutation. Ultimately, mutations that lead to some adaptive benefits to organisms are naturally selected, and it is by this process across many generations that new species evolve.

This said, evolutionary psychologists tend to focus less on mutations than other evolutionary scholars. This is largely because evolutionary psychologists study humans and we don’t tend to study them in terms of future changes in our species (which would typically take thousands of generations). So evolutionary psychologists are aware of mutations (and as you’ll see in some later sections, the topic of mutations does emerge somewhat in this field), but evolutionary psychology focuses little on speciation per se, and there’s little focus on the concept of mutation as a result.

Other core concepts that relate to Darwin’s ideas on natural selection pertain to adaptation, fitness, and RS. As you’ll see, these concepts are all really different ways of conceptualizing natural selection. An adaptation is a feature of an organism that is a product of natural selection. It is a specific feature of an organism that has come to typify a species (or a significant subset of the species) because it helps members of the species overcome some important survival or reproduction-based hurdles and facilitates reproduction. In the prior example about hyper-predator-vigilance, we can say that this behavioral trait is an adaptation—a feature of the organism that facilitates survival and ultimately RS.

Fitness is, as shown before, a Darwinian term with a specific interpretation regarding the fit between the organism and the environment. Fitness exists when some feature of an organism fits well with the nature of the environment and, as a consequence, facilitates survival and/or reproduction. So a feature of an organism that has or that increases fitness (as it’s often stated) is an adaptation. Adaptations increase fitness.
In the 1970s, renowned behavioral biologist Robert Trivers developed the term reproductive success to capture the importance of this concept in the landscape of evolution. RS is what it says—the ability of an organism to successfully reproduce. Focusing on RS makes it clear that evolutionary forces and natural selection are not ultimately about survival (although they are partly about survival). Ultimately, survival is only adaptive insofar as it ultimately increases RS. RS is evolution’s bottom line.

Sexual Selection

In terms of a pure conception of natural selection, some concepts make intuitive sense. We can understand why arboreal (tree-dwelling) primates have particularly strong hand-grip strength (see Gallup & Frederick, 2010), for instance. If you live in the tall trees, it pays to be able to hold on well, and arboreal ancestors who had poor hand-grip strength did not reproduce as much as those with strong hand-grip strength.

Some features of organisms make less sense from a straightforward natural-selection perspective. The particular feature that became famous for this idea is the peacock’s tail. Large, gaudy, and conspicuous, this feature of peacocks makes little sense on the surface from a natural-selection perspective. Clearly, Asian tigers are more likely to see you and slow you down—and eat you—if you’re carrying that kind of conspicuous baggage. Camouflage makes obvious evolutionary sense. The tail of the peacock does not, and this fact reportedly kept Darwin up at night!

At some point, Darwin figured out the riddle of the peacock’s tail. Selection is not really about survival. Qualities that survive are less likely in the future compared with qualities that lead to reproduction! So he considered that perhaps the peacock’s tail has some specific utility in the domain of reproduction—and, alas, it does. It turns out that peahens are more attracted to peacocks with brightly colored tails than to those with relatively dull plumage. So this conspicuous signal, which actually impedes survival (the big,
bright tail), was selected because it directly facilitates reproduction. All things equal, qualities that facilitate reproduction are more likely to be selected than qualities that only facilitate survival. As noted several times to this point, in evolutionary currency, reproduction trumps survival.

So Darwin’s other big idea was that of sexual selection—the idea that qualities that facilitate reproduction in the mating domain may be selected simply because of their role in this particular domain, even if these same qualities hinder survival. Modern evolutionists talk of the related idea of the handicap principle (see Zahavi, 1975), suggesting that under some conditions, something that is obviously a hindrance to survival (e.g., the peacock’s tail) can be attractive, based on the idea that if an individual is capable of doing pretty much everything anyone else can—even with this conspicuous handicap—this may be a sign that this individual has a particularly strong and mutation-free set of genes. This is clearly an interesting angle on how we think of the concept of sexiness.

Sexual selection comes in two varieties, each of which is crucial to understanding human evolutionary psychology. Some qualities of organisms evolved because they are attractive to potential mates (with the peacock’s tail being the prime exemplar). This kind of sexual selection is referred to as intersexual selection (with “inter” meaning “between,” so it’s between the sexes).

Some qualities evolve because they help individuals of one sex outcompete members of their same sex in seeking sexual access to the opposite sex. This kind of selection is referred to as intrasexual selection (with “intra” meaning “within,” so it’s a selection process within members of the same sex). The enormous size of the Irish elk’s antlers, which were up to 12 feet across from tip to tip in this extinct mammalian species, serves an oft-cited example of intrasexual selection. Bull elk tend to fight one another during mating season, with the winners gaining access
to local females. They fight using their antlers. In such a scenario, larger antlers tend to lead to more success in the fighting arena, which leads to success in the mating domain. And, again with the idea of an evolutionarily shaped handicap, walking around with hundreds of pounds of antlers on your head is not really the most efficient design from a biomechanical perspective. The antlers of the Irish elk weren’t selected because they facilitated survival—they were selected because they facilitated mating.

As we’ll see as this book unfolds, both varieties of sexual selection play a major role in the field of evolutionary psychology.

EVOLUTIONARY MISMATCH

In studying the attachment between babies and their parents, John Bowlby (1969) took an evolutionary perspective. In his classic treatise of the field, Bowlby coined the term *environ-ment of evolutionary adaptedness* (EEA). This concept pertains to the environmental conditions that typified the ancestors of a species, with the idea that organisms didn’t evolve the features that they have to match their current environments. All organisms are the products of thousands of generations of selection prior to their existence. Yet evolution has no crystal ball. So the best that selection processes can do is provide an organism with adaptations that were helpful to its ancestors under whatever the ecological conditions were then—essentially making a probabilistic-based “guess” that the environment will be the same. Of course, environments change, but with no knowledge of if, how, and when such change will occur, preparing organisms for ancestral environments is essentially the best bet.

Usually this works out fine, but sometimes contexts change in a short amount of time and organisms find themselves in
situations for which they are really not evolutionarily prepared. A famous example of this pertained to the sea turtles of Florida. For millions of years, sea turtles would come to the beaches of Florida to spawn and their hatchlings would head toward the sea—to live a life far away—and to return to Florida years later (much like New Yorkers!). It turns out that the way the young turtles knew to head toward the direction of the ocean was based on light glimmering off the sea at night. The sea beautifully reflects the light of the moon and the stars, and for millions of years, a simple algorithm of “head toward the light at night” allowed the turtles to effectively head toward the sea to pursue an effective life strategy. Well, then came Miami. Not built by the Onceler, but it’s the same idea. Miami and the other big cities on the coast of Florida are filled with lots of bright lights at night, so this led to an ecological catastrophe for the sea turtles (see Schlaepfer, Runge, & Sherman, 2002). Shaped by evolution to head toward light at night, hatchlings started toward the highways and cities by the millions—meeting premature death instead of a long seadwelling life. This is still an issue today, addressed by several conservation societies.

This is a case of a mismatch between the current conditions that exist and the EEA of the sea turtles. Organisms evolve to match the qualities of the EEA, and when modern conditions don’t match the EEA, there can be trouble.

Evolutionary psychology strongly relates to issues of the EEA for humans. Prior to the advent of agriculture about 10,000 years ago, humans did not stay put—they couldn’t, as they had to follow the food. As such, they lived in small nomadic bands (with the best estimates of typical size being approximately 150; see Dunbar, 1992). Further, such clans of early Homo sapiens tended to include many families, so any individual in such a clan was likely related to a good proportion of the group. It was like this for millions of years for our species. The advent of agriculture led quickly to civilization, which then led quickly to a major EEA issue for our species. In westernized societies, people tend to live in large cities. They may encounter thousands
of individuals in a day, with 99% of those individuals being strangers. The closest family member may be 500 miles away, and the most common form of communication may be texting via cell phone.

This is clearly a mismatch, and much of evolutionary psychology speaks to this mismatch. In the words of renowned evolutionists Leda Cosmides and John Tooby (1997, p. 85), “Our modern skulls house a Stone Age mind.”

This mismatch leads to many modern problems of humanity. As an example, consider the fact that McDonald’s is as popular as it is. Yet the food is famously bad in terms of nutritional value. How did this popularity come to be? From an evolutionary perspective, the answer pertains to the EEA. Under ancestral human conditions, drought in the African savanna was common—and with drought comes famine. If famine is common, then it makes sense that you’d try to get as much body fat on you as possible. However, high-fat and high-sugar-content foods were rare. All meat eaten by our ancestors was lean—there were no farms breeding fat pigs—as all animals were wild and athletic by necessity. A taste preference for high-fat and sugary foods under such conditions would clearly give an individual an advantage. As such, a preference would cause this individual to seek out high-fat and sugary foods, and consuming as much of these foods as possible (sound familiar?!) would be a great strategy given the overall scarcity of such foods and the constant fact of droughts in the environment. So these taste preferences would be selected, because individuals with these preferences would be better able to survive and, ultimately, reproduce to ultimately pass on these preferences to apes like ourselves! Our love of McDonald’s (manifest by the billions and billions served) is the result of this mismatch between modern westernized societies and the human EEA. Clearly this fact results in such major health and societal outcomes as high rates of heart disease and type 2 diabetes. As you can see, evolutionary psychology provides a strong and powerful framework for understanding such important features of the human condition.
If feminism is “the radical notion that women are people” (Kramare & Treichler, 1996), then evolutionary psychology is “the radical notion that human behavior is part of the natural world.” From this perspective, it’s very simple, and does not inherently yearn for controversy. The basic reasoning goes like this:

1. Organisms are the product of natural selection and other evolutionary forces.
2. Specific physical features of organisms are, thus, also the result of evolution.
3. The human nervous system is an important physical feature of our species (with the brain being the most intricate organ in the human body).
4. All behavior is the result of action of the nervous system.
5. Human behavior is, ultimately and importantly, the result of evolution.

That’s it—that’s evolutionary psychology in a nutshell!

Behavior, a broad and general concept that refers to all actions of organisms that possess nervous systems, is a crucial adaptation in evolutionary history. Before nervous systems existed, organisms could not move in reaction to stimuli in the environment (see Dawkins, 1976). A blade of grass moves slowly as it grows—but it is not able to dart out of the way of a predator such as a cow! Grasses have other adaptations (e.g., toxins) to address the “predator” issue.

At some point, some early organisms evolved a precursor to the nervous system that allowed for assessment of environmental stimuli and quick responses to such stimuli. This system was so adaptive that it replicated extensively. The human nervous
system that allows me to type these words and that allows you to read them is one result of this extraordinary evolutionary story.

Behavior is clearly shaped by many factors. Evolutionary psychologists often refer to Niko Tinbergen’s (1963) conception of ultimate versus proximate causes of behavior. The ultimate causes of a behavior pertain to its evolutionary (or phylogenetic) history, addressing questions such as How did this behavior come to be? How was it adaptive? How did it confer reproductive benefits to individuals with such a behavioral quality?

The proximate causes of behavior are relatively “immediate.” For instance, activity in the amygdala in the lower part of the brain seems to be a precursor to aggressive behavior. So if we see a guy get out of control at the bar one night, we might think of this proximate cause—his amygdala has many neurons that are firing.

An evolutionist always sees all behaviors as caused by multiple factors, so in addition to the proximate cause described in this example (neuronal firing in the amygdala), we can also think about how male aggression has been retained and selected in our species—how has this pattern of behavior allowed our male ancestors to out-reproduce competitors? This is an ultimate question, and it goes back to an analysis of how this behavioral pattern (here, it looks like intrasexual competition, which may lead to increased mating opportunities) corresponds to average increases in RS.

Of course, there are likely additional proximate causes (perhaps someone pushed the guy in front of a large group, and this action served as a stimulus that triggered an aggressive response), and there may be additional ultimate causes (in addition to out-competing competitors, male aggression may actually, under some contexts, be attractive to potential mates).

The evolutionary approach to behavior is one that appreciates nuance and complexity! Further, it’s a perspective that consistently incorporates environmental causes of behavior (e.g., ancestral contexts that selected for certain qualities) along with innate or internal causes of behavior (e.g., genes or brain systems.
that underlie behavior). Given this focus on both environmental and innate causes of behavior, coupled with a genuine focus on proximate and ultimate causes of behavior, evolutionary psychology is truly an approach to psychology that embraces both the *nature* and *nurture* side of the (somewhat silly) *nature/nurture* debate.

**DRIFT, SPANDRELS, MULTILEVEL SELECTION, AND CULTURAL EVOLUTION**

You’ll see that the wording in this book tends to be careful to not conflate *evolution* with *natural selection*. In fact, for various reasons, it’s important to discriminate *evolution* from *mechanisms that underlie evolutionary change*. Natural selection is a mechanism of evolution—it’s not synonymous with evolution itself. The two forms of sexual selection that we described earlier in this chapter are also mechanisms of evolution, rather than evolution itself.

There are other mechanisms of evolution, and they all play roles in ultimately shaping patterns of human behavior! Evolutionary psychologists often tend to focus on natural and sexual selection. This is largely due to the fact that these forces are famously powerful, and a good working hypothesis regarding why some feature exists will typically start with questions of *adaptation* as a result of natural or sexual selection (see Wilson, 2007).

This said, there are other significant mechanisms that underlie evolution of human behavior, and a good evolutionary psychologist understands the nature of these mechanisms and how they may apply to human behavior. These additional mechanisms include:

A. Genetic Drift (or just *drift*). Drift is the idea that some genes become more prevalent in populations not because they lead to adaptive benefits relative to alleles, but simply because
of happenstance regarding which genes were where when! Suppose you have an ancestral population of ungulates on the savanna. Two distinct coat patterns exist: one is tan with black spots, the other is tan with black stripes. Although these two different *phenotypes* (i.e., manifestations of specific genetic patterns, often referred to as *genotypes*) used to be equal in prevalence, a random flood several hundred years ago happened to wipe out one of the largest herds, and this herd happened to have a relatively high proportion of spotted animals. For this reason primarily, striped coats tend to dominate. There was nothing adaptive about the striped coat relative to the spotted coat. Due to somewhat random and uncontrollable factors, things just drifted this way.

B. Spandrels (or evolutionary by-products). The renowned paleontologist, Stephen J. Gould (1980), was famous for taking an antiadaptationist stance regarding much of evolution. Each adaptation, he argued, brings along several by-products that come to typify a species (just as the adaptations do), but that have no reproductive benefits—they just come along for the ride. In architecture, a term for such a feature is a *spandrel*. This is the space that exists under an arch. If you create, for instance, a bridge with several arches, each arch helps support the bridge. A by-product of this is the fact that you have several spandrels, and they may be used by various organisms for all kinds of purposes (such as nests for birds).

With this reasoning in mind, Gould warned evolutionary psychologists of being *hyperadaptationist* in their approach. While most evolutionary psychologists agree that adaptations are the primary result of evolution, Gould warns folks to think otherwise. For instance, he and others (e.g., Pinker, 1999) argue that our ability to read is not something that was selected because it gave our ancestors reproductive benefits. Pinker argues that the written word was actually developed by people well after the human brain evolved its capacity for language and higher-order cognition. So reading is an essential part of modern humans, but
it’s, according to Gould and Pinker, a by-product of language-related adaptations—not an adaptation per se. As evolutionists, we need to always keep Gould’s point in the backs of our minds—and every now and again, it’s good to argue against an adaptationist perspective by unleashing one’s inner Gould!

C. Multilevel Selection. Another important concept to keep in mind regarding different kinds of evolutionary forces is Wilson’s (2007) notion of multilevel selection. This is the idea that several evolutionary forces, at multiple levels, work simultaneously at a given time. A basic level of selection may be the gene (individuals, thus, may have adaptations that help them replicate their specific genes), but the individual him- or herself may be thought of as a separate unit on which evolutionary forces may act. Sometimes an individual may have a gene that is in the gene’s interest, but not in the individual’s interest (e.g., a gene that replicates in high frequencies by creating cancerous cells—these are cells that replicate a gene that is harmful to the individual).

In fact, Wilson would argue that selection is always acting at multiple levels—such levels including the genetic, cellular, organism-based, organism, kin group, social group, and other levels that ultimately surround an individual. Wilson has famously argued that there are many cases, particularly in humans (but in other species too), in which some feature has been selected because it is adaptive at one level (even if it is seems nonadaptive at a different level). As we’ll see in Chapter 6, Wilson sees many traits that are fostered by religion (e.g., sacrificing your own interests for those of a neighbor) as having been selected not because they help individuals directly (self-sacrifice is, by definition, not helping oneself!), but as helping the group to which one belongs (with the idea that cultivating your group ultimately brings back benefits to the individual). If you’re part of a large group of self-sacrificers, I’d say you can expect your broader group to thrive—particularly relative to a group of selfish jerks! It’s not difficult
to see how being in the self-sacrificer group can lead to ultimate benefits to the individual members of that group. Evolution takes place at multiple levels that surround an individual and his or her genes. Good evolutionary psychology takes this point deeply into account.

D. Cultural Evolution. In an important update to his classic book, *The Selfish Gene*, Dawkins (1989) created the term *meme*, which is, as he conceptualizes it, a cultural unit that has the capacity to be replicated—much like a gene. It’s a piece of human culture or an idea. The beauty of this idea is that it still can be understood in terms of evolution! Some ideas catch on (think: cell phone!). Some ideas mutate (think about how modern dance music has its roots in the Bee Gees songs of the 1970s—it’s true!). Some ideas never catch on (you may not remember the Beta videotape, which is proof in itself that it never caught on!).

In humans, cultural evolution is obviously huge and, importantly, it happens fast! Organic evolution takes thousands of generations to make important and observable changes in a population. However, in a very short amount of time, Justin Bieber’s fun and poppy style took the world by storm, leading to *Bieber Fever* (which would easily have been observable by anthropologists from Mars [if there are any!]—especially with his 3-D movie that was released in 2011). Nothing shows the powerful and fast-acting nature of cultural evolution more than does Bieber Fever (and I haven’t even gone into how his hairstyle alone captivated a generation! That hair is some meme!).

So when we’re thinking about where human behavior originates, evolutionists will often start by thinking about adaptations shaped by natural and sexual selection. Given Darwin’s big ideas, this is a powerful starting point. However, there are other important evolutionary forces at work as well—including drift, multilevel selection, and cultural evolution—along with the all-important concept of evolutionary by-products. Good
evolutionary psychologists show a clear understanding of all these concepts and apply them to their understanding of human behavior when appropriate.

TRADE-OFFS

In the 1990s, I was fortunate to attend a lecture by the great evolutionist Noam Chomsky. During this presentation on the topic of the evolution of language, Chomsky addressed a major misconception about evolution. He essentially said that people often see natural selection as creating perfection—optimally designed living machines. In fact, Chomsky said (with some jest), “The last perfectly designed organism was the shark!” Two things about this joke: First off, it’d be helpful to know that sharks are ancient organisms, and the paleontological record shows little changes in many species of sharks across millions of years. Now that was a great design! Second, it’s funny because none of us has ever met a perfect shark—sharks aren’t perfect either!

Chomsky went on to note how evolution does not create perfect, optimal designs. That’s not how it works. Evolutionary processes essentially select the best form (i.e., the most likely to replicate in the long run) of a discrete group of options. The human nervous system, for instance, is far from perfect. Mental illness and psychological problems that permeate many modern human societies can attest to this point. This said, the nervous system is amazing and clearly had qualities that allowed our ancestors with effective nervous systems to survive and reproduce relative to others. Still, evolution is not about the shaping of perfect qualities of organisms—it is about optimizing in light of alternatives that exist.

Evolutionary processes work in terms of trade-offs. Think about the importance of RS in an evolutionary framework. Given how important reproduction is, you’d think that individuals might start reproducing early. Twins might be more common.
Heck, triplets, quadruplets, and so on, might be the way to go. Maybe it would be optimal for people to have 2,000 offspring in a lifetime!

Well, every benefit comes with costs. For instance, reproducing too early in our species would have the cost of having parents be ill-prepared for child rearing. I can’t really see a 5-year-old being a brilliant parent. Having a high number of offspring at a time leads to increased risks of death to both mother and child during childbirth, and so forth. With any benefit, there are trade-offs. There are always trade-offs with everything, and evolution, naturally, takes trade-offs into account.

**SUMMARY: TURNING ON THE LIGHT**

When Daly and Wilson (1988) examined patterns of homicide from an evolutionary perspective, their results shocked the academic world. Lots of folks had studied homicide before—it’s an important social issue that we need to better understand and control. In short, homicide’s bad! Before the seminal work of Daly and Wilson on this topic, it was poorly understood. Lots of little, isolated facts about the predictors of homicide had been studied. However, before an evolutionary approach was applied in this area, there was no roadmap. No set of guiding principles. No overarching set of guidelines to help with the research. Once Daly and Wilson examined this topic from an evolutionary perspective, it was as if someone had turned on the light.

Simply, these researchers expected that patterns of homicide would make evolutionary sense. One set of studies they conducted, for instance, focused on males’ responses to sexual infidelity. In our species (as in other mammals), males can never be sure of paternity, and this fact should lead to several adaptations designed to help males reduce the likelihood that their partners are having someone else’s baby. There are nasty sides to this approach. In a study of thousands of North American homicides,
Daly and Wilson found that approximately one third had to do with male sexual jealousy (with males killing their partner, the interloper [i.e., the other guy], or getting themselves killed along the way).

Here’s another one. Daly and Wilson studied filicide (parents killing their own children). Obviously, this is disturbing. Prior research had uncovered some aspects of this phenomenon, but then Daly and Wilson “turned on the light” by using an evolutionary approach to understand this question. They found that, consistent with their predictions, step-parents were more than 100 times more likely to engage in filicide compared with biological parents. The single biggest predictor of engaging in filicide is status as a step-parent. This fact was completely missed by all researchers who examined filicide prior to this work by Daly and Wilson.

Human beings are the result of evolution. Our behavior is an important part of who we are. Evolutionary psychology is an approach to understanding human behavior by understanding our evolutionary past. The current movement in evolutionary psychology represents perhaps the single most important step in shaping the future of the behavioral sciences. By addressing the important behavioral domains examined by evolutionary psychologists, this book is designed to help “turn on the light” in shaping your understanding of the human mind and behavior. Enjoy the journey—and remember: Evolutionary psychology is the radical notion that human behavior is part of the natural world.

**DISCUSSION/ESSAY EXERCISES**

- Explain the idea of mismatch theory in terms of evolution. In your answer, explain the idea of the environment of evolutionary adaptedness (EEA). In your response, give examples
of how modern human contexts mismatch ancestral contexts in important ways.

- Describe the notions of adaptation, natural selection, and reproductive success and the interrelatedness of these concepts. Also, describe the idea of a spandrel, and address how this concept serves as an important idea to consider in thinking about adaptations in evolutionary psychology.

- Explain the distinction between organic evolution and cultural evolution. In your answer, discuss how these concepts share similarities and differences. Also, provide at least one example of each kind of evolutionary process.

- Briefly describe Dawkins’ (1976) notion of the selfish gene. In your answer, give an example of one kind of behavior—in any species—that explicates this concept. Finally, address the points of longevity, fidelity, and fecundity as they relate to the idea of gene replication.