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Aesthetics, Art, and Evolution

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Dedicated to Peter Goldie and Denis Dutton

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PART I

Key Concepts

Introduction

Four hundred thousand years ago a member of an ancestral humanoid species fashioned a hand axe. Like other such axes, this one was produced by shaping rock through a skillful process in which shards were struck from a stone core. The final tool was hand-sized and sharp-edged. It was distinguished by its exceptionally fine quality and by the dark red quartzite of which it was composed, which gave it the color of veinous blood. Probably it was not used for cutting. We cannot be sure how it got there, but it was the only artifact found in a pit in which the maker's group entombed their dead. It may have been the very first grave offering. So impressed were the archaeologists who unearthed this dramatically colored axe that they called it "Excalibur" after the sword of Arthurian legend.

Excalibur was not alone. Beginning about this time there is evidence of a remarkable development in the attitude to axe production. In some places there were far more axes (also known as "bifaces") than were needed on purely functional grounds. In about 1–2 percent of cases, great and unnecessary care was taken to make bilaterally symmetrical axes. Some of the finest and most symmetrical axes show no sign of having been used. Some axes were outsized or otherwise unusual in a fashion that made them not readily usable. Some axes made a feature of fossils or mineral veins in the stone. All this suggests that the axe makers were concerned with something more than basic utility.

The philosopher Gregory Currie describes one such axe as

> a piece of worked stone, shaped as an elongated tear drop, roughly symmetrical in two dimensions, with a twist to the symmetry which has retained an embedded fossil. In size and shape it would not have been a useful butchery implement, and is worked on to a degree out of proportion to any likely use. While it may be too much to call it an "early work of art," it is at least suggestive of an aesthetic sensibility.

By "aesthetic sensibility," Currie means a taste for the creation or appreciation of beauty, as I will explain further in Chapter 1. Positive aesthetic responses typically involve an emotionally heightened focus on an item's attractiveness or awesomeness.

Many other commentators share the judgment that the makers of these axes were seeking aesthetic effects, as do I. If they are right, a taste for the creation and appreciation of beauty was already present in our humanoid forerunners.

Who were these aestheticians and how are we related to them? Five million or more years ago a primitive, monkey-like creature gave rise to two genealogical lines. One line of descent extends to our nearest living primate relative, the chimpanzee, as well as to bonobos, gorillas, and orangutans. The other line from our distant precursor involves a branching web of species—species of *Homo*, and before them of *Australopithecines* (such as the much-documented "Lucy"), *Paranthropus*, and *Ardipithecus*. We—that is, *Homo sapiens*—emerged in Africa about 200 thousand years ago (henceforth abbreviated as "ka"). All earlier branches of that genealogical line other than the one leading to us ended with extinctions. The most recent extinction of a *Homo* species was that of the Neanderthals (*Homo neanderthalensis*) about 35 ka in what is now Europe. All the species making up this second line of descent, including *Homo sapiens*, are known collectively as the "Hominins".

In our lineage, it was members of ancient Hominin species who first used stone tools about 2.6 million years ago (abbreviated as "ma"). The first hand axes appeared about 1.65 ma. Excalibur was made by a member of a more recent species, *Homo heidelbergensis*, which in turn gave rise both to the Neanderthals and, later, to modern humans.

There is other evidence supporting the hypothesis that ancestral *Homo* species had an interest in aestheticizing their appearance. Ochre was collected from 300 ka. Archaeologists believe it was used as a personal decoration. Admittedly, we should be cautious not to assume that ochre always held aesthetic significance for its users. Among proposed alternative applications are as a preservative for hides, as medicine, as a sunblock and insect repellant, as a constituent of glues used in hafting stone tools, as a polishing abrasive, and to simulate (and thereby mask) menstruation. Still, there is evidence that the strongest, purest reds were favored, so the color was sometimes important. If this was because the color then more effectively beautified or made awesome the person it decorated, I claim the use was aesthetic.

Yet stronger evidence for an interest in beautifying themselves and their possessions is apparent after the arrival of anatomically modern humans. Thousands of ochre crayons found in Blombos cave, South Africa, are dated to 77 ka. And the adoption of ornaments as personal decorations further indicates aesthetic creation if they were made and used to enhance the wearer's appearance. They were common by 40 ka, though earlier examples are also known, including perforated shells at Es-Skhul shelter, Israel, dated to 100–135 ka, and at Dar es-Soltan I cave, Morocco, dated to 128 ka.

Adornments were crafted from shells (sea, bird, and snail), teeth, antlers, bones, ivory, amber, and stones such as steatite and jade. In addition to being attached to clothing, they took the form of beads, belts, necklaces, pendants, and amulets. Sometimes these materials were transported far from their sources.

In burials dated to 28 ka in Sungir, Russia, a 60-year-old man had nearly 3,000 beads and fragments about him and 25 mammoth-ivory bracelets on his arms, while a child had 4,900 beads and a belt decorated with 250 polar fox canine teeth.

As well as modern humans, in the later period of their existence Neanderthals apparently had beads. The current, though contested, view is that this was not the result of imitating their *Homo sapiens* neighbors.

Some commentators regard the personal ornaments created by modern humans as works of art. As will become apparent, I am happy to endorse a generous, far-reaching view of art that includes the decorative. Moreover, it is plausible to infer that art dates to the time when symbolic thinking and behavior became apparent, more than 50 ka. A few sticks of ochre carved with abstract hatchings in Blombos cave are interpreted as evidencing symbolic behavior as early as 78 ka. Symbolic behavior is associated with the development of what is called psychological (or behavioral) modernity. It involves referring to or representing abstract relations, as when a pattern or marker denotes social status or clan membership. Alternatively, it occurs when someone refers to or represents what is not immediately present, as when a past scene is depicted in a drawing. With the arrival of psychological modernity we are dealing with humans with minds—perceptions, intentions, desires, emotions—as well as bodies like ours. As such they were potential artists.

Calling bead decorations "art" will be regarded by some people as controversial, as inappropriately diluting the notion of art. We can afford to be agnostic about the art-status of personal decorations when arguing for the existence of humanly created prehistoric art, though, because uncontentious examples of art were created in the period known as the Upper Paleolithic (aka the late Pleistocene). Among these are the paintings in the French caves of Chauvet (up to 37 ka), Cosquer (27–19 ka), Cougnac (25–20 ka), Pech Merle (20 ka), and Lascaux (19 ka), and in Altamira cave, Spain (12.5 ka). Admittedly these caves sometimes contain doodles and erotic graffiti as well as pictures demonstrating technical weaknesses in the depictions of animals. Yet many cave paintings display breathtaking artistic skill, power, grandeur, and eloquence in abundance. Pablo Picasso famously acknowledged the quality of the work at Altamira in the observation "after Altamira, all is decadence."

A handful of writers question the art standing of these paintings, remain neutral on the matter, or place the word "art" in scare quotes. The overwhelming majority of experts, however, call them art without qualification or hesitation. Though they are confident that the paintings are art, they don't know what role these paintings played for their makers. A variety of theories are on offer—that they had religious significance and that the walls of the caves were understood as a membrane between the earthly world and an underworld, that they resulted from the use of hallucinogens, that they served as calendars, that they were a form of hunting magic, and that they were created "for their own sake." But no one knows for sure.

Peter Lamarque, a philosopher, nicely sums up the puzzle:

On the one hand, the surface perceptual qualities of the paintings naturally invite description in aesthetic or art historical terms. The techniques, pigments and materials have been studied, and there is extensive commentary on the form and texture of the paintings, the ways that natural features of the cave walls are exploited, the recurring motifs, the fidelity of naturalistic representation (allowing for the ease with which the subjects can be identified), and the sheer power, economy of means, and vitality of the depictions. On the other hand, the paintings remain a complete mystery; they are uninterpretable, and the role they played in the cultural or social life of the peoples who made them is unknown, as are the attitudes, aspirations, values, and beliefs of those who viewed them.

Yet even if we are not certain exactly why these paintings were done, we can be certain that they must have been very important to their makers given the difficulties that attended their creation. Their painters climbed below the surface of the earth with only candles or lamps for light. They erected scaffolds to paint high up on walls and ceilings. Some of the pigments they used had to be prepared by being heated to a very high temperature. And these paintings were created not when life was easy but when the land was chilled by glacial ice and conditions were harsh.

In my view, we are compelled to regard these works as art because we identify effortlessly with their creators. If we painted those images there could be no question that they were art, though they might be primarily intended to serve practical, perhaps religious, functions rather than being created for disengaged contemplation. In other words, these paintings transparently reveal artistic instincts that we share. Robin Dunbar, an anthropologist and evolutionary psychologist, makes the point this way:

> This outpouring of craftsmanship speaks to us across the intervening millennia. Here is a people not so very different from ourselves; what we find beautiful, they too found beautiful.

Lamarque joins the consensus when he concludes not only that their painters had aesthetic sensibilities and goals but also that much of what was produced should count as art.

The same care and craftsmanship directed to the creation of beautiful depictions is immediately apparent also in some ancient carved or fired figures. These include mammoths and a horse carved from mammoth ivory found in the Vogelherd cave, Germany (32 ka), a lion person carved from mammoth ivory discovered in the Hohlenstein Stadel cave, Germany (32 ka), the bone Venus figurine of Kostenki, Russia (30 ka), and the ceramic Venus of Dolní Věstonice, Czech Republic (26 ka). The evocative ivory Venus of Brassempouy, France (25 ka) survives as a woman's head and neck. A lamp with an ibex design on its underside (from La Mouthe cave, France, about 19 ka) shows how decoration added aesthetic value to a utilitarian item.

Yet more impressive is a spear thrower—the technical name is "atlatl"—from Le Mas d'Azil, France (about 20 ka). The aesthetic design of this spear thrower—the carved depiction of an ibex or chamois—is fully integrated with the item's utilitarian function. The animal, tail lifted, is shown peering down its back, the whole being perfectly shaped to accommodate the shaft of the spear and to preserve the strength of

the spear thrower. While some people think art must be non-functional, I will argue that many fine artworks not only are functional but also enlist their aesthetic features to help realize their practical purpose.

We also have prehistoric examples of musical instruments. The oldest is a vulture-bone flute dated to more than 35 ka. Drums and rattles are also probably ancient but are unlikely to be recognizable as such—membranes and skins stretched over wooden frames could not survive and natural items can function as drums when struck with sticks or stones. Note also that the hunting bow is of ancient design (64 ka) and doubles as a musical instrument, either bowed or plucked, for people of many hunter-gatherer communities.

For the sake of countering the Eurocentric bias of earlier generations of archaeologists, it is important to note that these ancient artistic developments were not confined to Europe. For example, the rock paintings of Australian Aborigines are of a comparable antiquity and also display striking symbolic power and artistic quality.

Our subject

Consideration of the pursuit of aesthetic experience by our Hominin precursors and of prehistoric art creation by humans prompts a host of questions.

What makes something aesthetically valuable or beautiful and does this vary with the nature of the thing in question and its cultural location?

Do an item's aesthetic properties belong to it or are they projected onto it by their appreciator?

Does aesthetic creation and contemplation always involve disregarding its object's function, as the outsize hand axes imply, or can we also take an aesthetic interest in how something performs its function?

Is there a connection between the notions of beauty appealed to by philosophers in their accounts of art or nature and that considered by evolutionary psychologists with respect to human sexual attractiveness?

Are there universal or overarching standards of aesthetic value?

Aesthetic experience is valued as a source of pleasure and wonder but what is its practical purpose or benefit?

Turning to art, we might ask what makes something an artwork.

Is the value and interest of art exhausted in appreciating an artwork's aesthetic properties or does art also present additionally valuable artistic properties? In other words, do we value artworks solely for their beauty or do we also take into account their style, expressiveness, references to traditions or other works, and so on?

What is the relation between functional artworks, such as religious artworks that illustrate, describe, or enact the group's story of creation, and those intended to be contemplated for their own sakes alone?

To what extent can we understand and appreciate the artworks produced in a culture in which we are not members or in a tradition of which we are ignorant?

How are humble forms of domestic and decorative art connected to esoteric Fine Art and to highly refined and sophisticated avant-garde art?

Which of these, if any, more truly represents art's nature or serves its primary purpose?

Finally we might ask if aesthetic and artistic behaviors are universal and foundational to human nature, as is perhaps implied by their extreme antiquity. More specifically, are these behaviors the product of evolution, either because they directly helped our ancestors survive and successfully reproduce or because they were a by-product of things that did? Alternatively, are aesthetic and artistic behaviors so controlled by what is culturally arbitrary that they have only a tenuous connection with biology?

These and similar questions provide the subject matter of this book. I investigate possible connections between our biologically evolved, culturally situated human natures, on the one hand, and on the other, our interest in the aesthetic generally, whether naturally occurring or humanly created, and our propensity to make and appreciate art.

Looking ahead

My aim here is to investigate possible connections between evolution, art, and aesthetics. To this end, I introduce and evaluate work from a spread of academic disciplines: psychology, neuroscience, anthropology, archaeology, ethology (that is, the study of animal, including human, behavior), evolutionary biology, philosophy of science, philosophy of the arts, art history, musicology, and English literature. The result is a broad view of our understanding of the issues, which suggests the following overall conclusions. Some, but not all, aesthetic interests and responses have biological underpinnings. To that extent those responses reflect our shared human nature. But when it comes to arguments claiming that art is an evolutionary adaptation, we should be more cautious. Adaptationist claims about art are not firmly established. But alternative positions—that art is a by-product of evolution or, alternatively, that it has so little to do with evolution that it must be counted as a non-biological invention of culture—are not more strongly supported. I recognize the tantalizing appeal and plausibility of claiming art as a central aspect of our common biological inheritance. But making the connection depends ultimately on a leap of faith, rather than on appeal to incontrovertible scientific fact.

Part I will be directed to clarifying our key concepts—aesthetics, art, and evolution—and to outlining how they might be connected. In each case I examine current theories and descriptions of their nature. I identify the different models and systems that are appealed to, discuss the competition between them where they are not mutually consistent, and where a range of options remains open, indicate which I prefer.

The importance of being clear about our key notions is apparent from the fact that the likelihood of connections between the aesthetic, art, and evolution depends to some extent on how they are analyzed. For instance, if judgments of human beauty are

universal, this may make it plausible to connect aesthetics with biology. If, contrary to my earlier suggestion, art is a recent Western invention that is not found in other cultures or earlier times, it is very unlikely to be directly related to the selective forces that shaped the character of our distant ancestors. If broad aesthetic preferences pass genetically from parents to their children but artistic talents don't, this would lead us to predict that the connection with evolution is more likely for our aesthetic dispositions than for our art creation. My initial stance favors theories and approaches that make the alleged connection between evolution, art, and aesthetics as plausible as is possible.

There are further reasons for looking closely at the central concepts in the debate. None is straightforward and our "folk" intuitions about them are not always reliable. Moreover, our topic requires an interdisciplinary approach, drawing as it does on areas both of the sciences and humanities. For that reason it is unlikely that all readers will have equal background knowledge. As I will illustrate later, this also comes out in writings on our topic. Some humanists possess only a hazy idea of how evolution operates or of what is involved, beyond noting that we can benefit from art, in connecting art to evolution. Meanwhile, evolution theorists and psychologists frequently operate with such a naïve notion of art and the aesthetic, or with such a reductive approach to the explanation of the relevant behaviors, that it is not clear that they mean what is usually understood by these terms.

As well, this is an area that attracts zealots whose arguments are sometimes steered by strong agendas. Some biologists are keen to explain all human behavior in biological terms, just as some neuroscientists see everything in terms of brain states. And evolutionary psychologists frequently downplay the controversial or speculative character of their methods and hypotheses. Meanwhile, some of the humanists who insist that art is an evolved adaptation seem motivated more by the desire to justify the centrality in human life of what interests them—that is, art—than in meeting high standards of explanatory rigor. For such reasons I generally adopt a critical stance to the evaluation of many of the theories that attempt to connect aesthetics and art to evolution, though my general project is to seek that connection.

In the final chapter of Part I, I will outline the different ways in which aesthetics and art could be tied to evolution. I will suggest that the aesthetic sense is universal among humans and that, in certain areas of aesthetic judgment, there is cross-cultural agreement. Similarly, I will hold that art making is pan-cultural and that almost everyone appreciates one or another kind of art. Indeed, we might all qualify as artists. Some aspects or kinds of art are also cross-culturally appreciable, and even where this is not so, with a little help we can often quickly achieve a partial understanding of another culture's art. These facts are at least suggestive of a link between evolution and both art and aesthetics. As well, we will consider whether the biological origins of our aesthetic and artistic behaviors are likely to explain their current purpose and function. I think this is likely for many of our aesthetic interests, for instance in human attractiveness, but is less so for art.

In Parts II and III, we will put the key notions—aesthetics, art, and evolution—to work. Part II is devoted to the aesthetic. We will first consider our aesthetic interest in

the appearances and powers of nonhuman animals. Subsequent chapters will cover our aesthetic responses to the environment and to human physical beauty. I argue that some but not all of our aesthetic responses are outcomes of how our species' evolutionary history has molded our thoughts and emotions.

Part III turns the spotlight on art. We will explore there whether the arts in general, or certain specific arts in particular, could be products of evolutionary selection because of the enabling role they played in our ancestors' lives; or instead, whether the relevant art behaviors and dispositions came free as a by-product of other evolutionarily beneficial behaviors such as sociability and group connectedness; or alternatively, whether those behaviors are so distantly removed from the effects of evolution that they are best regarded as "technologies," as purely cultural productions. Though these options cover the range of possibilities, I suggest that none is supported uncontestably by the available evidence.

1

The Aesthetic

Aesthetic theory was first systematized by philosophers in the eighteenth century. They identified two aesthetic qualities as primary: the beautiful and the sublime. We are familiar with the former, of course, but talk of the sublime is now less common. The term referred to qualities that made objects awesome or wondrous and sometimes suggested a hint of danger or challenge. As examples of the sublime we might cite rugged, towering mountains or the myriad number of stars in the night sky. The beautiful and the sublime both counted as aesthetic positives. Their negative opposites were the ugly and the bland, dull, or dreary. We are motivated to seek the beautiful and the sublime and when we find them our experience of them is pleasurable.

Nowadays aestheticians are inclined to talk of more specific aesthetic qualities, especially where art is the topic. These include being witty, bouncy, lifeless, serene, clumsy, somber, dumpy, joyful, vivid, realistic, moving, trite, sentimental, tragic, dainty, uncanny, handsome, gloomy, elegant, and garish, for example. And representational and expressive, qualities—being realistic, being sad—are also discussed. We can probably assimilate these features with the more general properties that interested earlier thinkers. What is joyful and elegant is thereby likely to be beautiful. What is uncanny, tragic, and moving is thereby likely to be sublime. The dreary is lifeless and trite. Garishness makes for ugliness, other things being equal.

Underlying and somehow giving rise to all these aesthetic properties are other properties that are not aesthetic or value-laden. For example, a splash of bright paint might be responsible for a picture's energetic character and minor harmonies might give rise to the somber character of a song. The properties that underlie an object's aesthetic qualities are sometimes confined within the boundaries of the object, but often this is not the case. Whether an artwork is realistic or tragic, for instance, depends not only on its contents but also on its relation to a wider context—how the world is, the practices and conventions of an artistic genre, and so on.

Aesthetic experience involves awareness and appreciation of something's aesthetic properties. In my view almost anything can be considered for its potential as a source of aesthetic experience. The object of aesthetic experience might be simple, such as a single color or musical tone; or complex, such as an elaborate painting or symphony. The approach to this object might be spontaneous and uncalculating, even visceral; or it might be deeply informed by abstruse knowledge. An example of the first kind is that of a person who exclaims "Oh! How beautiful!" on seeing a baby's smile. An example

of the second is that of a sports aficionado who savors in a game every tactical nicety, strategic ploy, and all the skills that are distinctive to the sport. His experience of the game depends on his knowledge of the sport's rules, traditions, conventions, history of practice, and point. Provided he seeks and values what in the experience and its object is beautiful or awesome, his is an aesthetic reaction, I maintain; as is also the experience of a person who watches the same game with no interest or knowledge of sport, yet who delights in the beauty of some of the formal patterns thrown up by the participants' movements.

Of course, this is not to say that every perceptually based judgment, preference, or choice is aesthetic. Many such experiences need have no aesthetic component. The pleasure in eating taken by a person on the brink of starvation is not aesthetic. Moral assessment (how kind! that is unjust!), gluttony (how edible!), lustful interest (how beddable!), and all sorts of practical assessments of appropriateness (that works! that would fit better there! how impolite! how apt!) need not be aesthetic. As I've said, aesthetic experience seeks the beautiful or sublime.

The origins of the aesthetic sense in humans

We don't know exactly how or when the aesthetic sense emerged. Because it seems as much a part of human nature as our sense of humor or the stance that assumes that our fellow humans have minds, we can speculate that it has a long evolutionary history. As I indicated in the Introduction to Part I, our extinct humanoid predecessors sometimes seem to have appealed to aesthetic criteria in constructing hand axes. Can we determine why the aesthetic sense arose? Here is one story.

Evolution via selection motivates animals to pursue their genes' interests. In some cases it does so via inflexible programming. With animals capable of learning through experience and modifying their behaviors accordingly, discomfort and pleasure serve as prompts to action. Animals constantly face important decisions about with whom to mate, where to live, and what to do. For instance, the male bird might build several nests that are shown to the female, who opts to lay her eggs in only one of them. Of course these choices are not consciously reasoned but are instinctively generated. They are reactions to the creature's physiological or emotional state. If there were a conscious basis for the choice, it would amount to "that looks (feel, smells, tastes) good (nice, comfortable, pleasant) to me" or "that looks (feel, smells, tastes) bad (unappealing, stressful, painful) to me." The evolutionarily successful animals would be those that were motivated by these instinctual evaluations to make choices that led to the successful propagation of their genes.

As will emerge shortly, with the exception of primates among living animals, I doubt that the just described responses of animals and birds to their environment are aesthetic. And I would certainly deny that insects and crustaceans are aesthetes. Nevertheless, it seems reasonable to me to consider the affective states that are action-motivating for higher animals, such as mammals, as proto-aesthetic, at least in the sense that humans'

aesthetic responses arose from that kind of reaction. Our ancestors uncalculatingly delighted in the beautiful appearance and presence of their mates and children. And they were evolutionarily successful when these reactions led them to choose mates with good genes and with whom they wanted to have children. Similarly, they would have sought as homes places that struck them as attractive and they would have decorated those homes to make them yet more congenial. And the evolutionarily successful ones did thereby succeed in choosing or creating genuinely congenial homes. Many of their other decisions would have been similarly motivated: they opted for what they found intrinsically appealing and rejected what they found intrinsically unappealing. Not only this, what was of purely utilitarian value would come to look beautiful in virtue of fulfilling its function and, in addition, the act of beautifying things added to their value even if it did not improve their functionality.

On this account, rather than being solely about restful, purposeless contemplation, aesthetic emotions guide how we navigate and engage with the world at large and our social relations. We have the ones we have because they lit the paths that were taken by our successful ancestors.

Of course, we discriminate among goods and the pleasures they provide. For instance, we distinguish moral goods and pleasures from aesthetic ones. Can we be sure that what our ancestors found good they also sometimes found beautiful? Apparently so. Humans have displayed aesthetic sensibilities to the limits of known history. But did we first adopt the aesthetic stance early in our species' development or at a later, though prehistoric, time? My proposal is that the aesthetic probably emerged sooner rather than later. As some of the examples of aesthetic experience I gave earlier indicate, aesthetic experience need not depend on cognitively sophisticated forms of reasoning, the development of a full-blown language, or a grasp of abstract concepts and modes of symbolism, as higher-order moral judgments and responses do. When we consider our distant Hominin forebears, there is no reason to think that aesthetic pleasure and displeasure would be less valuable or motivating than modes of pleasure and displeasure they experienced as non-aesthetic. So it's plausible that the aesthetic sense was present in our species and its immediate predecessors from the earliest times, rather than arriving only with the emergence of the highly developed mentality of African humans around 80 ka.

In the following I defend my account of aesthetic experience by comparing it to two alternatives. The first, which is often presumed by biologists and psychologists, equates aesthetic experience with perceptual pleasure. This strikes me as implausibly liberal. It would extend the aesthetic sense far beyond the primates to much simpler life forms. The second account of aesthetic experience has provided the dominant paradigm in philosophical aesthetics for more than two hundred years. In my opinion it conceives of aesthetic experience too narrowly by characterizing it as abstracted from practical concerns, as unconcerned with all but the form of its object, and as always cognitively sophisticated in its operation.

Do other animals possess an aesthetic sense?

The Scottish philosopher Thomas Reid anticipated Charles Darwin in maintaining both that animals have an aesthetic sense and that this appropriately orients each species to its way of life. In 1785 he wrote:

> This instinctual sense of beauty, in different species of animals, may differ as much as the external sense of taste, and in each species be adapted to its manner of life. By this perhaps the various tribes are led to associate with their kind, to dwell among certain objects rather than others, and to construct their habitation in a particular manner.

Darwin believed that birds, mammals, and even insects possess aesthetic taste, though he was clear that they find things beautiful that to humans are ugly.

> When we behold a male bird elaborately displaying his graceful plumes or splendid colours before the female, whilst other birds, not thus decorated, make no such display, it is impossible to doubt that she admires the beauty of her male partner. As women everywhere deck themselves with these plumes, the beauty of such ornaments cannot be disputed.
>
> If we admit that the females of the Homoptera [that is, aphids, cicadas, leafhoppers, etc.] and Orthoptera [that is, grasshoppers, locusts, crickets, etc.] appreciate the musical tones of their male partners, and that the various instruments have been perfected through sexual selection, there is little improbability in the females of other insects appreciating beauty in form or colour, and consequently in such characters having been thus gained by the males.

Among the birds to which Darwin drew attention was the bowerbird. This is a genus of eighteen species found in New Guinea and Australia. The males build elaborate constructions—huts, towers, walled avenues, moss platforms with parapets—according to species-specific patterns. They decorate these with colored items, with different species favoring different colors. And they dance and display to the females that visit their bowers. Some people have shared Darwin's view that the mating choices of female bowerbirds are made on aesthetic grounds. And it is sometimes suggested also that birds have an aesthetic appreciation of birdsong. Charles Hartshorne, an ornithologist and aesthetician, observes:

> Birds and other animals sing and thereby win and keep mates and, in many cases, also territories; but the energetic persistence in singing may be sustained by a feeling, however primitive, for the beauty (i.e. the "unity in contrast") of the sounds they are making.

Yet other theorists are more cautious, as I would be too, suggesting instead that the *precursors* of human aesthetic taste are found in such behaviors. And many hold, further, that aesthetic taste is among the features that distinguish humans from all other living creatures. The psychologist Yrjö Hirn wrote in 1900:

> It is hard to believe that the hen really has reached such a state of spiritual freedom that, when looking at the finery and antics of her rival suitors, she could be able to bestow her attention upon the aesthetic qualities of the display.

He went on to argue that the purpose of the male's display is the sexual stimulation of the hen. Even animal advocates have generally been reluctant to embrace the idea that the reactions and choices of animals have an aesthetic dimension.

The biologist's standard story about bird display is that the female selects for "good genes" by checking their outward exhibition in terms of health, vigor, and the capacity to sustain the cost of elaborate plumages. Now, if beauty correlates closely with good genes, the biologist's story is consistent with the view that the females choose on aesthetic grounds. In other words they could target good genes by choosing beauty. This, at least, is the position supported by Geoffrey Miller, an evolutionary psychologist. The aesthetician Wolfgang Welsch also holds that the females choose for beauty but he disagrees with Miller about there being a correlation between beauty and good genes.

Welsch argues that small alterations to a creature can drastically affect its beauty without altering its health and vigor. Then he observes that peahens do not inevitably prefer the peacock with the most eyespots in his tail—occasionally they pick a male with fewer but more symmetrical eyespots. This symmetry makes for beauty but not for good health. So, that the peahen opts for symmetry indicates that her choice is a purely aesthetic one, he maintains.

This argument is unconvincing, however. Symmetry is in fact one of the more reliable indications of good genes and of a history of immunity from disease, as I will outline further in Chapter 7. So even if it is true that peahens take the symmetry of peacocks' tail eyespots into account, this does not show that they are choosing on aesthetic grounds as opposed to choosing for good genes. And the claim that small changes in symmetry can have a damaging effect on beauty without indicating a corresponding lack of good genes is also doubtful. Where the difference in symmetry is a product of the bird's natural history (and not of the intervention of a human experimenter), small differences in symmetry can be significant signs of the bird's underlying condition. The considerations raised by Welsch fail to show that Miller's position is mistaken.

Choosing for beauty could be consistent with looking for signals of good genes. But is the peahen's choice in fact an aesthetic one, as both Miller and Welsch agree? Where is the argument to that conclusion? In general, theorists are very vague about how the choice takes on its alleged aesthetic character and Miller and Welsch are not exceptional.

Here's one argument trying to show how the female bird's response to the male's displays is aesthetic. Behaviors that are in our genes' best interests are often self-motivating because we experience them as intrinsically pleasurable. We act in ways that are conducive to our biological flourishing because we enjoy doing so, not because we calculate their biological consequences. For instance, we enjoy food, drink, sex, sleep, and exercise for their own sakes. And this is almost certainly how it must be for many animals and birds. They are not capable of the self-conscious calculation of biological benefits and costs, so they must be guided by pleasure and pain, emotion and

instinct. The female bird selects her mate because his appearance is pleasurable to contemplate. To experience pleasure in the contemplation of appearances is to respond to beauty. Therefore, hers must be an aesthetic response.

I take the following quotation from Welsch to represent a version of this argument:

> Aesthetic judgment is essentially a judgment based on *pleasure*—not on a concept or on objective analysis. The *appearance as such* must be experienced as *pleasurable*, without any need for knowledge of why this is so. When the peahen is excited by the peacock's display of his beautiful plumes, she takes delight in the beauty of his ornament and performance and nothing else. She performs an *aesthetic* judgment.

Similarly, Alex Comfort, author of the best-selling 1972 book *The Joy of Sex*, suggests:

> If animals show behavioural evidence of sensory preferences which do not depend on conditioning to, or instinctive pursuit of, something else, such as nectar, only human exclusiveness seems to stand in the way of calling this an aesthetic experience. At least it is difficult to distinguish it formally from an aesthetic experience.

The simple equation of an aesthetic response with perceptually founded pleasure recurs persistently in the biological literature and is found in Darwin's *Descent of Man*, where he characterizes the sense of the beautiful as "the pleasure given by certain colours, forms, and sounds." Likewise, the primatologist Frans de Waal: "We are not the only species to take pleasure in self-created visual effects, hence . . . the aesthetic sense probably has older roots than is often assumed." Robert Joyce claims: "Esthetics is traceable through the animal kingdom and the vegetable kingdom down to inorganic matter." In sum, a widespread view, especially among biologists and psychologists, is that a response is aesthetic if it is a perceptually based, positively or negatively charged emotional reaction.

The problem with this approach was noted earlier: appearances can give rise to pleasurable experiences that are not aesthetic in character. Perhaps the hen bird's pleasure is that of lustful anticipation. Or perhaps it amounts to "that looks good (right) to me," which is not exactly equivalent to "that looks beautiful to me." And in any case, among insects and crustaceans, females respond to male signaling but most of us would not think of their motivation or experiences as involving aesthetic taste. So where in animalkind does the experience take on its aesthetic hue or are we the only aesthetes?

It's not easy to answer these questions. Of course we can identify animals as making choices, which is not to assume that they deliberate or are conscious of choosing, and we can detect physiological and other signs of their arousal and pleasure. It is not clear how to work out how those choices are experienced by them, however, and that is the crucial matter. Do they find what they see beautiful as well as pleasurable to look at?

Nevertheless, it seems plausible to me that we are likely to share our aesthetic sense with our primate cousins and other higher animals, but to a limited extent. Though he is an enthusiast and conducted hundreds of experiments on ape "art," Desmond

Morris, a zoologist and ethologist, carefully qualifies his estimate of chimpanzee aesthetic taste:

> They show compositional control, but a minimum of it; they show calligraphic development, but a minimum of it; they show aesthetic variation, but again at a minimal level.

In some respects aesthetic experience is like an emotion—it is an attention-focusing, value-charged response to how we find the world. Both aesthetic and emotional responses can play an important role in learning by getting us to focus on what is important for us. I am confident that higher animals share our basic emotions, such as fear, happiness, and anger. The aesthetic sense is no less fundamental a way of engaging with the world than those emotions are, so I would not be surprised to learn that some of their experiences include an aesthetic dimension. Not that they will sit in entranced contemplation, apparently without regard to utilitarian interests or consequences. Unlike those people who assume that the aesthetic stance must be disengaged from utility and who would then argue that animals cannot experience aesthetic states because their activities are never decoupled from the business of life, I maintain that aesthetic experience is consistent with practical concerns. The cat will seek the lap for warmth and comfort but that may be compatible with its relishing the experience in an aesthetic fashion.

What about the birds? There's an obvious reason why they are discussed—our primary sense is that of sight and, unlike most mammals, birds see color much as we do. Their plumage displays attract our aesthetic admiration along with the interest of their potential mates. Is there an aesthetic element in their responses to each other, as Darwin proposed? I don't know but I doubt it. By contrast with birds, the aesthetic lives of dogs, assuming they have them, are likely to be quite different from ours by giving prominence to smell over sight. Imagine the delight they might take when presented with what are to them appealing odors of symphonic complexity!

The Kantian theory of the aesthetic

I've sketched my view of the aesthetic. I identify it with the kind of experience to which it gives rise and with the kinds of properties on which that experience focuses, these being in the most general classification those of beauty, the sublime, or their opposites. And I've rejected as too liberal the position that regards all pleasurable or unpleasurable perceptual experience as aesthetic. But neither my view nor this second one conforms to the model of the aesthetic developed in the eighteenth century, which culminated in the theories of the philosopher Immanuel Kant. Because this traditional view came to provide the dominant paradigm and because elements of it percolated through to be accepted by a wider, general public, it is important that I explain why I find it too narrow and cognitive. As I go on to explain, it is too narrow in confining aesthetic interest to the appreciation mainly of form. And it is too

cognitive in making central to aesthetic experience a special kind of interaction between the appreciator's imagination and understanding.

What became the model for an understanding of aesthetic experience was provided in Kant's discussion of what he called *free beauty*. The outline of his position is as follows: aesthetic experience is a delight taken in the beauty of the form of its perceptual object. This beauty is apprehended via interaction between the observer's imagination and understanding, both directed to an object. We reflect on its form, imagined in different ways and from different points of view. In particular, this interaction is one of "free play," which means that it is not governed by concepts and classifications. We are supposed to put aside knowledge of what kind of thing the object is, including what it is for, how it is produced, and so on. Aesthetic experience is disinterested, which is to say not connected to our goals, interests, or desires.

Some later theorists extended the notion of disinterestedness, making it the hallmark of aesthetic experience. They maintained that aesthetic experience must be appropriately distanced—not too close to one's own concerns to bias the experience nor so far from the object as to produce indifference. To achieve this distance, it was argued, the aesthete must put aside all knowledge of the experience's object. However, there were challenges in the 1960s to the supposition that aesthetic experience requires the adoption of a distinctive psychological attitude, such as "distance," as against ordinary attention. These were among the first arguments that led aestheticians to question claims for the psychological distinctiveness of aesthetic experience.

For Kant, aesthetic experience requires a degree of complexity both in the process of its perception and in its object. The process involves interaction between the perceiver's imagination and understanding, while the object must possess sufficient elements to present a form. In these respects, Kant thinks that aesthetic experience is distinguished from sensuous or simply sensory pleasures, that is, from experiences of what he called the merely agreeable. Gut reactions of pleasure to the experience of ice-cream, sex, a vivid color, or a baby's smile are too simple and unreflective to count as aesthetic, according to Kant. They are unsophisticated, desire-based, under-distanced, overly sentimental, unframed. In short they leave too little room for free play between the imagination and understanding. By contrast, the disinterested perception of free beauty always involves this free play. What is merely agreeable does not require aesthetic discernment for its perception, Kant held, and only such discernment is capable of evaluating objects as beautiful.

By the way it separates aesthetic experience from practical interests and restricts the focus to the object's formal features, and also with its emphasis on the cognitive sophistication of the response, Kant's theory may provide a plausible model for the appreciation of Fine Art. It is not congenial, however, to accounts aiming to connect aesthetic and art behaviors to the very practical evolutionary business of survival and reproduction. Nevertheless, so influential are Kant's views that some biologists and psychologists have acquiesced to them in their discussions of art, even where this hamstrings their accounts. A striking early example of this occurs in the work of the

ethologist Ernst Grosse. Writing in 1897, he maintained that all cultures have art but his deference to Kantian formalism forced him to argue, quite implausibly, that "primitive" art is never connected with religion. He reasoned in this Kantian fashion: if the attitude to art must be disinterested, art could never be primarily involved in practical goals such as serving religion.

A broader account of the aesthetic

Kant's model of the aesthetic rejects most of my earlier examples of aesthetic experience. The approach of the person whose interest in the sports game abstracts from its nature and focuses on its form conforms to the Kantian framework. But in Kant's view, a striking shade of blue or a baby's smile can provide only the pleasure of the merely agreeable, not aesthetic enjoyment. They are not formally complex, and perceptual experience of them does not require interaction between the imagination and understanding. Meanwhile the sports connoisseur's appreciation is too conceptually structured to qualify as a concern with free beauty. It is too concerned with classification, rules, and purposes.

Kant's distinction between free beauty and the merely agreeable obviously has important implications for his account of the aesthetic. To begin, it's easy to see why he is a formalist—there's not much other than form left when we abstract from the aesthetic object its agreeability, its purposes, roles, or uses, and its identifying class. And in turn, his formalism suggests that the source of the aesthetic resides exclusively in the perceptible contents of its perceptual object. Moreover, by rejecting aesthetic content of the sensuous and sensual kinds, Kant privileges the distal senses of vision and hearing over the proximal senses of touch, oral taste, smell, and kinesthetic awareness when it comes to aesthetic experience. And to focus again on Kant's positive characterization of free beauty, it is striking how he brackets off all background knowledge and conceptual classification from aesthetic experience. His views have been challenged on all these matters and it is to these criticisms that I turn.

A wider palette of properties and a move away from formalism

Kantian formalism holds that only qualities such as being unified, balanced, integrated, dynamic, graceful, and delicate are responsible for the production of the higher, more abstract properties of beauty and sublimity. As I noted at this chapter's beginning, modern aesthetic theorists typically expand the list of good- and bad-making properties. We could say that they have widened the notion of the aesthetic so that it includes more than the beautiful and the sublime, or alternatively, that they have stretched the notions of the beautiful and the sublime to include more than the formal. I prefer this second description.

Some of these additions may be regarded as controversial. For instance, the philosopher John Morreall argues that *cuteness* is an aesthetic property (and that our reaction to it is an evolved response). So far as high art is concerned, cuteness lacks seriousness and

subtlety, he observes, but this shows that it's a second-rate aesthetic property for Fine Art, not that the reaction is not aesthetic in nature. Though not everyone would agree, I share the view that cuteness should count as an aesthetic property.

Inclusion of the everyday

The Kantian view is generally presented as identifying nature and art as the primary objects of valuable aesthetic experience. But as well as expanding the range of aesthetic properties, aestheticians have also contended that they have a wider scope for application. Writing in the 1930s the pragmatist philosopher John Dewey was among the first to argue that the everyday is a legitimate source of aesthetic experience. In his opinion, any intense, unified, and complete experience qualifies as aesthetic. Contemporary aestheticians largely agree that we should not disqualify an experience from the realm of the beautiful solely in terms of its comparative lack of magnitude or gravitas. And we should question the idea that what is simple or crude always provides a lesser experience. For example, it has been argued that itches can be a source of aesthetic experience.

Proximal versus distal senses

Dewey also argued against confining aesthetic experience to the distal senses of sight and hearing. He thought that the proximal senses of touch, taste, and smell are capable of providing aesthetic experience. (It has also been suggested that proprioception—that is, a person's kinesthetic awareness of her body—could be added to this list.) Most of those who defend the aesthetic interest of the everyday agree that all the senses, including olfactory experiences involving smell and taste, can afford aesthetic experience. One result has been recent closer attention to the aesthetic qualities of food as well as of wine, beer, and whiskey. And Richard Shusterman, a philosopher, has developed an account of what he calls "somaesthetics," which emphasizes the aesthetic character of bodily self-presentation and awareness, including sex acts.

Not all of the aestheticians who believe that the everyday can be a source of aesthetic experience also accept that the proximal senses have aesthetic significance, however. Glenn Parsons and Allen Carlson defend Kant's distinction between the aesthetic and the merely agreeable. They claim, more particularly, that Kant's differentiation of aesthetic and bodily pleasure is apparent in the different experiences to which they give rise and is respected in linguistic practice, not only in English but in Chinese and Turkish as well. Moreover, they share Kant's fear that any amelioration of the distinction commits us to accepting that all aesthetic judgments and evaluations are inescapably personal with none more appropriate or true than any other. (Many people assert that taste is purely subjective but aestheticians tend to argue for a degree of interpersonal validity in such judgments. And whatever they assert, most ordinary people do expect others to share their most valued tastes and question the discernment of those who do not.)

It isn't obvious that the acceptance of aesthetic experience can come via the proximal senses commits one to accepting that aesthetic value is entirely subjective, such that no one person's aesthetic evaluations can be measured against another person's. Food, whiskey, wine, and beer are all judged competitively. This acknowledges that experience of them can be informed and refined through practice, through a knowledge of traditions and of widely accepted standards, and through appreciation of makers' intentions. It isn't clear that the judgment of Fine Art is more objective than this.

And even where the search for beauty in the everyday is more personal because it is motivated by a need for self-definition and self-development rather than for public agreement, this need not be sufficient to reduce that experience to something eccentric. It may be true that, as regards much of the everyday, we value personal enjoyment and enrichment above objectivity and interpersonal agreement, but aesthetics can expect and tolerate a fair degree of relativism in its judgments without collapsing into extreme subjectivity.

In general, I think that some aesthetic judgments are objective in the sense that there can be interpersonal agreement about them on the part of observers who are suitably skilled, knowledgeable, and practiced. But perhaps even here an element of personal taste remains in their shared judgments. And in any case, I accept that many aesthetic responses are idiosyncratic in being confined to small subgroups or even, occasionally, to individuals. Maybe a person has to be a teenage, heterosexual female to uncover the wit, pathos, and charm of a certain novel. Perhaps it is necessary to have experienced the horrors of war or the untimely death of loved ones to appreciate the full extent of anguish, repulsion, and loss in the works of some First World War poets. Given the diversity of any individual's tastes and preferences and the potential usefulness to her of others' aesthetic judgments, what matters, I suggest, is not universal agreement over aesthetic values and rankings but degrees of consensus.

Simple aesthetic properties

For Kant, an aesthetic object must offer sufficient complexity to sustain free play between the imagination and the understanding and sufficient elements to present a form. He tended to assume that bodily experiences involving the proximal senses must be simple and so reducible to the merely agreeable. This is not always the case, however. Consider the experience of fine dining, which encompasses the ambience and display of the meal's setting, the succession of balanced courses and complementary wines, the conversation of companions, and so on. This example shows that some experiences relying heavily on the proximal senses can be complexly structured and can take into account conventions and traditions.

Kantian formalism assumes that aesthetic pleasure always arises out of the cognitive interplay between the imagination and the understanding. We can allow that this is sometimes the case while claiming that sensuous experience can also be a source of aesthetic pleasure or displeasure. In other words, aesthetic experience need not always

be thoughtful or cognitively complex, and its object could be a perceptual simple that does not offer a variety of elements and relations among them. This is not to say that the pleasure we take in ice-cream or chocolate always is aesthetic. But where we relish and take delight in the beauty of colors, sounds, felt textures, or tastes—a monochrome paint patch, an isolated musical note, the touch of velvet, the aroma of coffee—that experience might be genuinely aesthetic.

Classification and the object of aesthetic experience

We can agree that aesthetic appreciation frequently involves a concern with its object for its own sake, rather than as a means to some end that could be specified prior to engagement with that object. This does not entail, however, that an interest in the thing for itself or for its own sake could and should be indifferent to the fact that the thing is a thing of a certain kind. Its membership in a kind is inextricably mixed with its identity and individuality. If we are to be interested in *it* for its own sake, we need to know what "it" is.

It is a mistake, therefore, to suggest that conceptualization makes the response non-aesthetic because too "interested." Where they are relevant to its identity, appreciation of an item's meaning or significance is involved in appreciating it for its own sake. In the case of art, identifying the work and noting its appreciable features usually depends on locating it with respect to the art-historical traditions, genres, conventions, and practices that it presumes as its background. We might not be able to appreciate a play "for its own sake" if we don't know that it is a satire, for example. And, in the case of nature, it's widely held that aesthetic appreciation presupposes scientific knowledge about ecological systems and biological species as well as about their histories. According to this idea, aesthetically appreciating a landscape might presuppose recognizing how it was formed and the relations between the creatures that populate it.

Functionality

If the object of appreciation is of a kind characterized in terms of its function, an aesthetic interest should often take its functionality into account, rather than ignoring this as the Kantian model enjoins. This applies both where the function is artifactual and humanly designed and where it is a natural proper function, such as the heart's function of pumping blood. It is true that, if the item fulfills secondary aesthetic purposes independent of its functionality, its aesthetic appreciation can be indifferent to the function that is its primary goal. For instance, if a pot is decorated with abstract designs we might consider these for their aesthetic interest independently of judging how well the pot holds what it is supposed to. In many cases, however, the manner in which an item serves its primary function can itself be a crucial source of aesthetic interest and satisfaction. For example, a mechanic might rejoice in the wonder and beauty of a complexly constructed engine as it works perfectly to do its job.

Accordingly, a full account of aesthetic experience should consider how this relates to its object's functionality. Yet that dimension is entirely absent from accounts that take Kant's notion of free beauty, and the separation from concept and functionality that this requires, as their archetype of aesthetic experience.

The idea that beauty measures the adequacy of things for their nature or purpose has an ancient pedigree alongside the more Kantian notion that beauty is a matter of formal proportion and harmony. In the *Memorabilia* (of about 2370 years before the present) of the historian Xenophon, it is related that, when asked if the same things are both beautiful and ugly, Socrates replied:

> Of course – and both good and bad. For what is good for hunger is often bad for fever, and what is good for fever bad for hunger; what is beautiful for running is often ugly for wrestling, and what is beautiful for wrestling ugly for running. For all things are good and beautiful in relation to those purposes for which they are well adapted, bad and ugly in relation to those for which they are ill adapted.

I suggest that aesthetic evaluation with respect to a utilitarian item's functionality involves a judgment about the input made by its aesthetic properties to its overall functional success, or more generally an aesthetic appreciation of how it brings off this success. An item can be functionally beautiful in two ways: either it possesses aesthetic properties that contribute positively to its performing its intended, principal function, or alternatively, it achieves its functionality in an aesthetically appreciable manner. In other words, an item that is beautiful in either of these ways is beautifully functional, not solely beautiful and functional. We should acknowledge as genuinely aesthetic a broad class of judgments in which the beauty of objects is seen as depending at least in part on how they meet their primary function. The beauty of a chair depends not only on its being stylish and graceful, say, but also on its having these qualities in a manner that makes it comfortable to sit on, stable, and supportive of the back.

The "location" of aesthetic properties

Kant thought that there is an element of projection or sentiment in our identification and appreciation of aesthetic properties. He holds that the aesthetic property is bound up with our response to it, so there is a sense in which it belongs to us as much as it belongs to the object in which we find it. I disagree. I hold that aesthetic properties belong to the object in which they are detected, not that they are projected onto that object by the perceiver. Of course, only observers with the appropriate perceptual and other sensitivities will be able to detect an item's aesthetic features. But in the same way, only a bird receptive to certain wavelengths of reflected light can discriminate the ripe berries by their color. We should be no more inclined to posit the human projection of aesthetic character onto its object than to maintain that the bird projects color onto the berry.

Are there morally improper aesthetic responses?

As I indicated previously, many aestheticians and philosophers of art approve of the liberalization of the notion of the aesthetic for which I've been arguing. There are some respects in which my view departs from the mainstream, however, as I now outline.

I noted above a tendency for traditional theories of the aesthetic to regard as improper responses motivated by the wrong attitude—interest rather than disinterest, for example; or directed to objects not worthy of it—such as chocolate. Along with this, there is also a tendency to regard these improper responses as not genuinely aesthetic, much as a false friend is not genuinely a friend at all. While the extreme form of this attitude is now often rejected, one idea frequently retained from the traditional account is that aesthetic experience should be directed to an object regarded *as the object it is*, not in some way incidental to its identity. For example, in environmental aesthetics it has been argued that formalist, art-based, and impressionistic approaches to natural environments fail to respect their identity as *natural environments*. Much subsequent debate has centered on what respecting them as natural environments requires by way of background knowledge from a well-situated, aesthetically motivated observer. The implication is that the analysis of aesthetic experience should exclude inappropriate responses and perhaps also that unwarranted responses are thereby non-aesthetic.

I agree that it is important to specify under what concepts the object of attention is appreciated when it is appreciated aesthetically—as a home, as an investment, as a work of architecture, as potential firewood, for example. I accept also that, among the possibilities, those that identify it for what it is are primary. Aesthetically appreciating a book for the story it contains is more relevant to its identity than appreciating it as a potential doorstop. But I see no reason to suppose that less thoughtful or more speculative, imaginative, and perverse (if you will) ways of regarding the object cannot result in genuinely aesthetic experiences. A response that is mindlessly spontaneous can, nevertheless, be directed to an item's perceived beauty, sublimity, or to the opposites of these. And one that is unsuited to its object because it thinks of that object in a way that ignores some key aspect of its identity is not thereby deprived of its aesthetic dimension. Books can be aesthetically appreciable as potential doorstops.

These opinions lead me to disagree with the stand taken by Parsons and Carlson when they discuss humans' aesthetic appreciation of nonhuman animals. They deplore approaches that appreciate animals as exotic or symbolic, that anthropomorphize them in a kitsch way, or that consider them solely for their formal features. Such approaches involve "relating to them in a shallow, and hence morally inappropriate, manner." The moral issue arises, they suggest, because, though animals are not themselves moral agents, they can be treated immorally by humans. Animals ought to be respected for themselves. Our aesthetic appreciation should recognize and depend on the nature of the animal that is its object. We should consider an animal's traits or characteristics in

terms of their proper function of matching it to its environment, and it is the animal's looking adapted to its situation that should be the source of aesthetic pleasure.

I share the thought that we can take pleasure in an animal's suitedness to its environment and way of life, but I think alternative approaches to animal beauty are not inappropriate or immoral in the way that is suggested. For instance, we might consider a bird as if it is a mobile sculpture. (I will explore this and other alternatives in Chapter 5.) Of course, these forms of appreciation are partial if they disregard the animal's kind, but this does not entail, as Parsons and Carlson apparently assume, that they must therefore be superficial or shallow. I might take a deep and studied delight in the patterned intricacy of a bird's plumage without regard to its functional beauty, that is, to how the bird's feathers provide camouflage, insulation, and the possibility of flight. The Dinka, herders of East Africa, are connoisseurs of the markings of their cattle and have a large vocabulary of terms for describing these markings. Cow colors are often used by them as the first names of their children.

If we accept for the sake of the discussion that a focus on an animal's unfamiliar, formal, symbolic, or humanlike features is not only partial but also shallow, still there is no warrant for the assumption that the response is thereby morally suspect. Undeniably it would be so if we made decisions affecting the animals solely on this inappropriate basis. For example, it would be immoral to decide to exterminate ugly-looking species just because of the way they look. But so long as it does not lead to immoral behavior, there need be nothing untoward in pursuing and enjoying an aesthetic response that is shallow. And if we are liable to unconscious bias in favor of "pretty" or "cute" and against "ugly" animals, this suggests that we should guard against the bias where it could lead us to act or judge wrongly, not that we should condemn out of hand any aesthetic interest in the animal that does not focus on how it fits into its environment.

Finally, it is mistaken to insist that the anthropocentric standpoint is inappropriate to the proper aesthetic appreciation of animals. After all, we are considering *our* responses to and judgments about *them*—not one lion's aesthetic judgments about another, if lions make such judgments—and it is reasonable to expect our judgments to connect to our interests as well as to theirs.

There is no doubt that animals can be and often are morally wronged by humans. But I doubt that there's a direct connection between that fact and the adoption of an aesthetic attitude to an animal's appearance that is partial or even shallow.

Artistic versus aesthetic properties

I have characterized the aesthetic in terms of its properties and the experiences directed to them and I have suggested that all sorts of things, including human artifacts, might possess such properties. Obviously this includes artworks, which are a special class of humanly produced items. Artworks can possess aesthetic properties and can be appreciated for doing so.

Much art has representational, expressive, or symbolic content that can be assessed in aesthetic terms. For instance, we might judge the landscape depicted in a painting to be beautiful or the emotion described in a novel to be painfully powerful. But in addition to this aesthetically evaluable content, we judge the work in which it appears for its own aesthetic character. The manner in which the landscape is depicted or the emotion is described can be beautiful. When it comes to the assessment of art, these latter aesthetic properties are the more relevant. We should be more concerned with the beauty or otherwise of the portrait than with the beauty or otherwise of its sitter.

It is also important to note, however, that there is often more to the value of art than the value of the aesthetic qualities it presents. In particular, we should distinguish artistic from aesthetic properties and note that the former as well as the latter are relevant to art's assessment. Artistic properties include reference, allusion, quotation, allegory, symbolism, irony, humor, art-historical location, genre, and style. A work of art might be masterfully witty in ways that do not implicate its aesthetic properties. Indeed, conceptual artworks that are about the *idea* of carrying out a specified performance, whether or not it is actually enacted, might have no perceptible properties. This might be the case with a 1970 work by Yoko Ono, specified as "Draw an imaginary map . . . Go walking on an actual street according to the map." It is not clear that this work is performable at all.

Some people would expand the list of aesthetic properties to include those I have identified as artistic. It might be reasoned that, if the notion of the aesthetic has already grown in the ways indicated previously, there should be no objection to extending it further. For my part, however, I would prefer to retain the connection between the aesthetic and the perceptually sensible qualities of things. And I would add that there are features that draw us to art, and that are relevant to its appreciative comprehension, other than its perceptually sensible features. So I think that the distinction between aesthetic and artistic properties performs a useful conceptual service.

Mention of artistic properties leads us to this book's second main topic.

2

The Nature of Art

I am not going to attempt a technical definition of what art is. I think there's a high degree of agreement about paradigm instances of art and that this agreement concerns not only the products of highly refined Western art traditions but, as we saw in the discussion of prehistoric cave art, items produced in other cultures and periods. Nevertheless, use of the word "art" sometimes is controversial and contested, so I need to make clear what I take the term to encompass.

If we are to connect art to evolution by means of its centrality to human nature, it's plausible to think that we will need a humbler notion of art than one restricted to Western Fine Art of the past three centuries. Rather, we can anticipate that art must be pan-cultural and ubiquitous, as well as prehistoric in origin. It should be found in hunter-gatherer cultures as well as in the court, church, and the modern state, in tropical forests as well as contemporary cities. That this is the case is sometimes denied, however.

The alleged eighteenth-century invention of art

Larry Shiner, a philosopher, argues that our concept of art was a product of the European eighteenth-century Enlightenment. It was then that the arts were first grouped together—formerly, music was classed with mathematic and astronomy, for example. Moreover, at this time art was distinguished from and contrasted with craft and the artist set apart from the artisan. (Previously art was contrasted with nature and everything humanly made was regarded as a "work of art.") Histories recording the lives of artists were written, as were the first works of art criticism. Many of the institutions we now associate with art, such as the museum and the public concert hall, came into being. The works presented there were treated as being for serious contemplation, rather than as peripheral entertainments. And philosophers such as Edmund Burke, the third Earl of Shaftesbury, Francis Hutcheson, David Hume, and later Kant theorized about art to an unprecedented extent.

There can be no denying many of the wholesale changes to which Shiner draws attention, but it is difficult to embrace the idea that Greek tragedy and the works of Michelangelo, da Vinci, and Shakespeare are not art. And even if Aristotle and Plato placed art in the broad category of the humanly created, they plainly recognized the cluster of arts as sharing related functions and status. If their concept differed somewhat

from our current one, the overlap is considerable and significant—sufficiently so that we can know that they were talking about what we refer to as art. Moreover, we can question the claim that the philosophers of the eighteenth century successfully identified the nature of art for the first time. As we saw in Chapter 1, the aesthetic formalism that many of those earlier aestheticians saw as central to art's nature has been challenged and revised.

In fact, much of what was unique in the developments of the Enlightenment was a consequence of the economic emergence of a middle class that aspired to the values of the ruling elites, including their appetite for Fine Art. The members of this class demanded and created the conditions for art's public reception. But there is no reason to conclude that any of this amounted to the invention of a fresh concept. Perhaps there was more of a focus on the idea that art should be non-utilitarian, but religious and other forms of functional art continued to be created as before. Indeed, we might suspect that being contemplated for its own sake alone is just another function that art can serve. Besides, all forms of art, including the functional, have always invited and rewarded contemplation in terms of what makes them the works they are. Even if dance, music, drama, picturing, and poetry typically are servants of ritual and religion in many foraging cultures, that is not sufficient to show that they are not thereby art.

In Chapter 1 I suggested that aesthetic appreciation need not be opposed to consideration of how an item achieves its utilitarian function. The same argument applies to art and explains how the aesthetic value of functional art often enhances and facilitates its efficacy, as opposed merely to piggybacking on its function. In fact, for much of art's history, aesthetic quality and functionality were expected to be mutually supportive. Art enriched ritual and helped convey religious lore, for instance. Indeed, some of art's most sublime achievements are displayed in pieces that reconcile the highest aesthetic qualities of design and display with a demand for the economical and efficient realization of functions that go with significant constraints on what is workable. Many medieval cathedrals could serve as illustrations.

My position opposes the idea that considering art for its own sake involves viewing it as if it is non-functional. Though much art created since the eighteenth century has been intended for contemplation in a fashion that holds in abeyance any interest in its practical usefulness, here Western high art departs from its history and from art as it has existed in most other cultures. So I disagree with the aesthetician Denis Dutton who identifies as a hallmark of art that it invites "disinterested" attention that separates its appreciation from practical concerns. (On the other hand, I applaud the broadness of the concept of art that he defends and his interest in exploring how art might be connected to evolution.)

What falls under the concept of art?

It might be thought that the universality of art follows straightforwardly from the observation that all cultures have music, poetry, narrative, drama, dancing, and

picturing. This argument would be too fast, however, if not all music, poetry, and so on should be counted as art. "Happy Birthday" and the catchy jingle that advertises the phone number of the local pizza parlor are music, but I'd be reluctant to count them as art, even assuming a humble view of what art is. Similarly, I don't think most storybooks for 4-year-olds, mnemonic rhymes, illustrations in manuals for assembling furniture, my last waltz, and games of charades make the grade. These are among the reasons why we cannot define art as the sum of the art forms.

Yet even if we cannot define art as the sum of the various art forms, the ubiquity of many of these art forms and the sophisticated, energy-consuming devotion with which they are pursued and enjoyed are almost incontrovertible evidence of art's universality. If we are to detect the presence of art, it will often be useful to look for familiar modes of art making, such as singing, dancing, carving, narrating, dramatizing, and painting. An example might be the decorated betelnut paraphernalia in the Massim cultural area of east New Guinea and the Trobriand Islands. This is stylistically distinctive but plainly counts as a form of carving. It is also possible, however, that an artwork is not in one of these common artistic categories and stands outside all established artistic traditions. Perhaps Japanese paper folding is an example. Is there another approach that will give us a reliable indication of what falls under the concept of art?

A common strategy adopted by theorists is to characterize art as a "cluster" concept. A list of characteristic properties is provided. None of these is essential for something being art, but various (usually unspecified) combinations do suffice for something being art. For example, the philosopher Berys Gaut's list is: (1) possessing positive aesthetic properties, (2) being expressive of emotion, (3) being intellectually challenging, (4) being formally complex and coherent, (5) having a capacity to convey complex meanings, (6) exhibiting an individual point of view, (7) being an exercise of creative imagination, (8) being an artifact or performance that is the product of high skill, (9) belonging to an established art form, and (10) being the product of an intention to make a work of art. According to him, Egyptian art is art because it satisfies (1), (2), (4), (5), (8), and (9) though it does not satisfy (3), (6), (7), and (10). In other words the satisfaction of a limited set of these conditions is sufficient for something's being art.

An alternative cluster is proposed by Dutton. He holds that art typically (i) provides immediate experiential pleasure and not utility, (ii) displays skill and virtuosity, (iii) exhibits style, (iv) has novelty and demonstrates creativity, (v) is subject to critical judgments and appreciation, (vi) involves representation, (vii) attracts special focus and is bracketed off from the everyday, (viii) expresses individuality, (ix) is emotionally saturated, (x) offers intellectual challenge, (xi) is associated with art traditions and institutions, and (xii) evokes imaginative experience. Of these, the last is identified by Dutton as the most significant.

The "cluster" approach can successfully highlight characteristic features of complex, multifaceted practices, but I do have reservations about its account of art. The first worry is that such lists often display an ethnocentric bias in favor of the features that were accorded prominence in philosophers' Enlightenment and Romantic accounts of

European art, for instance, by listing originality and cognitive complexity, distinctness from the everyday, and expressive individuality, while bypassing stylistic faithfulness, deference to tradition, and uncomplicated accessibility, which are all usually more important in traditional societies. But the most pertinent criticism in the present context is that the cluster theory does not deliver what we are after, which is an account that allows us to map the concept by indicating what falls under it. In other words, cluster theories do little to help us identify art as such.

Suppose we are faced with some item of possible art and we wonder if it qualifies. We note that it has properties (2), (3), (4), (5), (7), and (9) from Gaut's list but not (1), (6), (8), and (10). That is no help to us unless we know whether the combination of just these six properties is sufficient for something being art and we would know that only if some uncontroversial cases of art qualified on precisely those grounds. But if we were uncertain about the art standing of the present piece, though we clearly recognize the art-relevant properties it has, then all similar cases should be equally controversial. The calculation would become yet more intractable if, as seems likely, the various features vary in their importance from case to case. Without specifying exactly which combinations of the properties are sufficient for something being art and under what circumstances, which is something cluster theorists never do, the cluster theory is of no help to us. Though both Gaut and Dutton maintain that their theories can help us settle the status of marginal and disputed cases of possible art, I think they are mistaken in this.

In general, attempts by scientists to characterize art's nature strike me as no more helpful than philosophers'. Kathryn Coe, an anthropologist, sees three conditions that must always be satisfied for something to qualify as visual art: it must be humanly made, must use color, line, pattern and/or form, and must have no function other than to attract attention. The natural historian R. Dale Guthrie considers as art making "a certain class of actions that are not overtly necessary for the operational demands immediately linked to reproductive *fitness*." Lawrence S. Barham, an archaeologist, adopts a definition according to which art is "the medium conveying awareness of a perceived reality to the sensory perception of other humans." I have earlier challenged the assumption adopted by Coe and Guthrie, that art must be non-functional, but here the key problem is that in other respects all the definitions are too inclusive. Much that we would not ordinarily count as art—crude doodlings and clumsy graffiti, for instance—satisfy these inadequate proposals. Just as many scientists cheapen the notion of the aesthetic to the point where all sense-based reactions would qualify, some of them do the same for art, with the result that claims for connections between art and humans' evolved behavior become trivially true.

I believe we will do better to adopt a multi-stranded account that acknowledges the different ways in which something can qualify as art: something is art (a) if it falls under an established, publicly recognized category of art or within an established art tradition, or (b) if it is intended by its maker/presenter to be art and its maker/presenter does

what is necessary and appropriate to realizing that intention, or (c) if it shows excellence of skill and achievement in realizing significant aesthetic or artistic goals.

The first two conditions acknowledge that different cultures may have distinct artistic traditions and that different art traditions might not include all the same art forms (though we would expect a considerable overlap). The final condition allows the possibility of something being art even if it falls outside all art traditions and publicly recognized art categories and even if it has the primary function of being for some purpose other than contemplation for its own sake. The need for this final condition is apparent when we consider the circumstances under which the first artworks were created. Such works pre-dated art traditions and publicly established categories of art. They would have been made by people who either did not possess the concept of art or had only a rudimentary conception of art. Here, skill and achievement take the place of intentions, traditions, and categories.

Together these conditions are probably inadequate to art's definition. I don't doubt that some works of art fail them and that some non-artworks satisfy them. But our task was to identify our subject matter by providing a characterization that will track what falls under the concept of art with some accuracy. The suggested conditions do that, I believe.

Art making and the concept of art

Some people might accept that there is sufficient continuity across several millennia of Western culture to show that art has a long history there, but nevertheless balk at allowing that non-Western cultures have art. Common assumptions are that only those with a concept of art can create it and only those with a word for art can have the concept. Coupling these assumptions with the observation that most cultures have no word for art delivers the conclusion that they do not have art.

Several responses are available. As consideration of the first art just now suggested, it might be possible to create art even if one lacks the concept. A person without the concept could not label what she had created as art, but that does not show that it could not be art that was made.

Besides, the assumption that most cultures lack a word for art should be challenged. Many cultures do have a word or a phrase that seems to correspond to "art." Indeed, some cultures, such as those of China, Japan, Southeast Asia, India, and the Middle East, as well as smaller-scale African civilizations such as the Yoruba, Akan, and Igbo, have art institutions, traditions, recorded histories, and bodies of theory and criticism that parallel those of the Western world of Fine Art. Similar traditions of art criticism and institutionalization also occur in some small-scale societies.

Also, other cultures may have the concept of art even where their languages do not apparently distinguish it clearly from other things or practices. Our behavior is a better marker of what we know and believe than the presence of an explicit, articulable linguistic concept. No culture is without music, narrative, drama, dancing,

and picturing. Moreover, at least some of the musical, storytelling, dramatic, dancing, and picturing practices of other cultures are treated seriously, with appropriate critical interest in and respect for what is thereby skillfully achieved. These facts should count positively toward the conclusion that they have art.

Finally, we can sometimes identify in other cultures art forms not shared with the West. Indonesian shadow puppetry, the Japanese tea ceremony, and Islamic calligraphy are plausible candidates. Again, the skills required of practitioners and the serious attention that goes into their appreciation speaks for their status as art forms.

When such considerations are weighed it would be churlish, ethnocentric, and insulting to deny that art is present in all cultures. Not surprisingly, many diverse theorists claim universality for art. In many cultures, though, art is tied to ritual or other functions, not reserved purely for contemplation.

Consider an imaginary culture of islanders who perform elegant, difficult, extended dances in their temples as offerings to their gods. Their island attracts missionaries and tourists. Following their religious conversion their temples stand derelict, but they now present the same dances for the enjoyment of tourists. I would not agree with the suggestion that the islanders have acquired art where they had none originally. Nor would I agree with the cultural purist who holds that their indigenous art is lost. I would say that they had art originally and that their gods were art connoisseurs. And I would maintain also that they have preserved their art, though it now does not contribute to their religious experience, so long as the aesthetic values and methods of their tradition are retained so that, were they still to be watching, their former gods would recognize and approve of what they saw.

Prehistoric art

Not only is it reasonable to regard the production and enjoyment of art as currently pan-cultural, there is every reason to believe that the deliberate pursuit of artistic excellence is historically as ancient as recognizable signs of culture and symbolic thinking. As I noted in the Introduction to Part I, the paintings and carved objects associated with caves and dating back as far as 35 ka are confidently deemed to be art by those who examine them.

Australian rock art may be of similar antiquity. Because Australian Aboriginal culture survives, we can also take note of its artistic richness, which includes elaborate sand drawings, song cycles, narratives, and dance rituals, none of which leave a physical trace. Presumably these artistic behaviors, along with those of other present-day foraging cultures, have the same venerable age as early cave art. That these art practices frequently are linked to religious ceremonies, rites of passage, and moments of social celebration counts for, not against, their claim to art status, I think. As I argued earlier, art can be utilitarian and the fact that it can immeasurably elevate the experience of socially or personally significant occasions testifies to its importance for humans.

Is art made by other animals?

Among the definitions offered of *Homo sapiens* was the suggestion that we are the tool-using animal. That view is now rejected. Many creatures have been found to make and use tools. In addition, many of our other seemingly distinctive capacities, such as emotionality and self-consciousness, are apparently present to some degree in other animals. So it would not be completely surprising if the idea that we are the art-making animal is also challenged and eventually displaced.

For other animals to make art, they would have to have an aesthetic sense. Given their cognitive limitations they are unlikely to be makers of subtle forms of conceptual art, so we should expect their artworks mainly to highlight the appeal of perceptually accessible aesthetic properties. As a corollary, we can also anticipate that their art should be apparent to us as such, provided our sensory world overlaps with theirs.

In Chapter 1, I considered whether some nonhuman animals have an aesthetic sense and the conclusion reached was equivocal. So the suggestion that some nonhuman animals make art rests on shaky ground. Nevertheless, just as there are people who are convinced that animals display aesthetic taste, there are those who think that those same animals make art. It is said that the bowers of male bowerbirds are works of art. Others take more qualified positions: for example, that the bowers are art but might better be viewed as ritualized display; or that they are precursors of humans' aesthetic products and of art; yet weaker, that we recognize something artistic in the birds' bowers; or, damning by faint praise, that they would show artistry were they made by humans.

It has also been suggested that paintings by chimpanzees and elephants are artworks, that percussive bimanual drumming by African great apes on resonant objects, including themselves, is equivalent to human drumming and is a precursor of human instrumental music, and that elephants and humpback whales make music.

The philosopher George Dickie speaks for the negative with respect to chimpanzee art. He defines arthood as a status conferred by someone acting on behalf of an artworld—an abstract social entity generated out of artistic practices, works, genres, theories, and traditions. It follows that chimpanzees can't create art because they couldn't conceive of themselves as members of an artworld. Their paintings could be turned into art, however, if someone with the appropriate institutional credentials displayed them as such. This argument is not convincing if we allow, as I would, that art can be made outside of an established art tradition by someone who does not possess the concept of art.

Dutton also denies that chimpanzees are art makers. He complains that they paint over their own work and, when they stop, they show no further interest in what they have painted. But the cave painters of the late Paleolithic often drew their pictures over existing ones, and artworks created for ritual use in tribal societies are often discarded as soon as they have played their role.

Thierry Lenain, an art theorist, offers a more compelling argument for the negative. The patterns that chimpanzees paint are rigidly stereotyped. They show no autonomy with respect to the pictorial field, which is presented to rather than selected or constructed by the chimpanzee. In other words, there's nothing to suggest that the world of the chimpanzee painting could extend beyond the boundaries of the fixed frame. Whereas humanly painted patterns take on an aesthetic life independent from the action of producing them, this is plainly not so for the chimpanzees. Lenain maintains that the ape's aim is not aesthetic but is rather to disrupt and destroy the blank space in front of it. Alternatively, it has been suggested that chimpanzees draw to replicate familiar shapes, such as the fan shape of the hand, but again without artistic purpose. And perhaps it is significant that painting behaviors do not normally occur in wild chimpanzees, being humanly induced.

Let us return to the bowerbird. In suggesting that the bowers are artworks, the geographer Jared Diamond notes that their construction and decoration are not rigidly programmed. There is a "cultural" element involved, which allows some scope for artistic creativity. Young birds must learn local styles by observing the constructions of older males.

Yet this is not decisive. Most songbird males inherit their species' basic song pattern but learn the local dialect and detail from other birds. Birds raised in isolation sing the unelaborated basic song, which is crude by comparison. In the wild, the song changes over time, but slowly and subtly. British bird species introduced to New Zealand more than one hundred years ago sing species-specific songs that are immediately recognizable by today's European tourists.

Moreover, the kind of change to which their songs have been subject—some syllables elaborated but others lost—is indicative of random alteration. There is no evidence that the males attempt to make the songs more elaborate and thereby more appealing to females. So it is a mistake to compare change in birdsong with the generativity of language and music—that is, with the capacity of human speakers and singers to produce novel utterances and songs. In addition, birdsongs are not hierarchically structured as human music is. Human music is very clearly ordered into phrases, melodies, chorus, verse, etc., whereas birdsong is not.

Darwin calls birdsong music. Others regards it as art and even compare the structure of some birds' songs with sonata form in classical music, claiming that the parallel arises because, like us, birds desire to break the monotony of repetition without losing sight of the unifying theme in their compositions. I do not wish to underrate the beauty of birdsong, but this kind of comparison strikes me as fanciful. At the other extreme are Josh McDermott, a neuroscientist, and Marc D. Hauser, an evolutionary biologist. In their review of the scientific literature, they conclude that human and animal songs are neither similar in form nor evolved to serve corresponding functions, "and thus have little to do with each other." Others acknowledge the differences between human music and animal song but argue that, for the study of evolution, the search for commonalities may be important.

I would certainly deny that birds' songs are literally artworks or that they overlap significantly with art music in form or function. Nor do I agree that Diamond's appeal to the role of avian "culture" in the bowerbirds' behavior shows them to be artists. Diamond also notes that the bowerbirds will sort poker chips by color and display them alongside the similarly colored items they favor. This demonstrates that the birds are fussy about color but very undiscriminating in other respects, which shows how inflexible are the biological programs that govern the construction and decoration of their elaborate bowers.

We do not think of the peacock as an artist because he grew his tail. And we do not think of birds as artists for the nests they build, though many of these are "works of art" in the sense of being works of extraordinary skill. I suspect we should view the bowerbirds' bower as equivalent. In other words, the bowers are part of what is known as the extended phenotype—organism-defining products of the creature's genes that fall beyond its body—not artifacts it makes. The bower is remarkable, certainly, and it may be pretty, but the male's repertoire of behaviors is severely circumscribed and comparatively inflexible. For instance, he would carry on the same even if there were no females or rivals to inspect his efforts. We should think of the bower standing to him as the elaborate courting plumage and displays of male birds of paradise stand to them. (Indeed, there is evidence that bowers evolved to replace courtship plumage that put the males at risk of predation.) If he is no artist, what he creates is not an artwork.

Why have bowerbirds attracted so much attention? I allow that their bowers and behaviors are fascinating, but I also suspect that they are advantaged by certain of our biases. Darwin paid them heed and that gives them a degree of esteem. Also relevant, I suspect, is a presumption that artworks are artifacts and that in seeking animal artists we should therefore focus on ones that build or mark the environment in a striking fashion. Beavers, for instance, would be of interest if only their dams and lakes were made to be more pleasing to our aesthetic senses. But this prejudices the case of more plausible candidates: many animals are singers or dancers.

Bees "dance," but not to make art. Some birds have gorgeous songs—the nightingale deserves the accolades it has received; and some are charming dancers—cranes, for instance; but most lack the potential even for minimal creativity and on this score cannot count as artists. A few kinds of birds—some parrots and corvids (ravens and crows)—display a considerable (but very alien) intelligence, but none of these are noted as singers. (Some parrots dance to human music, however.) The same applies, I believe, to our monkey relatives. A number of monkeys vocalize and gibbons are noted as singers of stereotyped, species-specific songs, but we should not be tempted to think of them as composers of music.

Perhaps the most plausible candidate for artist here is the humpback whale. Male humpback whales sing long, complex songs. The elements of these songs seem to be hierarchically ordered, which is a distinctive feature of human music. Members of the same population sing the same song, but this continuously and rapidly evolves and

changes. This is suggestive of the musical generativity that I claim is absent from birdsong. The bioacoustics researcher Katharine Payne notes:

> Such changes, which affect the song at all levels, seem to arise through improvisation and imitation rather than through accident or as conveyors of information.

She speculates that sexual selection (which will be outlined and discussed in Chapter 3) is the "driving evolutionary force behind song change."

As we will learn in following chapters, it is regularly suggested that art arose in humans as an instrument of sexual selection, which is all about attracting mates via competitive display. Of course, it is not solely the element of sexual display that makes the result art—bowerbird males also make bowers to attract mates, but that does not make them artists, I have said. It is humans' imaginative creativity and freedom (within stylistic constraints and art-making traditions) that mark them as artists. And something similar can be said of the whales: that they reveal creative flexibility in the production and development of their songs.

Are male humpback whales artists and their songs artworks? I don't know, nor am I sure what kinds of tests could definitively settle the issue. But it seems to me that they are the most likely contender among our fellow creatures.

3

The Theory of Evolution

The theory of evolution is associated most famously with Charles Darwin and Alfred Russel Wallace. The basic principles of the theory of evolution by natural selection are as follows. Individuals of a species differ. These differential features are a result of random mutations or of unique combinations of inherited genes. Some of these differences make the individuals possessing them relatively better adapted to their environment. As a result, those individuals are comparatively more able to flourish and out-compete than other members of their species. If these adaptive characteristics are heritable, this comparative advantage can be passed to the successful individuals' descendants. Other things being equal, heritable adaptive features spread throughout the population over time because those who have them survive and reproduce more successfully. A variant that produces 1 percent more offspring would increase in frequency from 0.1 percent to 99.9 percent of the population in just 4,000 generations.

This simple account invites closer consideration. Neither Darwin nor Wallace understood how adaptive traits are transmitted from one generation to the next. It was Gregor Mendel, a scientist and Augustinian friar, who provided the first account of genetic transmission. According to what then became the classical version of the theory of evolution, the *unit* of selection is the individual creature, not the group or the species, and the *mechanism* of inheritance is solely genetic. More accurately, the creature's genes might be identified as the items on which natural selection operates. But genes come packaged in individuals and, in sexual species, are propagated via the matings of those individuals.

These tenets of the classical theory have been queried. *Multilevel selection theory* suggests that, under certain conditions, natural selection can operate on groups, not just on individuals. In other words, differences in the comparative fitness of groups can be a factor in determining which groups survive. *Developmental systems theory* identifies the unit of selection as the life cycle and argues that what matters is that the necessary developmental resources are available to each generation, not that those resources are passed down biologically. For instance, as was mentioned in Chapter 2, songbirds inherit the outline of their song but the song reaches its species-typical form only through exposure to other singing birds. Developmental systems theory rejects any sharp distinction between what is genetically inherited and what is supplied by the environment. Rather, these two unite to form the systems under which individuals develop as members of their species.

In addition to these new theories, the explanatory model central to the theory of evolution has been applied more broadly to explain change through competition in other spheres. For instance, it has been argued that cultural ideas and inventions, or "memes" as they are called in this context, survive or not according to evolutionary principles of selection. And just as branching trees of descent are used to map the evolutionary relationships between species, similar trees are used to chart relations between languages.

Among the humanists who argue that art is an evolutionary adaptation, it is not popular to adopt meme theory, which draws an (arguably very strained) analogy between cultural and biological processes of transmission, rather than connecting art to biology. Nor do they acknowledge developmental systems theory. These humanists are keen to inherit the respectability and persuasiveness of classical Darwinian theory when seeking a scientific basis for the importance of the arts. As we will see, it is common, however, for them to argue that art is adaptive in virtue of the benefits it bestows on groups, not solely on individuals. I suspect this is because it is easier to support a connection between our penchant for art and our evolved human nature by this route. For instance, whereas adaptationist hypotheses about individuals should consider the genetic heritability of the characteristic in question, this need is less obvious where the group occupies the explanatory spotlight because groups persist and flourish as the result of social rather than biological transmission.

Unless indicated otherwise, I will assume as the default position the classical theory of evolution via natural selection, but there is a modern refinement to that theory which I should make explicit. Along with many present-day evolutionary theorists, I assume the truth of *gene-culture coevolution* (aka *dual inheritance theory*). In other words, I reject what has been called the "avocado" model, according to which biology provides the individual with a primitive core of one kind and culture surrounds this substrate while being of a very different kind. The theory of gene-culture coevolution emphasizes that humans are a joint product of biology and culture and that culture modifies biology just as biology affects culture. Here are some examples of culture affecting biology: humans' dentition, jaw size, and gut have reduced in response to our comparatively recent diet of soft foods; the peoples who domesticated cattle became more lactose tolerant; and increased resistance to malaria followed the move to agriculture.

I also would question the common assumption that, after a glacially slow process, evolution completed its work millennia ago and everything that distinguishes modern people from the earliest humans is a product solely of culture. For one, our immune systems are pitted in a constant race against pathogens and we are immune to viruses and illnesses that would have killed the earliest modern humans. And there is evidence of changes in brain size over the past 5,400 years. The reality of gene-culture evolution makes clear that human evolution is ongoing and potentially rapid, especially under conditions of environmental instability.

Sexual selection

In *The Descent of Man and Selection in Relation to Sex* (first published in 1871), Darwin introduced a second evolutionary process, that of sexual selection. Just as humans can selectively breed plants and animals to accentuate features they desire, so preferences within a species for mates with certain characteristics convey those favored features to the resulting offspring. More specifically, because of their higher investment in the egg and its development (and in subsequent offspring care, if this occurs), it is the females who are choosy about the males with whom they will breed. And because males benefit more than females from multiple matings, it is the males who compete for females. The peacock's tail is the most often cited example of the outcome of this process. Peahens choose to mate with the male with the highest number of tail "eyes." Whether they know it or not, they select for good genes because that tail is a reliable signal that its possessor can obtain the food needed to grow and maintain it and that he is able to flourish despite the handicap the tail imposes on his capacities for flight and predator avoidance.

Sexual selection is not always driven by female choice. Instead of competing for the attention of females, males in some species simply fight, or threaten to fight, with control of breeding females going to the winner. Deer and elephant seals are examples. This strategy also leads to sexual dimorphism—marked physical differences between males and females—by favoring increased male bulk or larger weaponry. But I concentrate on sexual selection via female (and male) choice because, if human evolution depends on sexual selection, that is the form it takes.

There are several respects in which sexual selection is unlike natural selection as it was characterized earlier. Whereas natural selection operates on random mutations, sexual selection is powered by the choices of members of the affected species. One consequence of this is that it can produce rapid change, as in the case of what is known as *runaway* selection. Suppose the females of a bird species prefer males with bigger head plumes, then the size of males' head plumes will keep increasing under the pressure of the females' choices until some limit is reached. The process might continue, for example, to the point where the cost of producing a larger head plume is unsustainable. Meanwhile, the preference for bigger head plumes will spread through the female population.

In addition, sexual selection and natural selection seem to invoke different notions of fitness. Fitness under natural selection involves the match between an individual and its environment, whereas under sexual selection it is a matter of the individual's attractiveness to a mate, which often means the capacity to sustain heavy costs that make their bearer otherwise less well suited to his environment. As already noted, the peacock's tail is costly and makes its owner more vulnerable to predation.

Despite these differences, theorists now tend to depart from Darwin's view of the separateness of these processes and subsume sexual selection under the broader remit of natural selection. Doing so involves two steps: a new account of fitness in terms of

potential reproductive success and the assumption that the process of sexual selection tracks this kind of fitness. On this view, we might measure fitness in terms of the number of a person's genes that will survive into the future; and fitness is *inclusive* if we include in the count genes which the person shares with his relatives and which are passed on by them. The peacock's tail exhibits this fitness—that is, his reproductive quality—though the tail is costly and potentially dangerous, and in these ways does not ideally match him to his environment. If we also assume that females choose mates for features that display or correlate with the quality of their genes, sexual and natural selection come into line. As the paleontologist George Simpson observed:

> By this broader but not anti-Darwinian definition [of fitness], sexual selection, to the extent that it does occur, is not an alternative to natural selection but a special case of it.

Darwin's account of sexual selection made a direct connection with aesthetics. He thought the mate choices made by females were aesthetically motivated. The idea here is that the peahen chooses her peacock not because she makes a calculation of his comparative fitness and not because she consciously tallies the number of "eyes" in his tail but because he strikes her, or his tail does, as beautiful. If Darwin is right about this (which I queried in Chapter 1) and if sexual selection has played a significant role in the evolution of *Homo sapiens* as well as of peafowl, then interdependence between two of our topics—aesthetics and evolution—is already secured. Men and women select their mates at least in part for their beauty.

But the theory of sexual selection was challenged from the outset and neglected until well into the twentieth century. This was in part because of skepticism about Darwin's claim that the mate choices made by female animals, birds, and insects are aesthetically motivated. That aspect of the theory implies that humans' aesthetic sensibilities do not separate us from lower animals, and many people found this implication unpalatable. Exaggerated male signaling to females is common in many crustaceans and insects that we don't think of as possessors of aesthetic taste.

Though the theory of sexual selection is now rehabilitated, its contemporary versions tend not to give it the aesthetic slant that Darwin favored. On the modern account, it is maintained that, while females are instinctively drawn to what serves their biological interests in producing healthy offspring, this need not involve deliberation, whether aesthetic or not. And even where there might be something like decision-making in the selections of high-order nonhuman creatures, we can allow that they pick what they like or what seems right to them without holding that choice to be aesthetic in character. In general, the favored view now is that male adornments attract females not because they are experienced as beautiful but because they signal health and fertility. Such signals are honest because they are too costly to be forged by comparatively unhealthy, infertile males. The use of expensive markers of fitness is known as the "handicap principle" or costly signaling theory.

There were other reasons why Darwin's account of sexual selection did not appeal to biologists of the time. For one thing, it made the nature of maleness hostage to the

capricious whims of females. Wallace preferred to explain the gaudy colors of male birds and the horns and ornaments of masculinity as a by-product of the energy that males possess in more abundance than females. In favoring these features, females choose not for beauty but directly for quality, he held. Another view is that these markings serve primarily in species recognition. In some cases, extreme male traits can develop simply as a consequence of females' need to recognize their own species, not to discriminate among its males. In addition, sexual selection was initially regarded as suspect because it did not bear out the early assumption—an assumption that is now rejected—that evolution works for the good of the species.

A further problem was that it was not clear how aesthetic preferences, if they did not track good genes, could predict evolutionary success. This issue was addressed by R. A. Fisher, a population geneticist, who explained how the female benefited evolutionarily by selecting for beauty, even where it does not signal fitness. By producing sons who are attractive to females, a mother improves her chances of having grandchildren. Female preference for a certain male feature results in reproductive success, provided more females share that preference than any alternative. Males whose beauty caters to the dominant female preference are more reproductively successful as a result. In other words, rather than *tracking* fitness, beauty can *create* it. Fisher vindicated Darwin's view that sexual selection may be distinct from natural selection because it need not be about the detection of good genes.

It certainly is true that females do not always prefer markers of good genes. One case is too charming not to mention. When colored bands were assigned to wild zebra finches (for the purpose of identifying individuals), it turned out that the females preferred males with green or red rather than orange bands and males preferred females with black rather than blue or orange bands. Plainly the band's color did not improve its wearer's genes, so the choice did not track fitness. Was the choice aesthetic, then? More likely it is the result of biases built into the birds' perceptual systems. Such a choice might lower reproductive success or leave it unaffected. In this case, however, the most attractive (black-ringed) females bred more successfully. It is not easy to explain why. Perhaps birds that gained mates that were attractive to them put more effort into raising offspring.

Whatever applies to other creatures, for humans (and perhaps also our Hominin predecessors) mate selection often involves an aesthetic component. As I will explain further in Chapter 7, evolutionary psychologists attempt to show that what we find beautiful correlates with health and fecundity. Human beauty then is a reliable signal of fitness provided that it is sufficiently demanding to produce and cannot be faked.

There are further respects in which mate choice, and thereby sexual selection, does not apply to humans as it does to other animals. For example, in our species males and females are fairly similar in form and size; competition between women for male partners is as active as it is among men for female partners; and heterosexuals of both sexes are involved in signaling their potential fitness as partners. But these facts can be explained by reference to the mating strategy that in humans optimizes the chances of

reproductive success. Children are most effectively raised in long-term partnerships in which the male invests considerable effort and receives in return a fairly reliable guarantee that the offspring of the partnership are his own. By contrast, in those species where sexual selection produces gaudy males and striking sexual dimorphism, it is commonly the case that only one or a few males are chosen by all the available females for mating and the males contribute only their sperm to the next generation. Further, when humans come to selecting a breeding partner, both sexes aim for the highest quality spouse they can attract (aka assortative mating) and both place a high value on fidelity (as I will discuss and document in Chapter 7). It follows that all members of both sexes are in competition for mates—that is, for long-term partners—and all are keen to signal their quality as potential breeders and parents. In other words, sexual selection is bound to operate much more even-handedly among humans than among many other species.

We will return to the place of sexual selection in Chapter 8. The theory provides one plausible way of tying art to evolution. If artists are displaying skills and talents that indirectly but honestly indicate that they have better genes, then art might stand to human reproduction as the peacock's tail stands to peafowl reproduction. Their art would signal their health and fertility and make them attractive to potential mates. Tales of the amorous successes of chart-topping pop musicians, famous artists, successful film stars, and sports heroes are sufficiently common and reliable to make this hypothesis initially credible. In this vein, Geoffrey Miller, an evolutionary psychologist, regards our minds as overpowered multi-channel entertainment devices with which we attempt to interest and attract each other. The arts are among the most highly functional elements within these amusement systems, he holds.

Evolutionary psychology

With the dominance of behaviorism for much of the twentieth century, psychology forgot about the mind. So when attention was focused on human evolution, it was from the direction of human behavioral ecology. The result, sociobiology, was subject to withering criticism for its gene-centrism and the social conservatism of some views it presented. In the 1980s, Evolutionary Psychology emerged as a new approach to human evolution that shifted attention from behavior to the mind. In particular, it argued that many cognitive mechanisms operate as automated programs, each directed to solving specific problems faced by our distant ancestors. (This is sometimes referred to as the thesis that our minds are massively modularized.) These problems concerned, for example, facial recognition, emotion detection, acquisition of knowledge of natural science, mate selection, cheater detection, fidelity monitoring, and the facilitation of cooperation under the threat of defecting free riders. It is held that these former adaptations leave their mark on present-day human psychology, and that by matching them to the past circumstances to which they were successful responses we can understand the origins and direction of humans' evolved psychology.

Anatomically modern humans (*Homo sapiens*) emerged by 160 ka or earlier. Those people may have been psychologically "modern" also. They had the same neural systems for perception, emotion, motor action, and thought as we have. This is doubted, however, by those who date the emergence of the modern mind to the later European "cultural explosion" of about 45–35 ka, when, among other things, the first European cave art was created. But it is now widely accepted that the cultural innovations and advances documented for Europe were widely anticipated in Africa and the Middle East by many thousands of years.

Whatever date we settle on for the appearance of psychologically modern humans, it is posited by evolutionary psychologists that many of our emotions and ways of thinking, imagining, and reasoning are likely to have been evolutionary adaptations geared to deal with the challenges our distant forebears faced as group foragers on the savannas of the Pleistocene—that is, in the period 2.5 ma to 12 ka—which is sometimes referred to as the environment of evolutionary adaptedness. The new subdiscipline of Evolutionary Psychology set itself to infer what those challenges were and how they shaped our minds. Among the most famous practitioners of Evolutionary Psychology are David Buss, Leda Cosmides, Stephen Pinker, Donald Symons, and John Tooby.

Central assumptions and doctrines of Evolutionary Psychology have been criticized. Among them is the idea that human evolution ceased 20 ka and that the mind is like a Swiss army knife in being comprised mainly of specialized routines (aka modules) many of which operate unconsciously. Also in doubt is the supposition that many human behaviors are developmentally fixed, inflexible, and highly structured responses to fixed conditions and environments. Similarly, the suggestion that human sexual behaviors and preferences are also highly stereotyped can be questioned. By contrast with these views, contemporary evolutionary psychologists are now more likely to stress humans' neural and behavioral plasticity in response to contingency, variety, and change. They emphasize how highly developed we are socially and culturally. They stress our cognitive differences as well as commonalities. And they are more liable to hold that evolution works in tandem with culture rather than in opposition to it.

The methods of Evolutionary Psychology have also been challenged. Central among these methods is "reverse engineering," that is, reasoning backward from our current behaviors and ways of thinking to work out how those were adaptations to conditions of our ancestral past. It has been suggested that this approach results in imaginative fictions that cannot be tested or substantiated. These are said to have no more credibility than Rudyard Kipling's "Just So" fables in which, for example, the leopard was given its spots by an Ethiopian who transferred black from his skin on the tips of his fingers to the spotless leopard, and the elephant gained its trunk when a crocodile grabbed the elephant child's short nose and pulled.

Undoubtedly, evolutionary psychologists sometimes make unwarranted inferences about how our ancestors were and how they came to be as they were. And it is unsettling to come across half a dozen or more different, apparently unrelated accounts

of how some bit of behavior was supposedly adaptive for our predecessors. There is also the difficulty that the "problems" to which adaptive behaviors were the solution often were moving targets, involving ongoing inter- or intra-species adjustments and complex feedback loops. For instance, changes in a prey species' defenses could provoke responses in its predators that affected the environment of our ancestors, and so on. Allowing this, it can be difficult (or impossible), starting from the present, to track the layers of change. Another issue is that, for humans, the social environment more than the physical one is crucial to our behavior. Whereas we can know about the physical environments our ancestors lived in, we must speculate about such matters as their group size, birth spacing, dominance hierarchies, breeding relationships, and the like.

Yet, as a method, reverse engineering is in principle no more unreliable than other forms of abductive reasoning—that is, reasoning from some state of affairs to the best explanation of how it came about—which is regarded as an acceptable scientific method within the philosophy of science. And even if we should be cautious in applying reverse engineering, we should be equally wary of assuming that most of the things we see in nature are non-adaptive by-products of now untraceable adaptations. There are as likely to be as many by-product Just So stories as there are adaptationist ones.

The hopeful, positive outlook maintains that the more we learn about the history of our species, other Hominins, and the environments in which they survived, the more scope there may be for refining the explanatory hypotheses generated via reverse engineering. The skeptical and pessimistic alternative holds that, if those environments were sufficiently diverse and complex, it might be difficult to establish any hypotheses as credible, especially if there is doubt about when or where the behaviors in question originated.

In addition to reverse engineering, Evolutionary Psychology can and sometimes does support its conclusions with other methods, such as study of nonhuman primates, of present-day hunter-gatherers, of child development, of how the brain works, and of how brain deficits and damage affect those who have them. In addition, sometimes evolutionary psychologists have predicted unexpected but confirmable results about aspects of contemporary behavior. For example, Cosmides and Tooby showed that people perform better on a standard test of conditional reasoning when the topics are about human interactions. Though the form of the arguments are the same, people follow them better when they are about social relationships and norms than when they are about descriptive or causal rules. This result supports the idea that there is a domain-specific module that deals with social relations.

The central premise of Evolutionary Psychology—that we have inherited (some) ways of thinking and perceiving, emotions, personalities, and values because those behaviors and attributes promoted the survival and reproduction of our distant forebears—can hardly be denied. And Evolutionary Psychology is bound to play an important role in understanding our minds and what makes us distinctively human. But evolutionary psychologists now are inclined to drop the capital "E" and "P." In

other words, they reject many of the assumptions and models on which earlier versions of Evolutionary Psychology were based, such as the idea that our minds mainly operate in an automatic, modularized fashion. New style evolutionary psychology accepts that our psychology to some extent reflects the minds of our human predecessors and draws on previous research, but is more open to the variety of ways and the flexibility with which our minds work.

In any case, given the subject of this book it is inevitable that we must explore and assess ideas propounded within evolutionary psychology of both the early (capitalized) and later (lower-case) forms.

The standard of proof

We are now in a position to be clear about what is to be expected from a successful theory tying evolution to aesthetics or art and the standard of proof to which it can reasonably be held.

Many of the theories connecting aesthetic or artistic practices to evolution take this form: they claim that we are heirs to the relevant universal traits or behaviors because they were adaptive for our prehistoric predecessors under their conditions for existence. If it stopped here the theory would be weak in two ways. It does not explain how the behaviors were adaptive or what they were adaptations for. Nor does it tell us anything about the current state of the relevant practices. It does not explain their ongoing importance for modern humans. Not surprisingly then, most theorists attempt to say how the behavior improved the evolutionary success of our ancestors and why, or why not, we are also affected. Almost inevitably, this extension of the theory involves conjecture. We are too ignorant about the lives of our forebears to avoid this. Of course we should avail ourselves of the latest scientific information on the matter, but this generally leaves answers to crucial questions under-determined.

I am sympathetic to this difficulty. I don't mean to fault theories for being speculative in part, especially if they acknowledge the extent to which they go beyond the evidence. But where a range of very different proposals about the evolutionary significance of some behavior are in competition, with none clearly established as superior to all others, which is often the case where aesthetics and art are the topic, it will be more appropriate to reserve judgment than to opt for what we might like to be true.

Another common feature of the theories we will encounter deserves to be noted. Many claim that aesthetic or art practices are evolutionarily adaptive beyond the ways they affect its members. That is, these theories adopt a commitment to multilevel selection theory and depart from the classical Darwinian model of evolutionary explanation that focuses on individuals or their genes. This has two consequences. First, the account is thereby weakened in explanatory power. This is because genetic inheritance provides a strong explanation of the faithful replication of beneficial traits over the long term, assuming the environment is stable; whereas the preservation of group benefits relies on

cultural transmission, which is less accurate and reliable. Second, there is a change in what counts as relevant evidence. The spotlight falls on competition between groups rather than between individuals. And it is necessary to show in addition that the force of this competition is more significant for group survival and success than the effects of competition within the groups between their members.

I have no objection to theories that appeal to multilevel selection theory as against classical Darwinian models. But I am suspicious when this occurs without acknowledgment, without apparent awareness of the weakening of explanatory power, and with no attempt to consider the change in what evidence is relevant.

4

How Might the Aesthetic, Art, and Evolution be Related?

If there are connections between aesthetics and evolution and between art and evolution, what evolutionary roles could aesthetics or art play? There are three candidates. First, they might be adaptations, that is, transmissible capacities that increased the fitness of those who displayed them so that their possessors parented more extensive and far-reaching lineages. Examples of adaptations are the oxygen-fixing qualities of blood and development of feathers in birds. Second, they might be by-products or spandrels, that is, adventitious side-effects of adaptations without adaptive significance in themselves. Examples of spandrels are the navel and the redness of blood. Or third, they might be vestiges, that is, currently non-functional features that were functional either in the species' earlier development or for a precursor species from whom they were inherited. Examples of vestiges in humans are the appendix, which played a role in digestion for a distant herbivore ancestor, and the coccyx, which is the remnant of a tail.

A fourth possibility is provided by the negative hypothesis—that there is no significant connection between art and evolution. The relation between evolved adaptations and art behaviors might be so distant and thin that it would be misleading to claim an interesting or explanatorily fruitful link between them. On this view, such behaviors are facilitated by and presuppose our biological nature, certainly, but they are not thereby either adaptations or spandrels. Rather, they express the aspects of our nature that lead us to be inventors and users of technology and to be appreciators both of what technology does for us and of the achievement that goes into its creation. Many behaviors—the making of fire and the wearing of clothing, for example—are widespread because they are culturally passed down for their usefulness, not because we are genetically programmed to express them.

At this stage, I wish to put the third possibility—that art and the aesthetic are vestiges—to one side. We are not indifferent to beauty and other aesthetic properties, and the experience of these properties can be deeply moving and emotionally arousing. The beautiful and wondrous light up our lives. Meanwhile, provided we take the broad view of art that I recommended earlier, one including domestic, decorative, folk, mass, and popular art, it is apparent that art is created, valued, and enjoyed with a vigor

that suggests it has not lost its human significance. These observations strongly suggest that our aesthetic sense and our propensity to make and appreciate art are not vestiges.

For different reasons I also intend here to discount the negative fourth option—that there is no explanatory relation between art, the aesthetic, and evolution. As I indicated in Chapter 3, I am reluctant to endorse views that treat biology and culture as separate domains with very little causal interaction between them, and some such separation is presumed in this view. Besides, it is the possibility that aesthetic and art behaviors are evolutionary adaptations or by-products that is most relevant to our project, so we will want to explore them in depth before considering the negative alternative. Nevertheless, this possibility deserves consideration and will receive this in Chapter 10.

In Part II, I will argue that there is a strong case for the claim that the aesthetic sense has a biological origin. That sense leads us variously to judge things to be beautiful or sublime (or their opposites), to make things or seek out things that have these qualities, and to value and take pleasure in them. In some cases our aesthetic sense may be adaptive, though in others it plainly is not. In other words, sometimes the exercise of our aesthetic sense apparently serves our biological agenda by drawing us to more successful, fertile lifestyles, yet at other times we indulge our tastes to no obvious effect.

The attempt to connect art to evolution is more difficult and complex, as I will outline in Part III. Though art behaviors are rewarding in many ways, it is far from easy to show that they were selected for the sake of the advantages they confer. However, there are reasons that will be explored in Chapter 9 to think that art could not persist as a biologically meaningless spandrel, even if it first arose in that fashion.

What counts as evidence for the connection?

If aesthetics and art behaviors are aspects of our evolved human nature, what evidence would we expect to find of this? For one, we would anticipate that the relevant interests, behaviors, emotions, and values would be present in the lives of at least some of our early modern human ancestors, that is, from perhaps 40 ka or even earlier. Already in the Introduction to Part I, I drew attention to artifacts, such as hand axes, that are much older than this and that are suggestive of aesthetic sensibilities in their humanoid makers. Also, many of these artifacts, such as a significant number of the cave paintings of 35–15 ka, are almost unanimously classed as works of art. So astonishingly sophisticated, skillful, and stylish are they that they stand direct comparison to what we unequivocally count as art now. It is not as if they are merely rudimentary approximations of what we think of as art.

Another indication that aesthetic sentiments and art behaviors are intimately connected to our evolved human natures would be that they emerge as spontaneously in the development of each individual as does language acquisition and use. Innate propensities with this feature are often adaptations. Yet stronger evidence again would be that what emerges is much the same from time to time and place to place and thereby is mutually intelligible across historical and cultural boundaries. These

possibilities are important, so I explore them in some detail. For both aesthetics and art, I think it is possible to make a plausible positive case for their connections with our evolved nature, though qualifications and caveats are inevitable.

Is the aesthetic universal and is there universal agreement on what it is?

It will be more plausible to posit a connection between aesthetic experience and evolution if everyone has aesthetic responses. And who could doubt that they do? Who among us has never taken aesthetic delight, given how I characterized that in Chapter 1, in a sunset, a rainbow, a kitten's playfulness, a story, a song? And this kind of pleasurable response seems to be characteristic of humans generally across historical periods and cultures.

Nevertheless, the claim has been challenged. A common debating strategy here is to focus on the concept rather than the experience and to suggest that the discourse expressing this concept is peculiarly Western in provenance and is shaped by exclusively cultural factors. We encountered similar views about the nature of art in Chapter 2. I will not revisit the responses I mentioned there, nor will I review arguments rejecting the notion that the aesthetic is a modernist Western category. Nor, indeed, will I discuss empirical studies revealing underlying cross-cultural commonalities of aesthetic judgment. I think I can undermine skepticism about the universality of aesthetic responses without needing to consider these further options.

What does the claim that our discourse about the aesthetic is culturally shaped come to? The suggestion might be that aesthetic discourse—how we talk and reason about the aesthetic—is conditioned by aesthetic theories that are distinctive to our culture. But this seems unlikely. We have seen that theorists in Western culture disagree about the nature of the aesthetic and have always done so. In addition, I have suggested that leading models of the aesthetic, such as the Kantian one, can misrepresent our aesthetic practices and experiences. Those practices and experiences are not subservient to theory. Comparatively few people are exposed to the views of Kant or other eighteenth-century philosophers, but everyone has robust opinions about what is beautiful or awesome. Recall also that the aesthetic is not reserved to a small class of nonfunctional items accessed and appreciated by only an elite few. Rather, it is part of everyday experience and is available to all. Given this, the suggestion that the discourse controls the experience in ways that make it arbitrarily cultural should seem unconvincing. In fact, the aesthetic is a stance that humans take to the world at large, so the making of aesthetic judgments is part of our ordinary discourse rather than some highly technical language.

At this point the argument might shift ground. Even if the peoples of all cultures seem to have aesthetic experiences, it may be that there are no cross-cultural standards by reference to which we could establish the permanence and objectivity of aesthetic

valuations. For that matter, within any given culture there might be no basis for agreement about aesthetic standards. We say "beauty is in the eye of the beholder" and "there is no disputing matters of taste." Undeniably there is variation at both the individual and cultural levels about what counts as aesthetically interesting or valuable.

A first response might take this form: our capacity to learn and speak a language is surely an adaptation, but that does not mean that we all speak a single language or that different languages are cross-culturally comprehensible. Among other things, however, it does mean that there is sufficient public agreement about the meanings of words to establish a language in the first place, and that it is possible to learn foreign languages through appropriate training and immersion. Perhaps it is conditions like these, rather than universal agreement and transparency, that we should expect to find in aesthetics. That is, perhaps we should be looking for widespread consensus over at least some aesthetic assessments within a culture and the possibility of coming to understand the different aesthetic preferences of other groups.

I do not mean to downplay or ignore the differences in aesthetic sensibilities between individuals and from culture to culture, but in fact we can do much better than the replies so far offered in establishing the universal character of at least some aesthetic experiences and judgments.

One frequently discussed case is that of the surveys commissioned by the Russian émigré artists Vitaly Komar and Alexander Melamid. They asked people in many countries what they wanted to see and did not want to see in a painting, and the results were very similar between countries. People did not like hard-edged abstract paintings in the modernist style. Instead, they wanted paintings of natural settings including vegetation, blue sky and water, animals, healthy people, and nationally famous people. So consistent were the results, it seems reasonable to conclude that the questionnaires were exposing landscape preferences deeply rooted in our shared ancestral past.

The philosopher Arthur C. Danto resists this conclusion. He suggests that the results are explained by the wide distribution of Western landscape calendars. Denis Dutton responds that, even if this unlikely account were correct, it would remain necessary to explain the universal popularity of such calendars, which would lead us back to its primeval basis.

Meanwhile, Ellen Dissanayake, an ethologist, disputes the idea that what was exposed was Pleistocene aesthetic taste, on the grounds that nothing in the responses would allow one to discriminate between a great landscape painting and a poor one. She surely is correct that the surveys explain next to nothing about the appeal of art, and this is borne out in the humorous caricatures created by Komar and Melamid as illustrating the surveys' results. The aesthetic interest of art typically depends more on the treatment of the subject in the given medium and tradition than on the aesthetic qualities of the subject itself. But Dissanayake's reaction misses what is at issue here: that what were revealed are shared preferences not peculiarly for art but rather for habitats with certain qualities, and that the aesthetic appeal of these environments connects to

features that would have made them survivable by, and thereby supportive of, our foraging ancestors in the late Pleistocene.

The topic of humans' landscape aesthetic preferences will be considered further in Part II, which also includes discussion of human beauty and humans' aesthetic reactions to nonhuman animals. As regards these further topics, here it is sufficient to note that studies of facial attractiveness show that cross-cultural agreement on the criteria for female facial beauty is the norm, as is a male preference for a waist-to-hip ratio of 0.7 in females. Meanwhile, humans made pets of birds, monkeys, cats, dogs, and other creatures thousands of years ago, and pets are found in all cultures. Animals are also perennially fascinating to all children. So in these areas as well as in landscape preferences, some aesthetic fundamentals cross the boundaries of cultures.

Another consideration is this: neuroscientists identify perceptual processes and biases in perception that can be exploited by artists to attract interest to their work and to heighten the impact of its features. Because these processes and biases belong to our evolved perceptual systems, their influence on our responses is cross-cultural. I will mention these views as they pertain to art later, but the relevant point here is that, either intentionally or accidentally, human makers of non-art items might produce stimuli triggering the same responses. And of course nature can do the same. After all, our perceptual systems evolved in response to our needs with respect to the natural world, which is to say that they are as they are because they allow us to detect and attend to what is relevant to our survival. Nature, with all its variety and complexity, is bound to present stimuli that can affect us via the previously mentioned neural processes to the same effect of stimulation and heightened awareness that is identified by these neuroscientists as the root of the aesthetic response to art.

Is art universal?

We can ask of art what we just asked of the aesthetic: is it universal in occurrence? In addressing this question we need to focus on the relevant behaviors rather than the artifacts they generate, on art-creative and art-appreciative acts, not on paintings, novels, symphonies, and statues. Before I get to the issue of universality, however, I will first consider the possibility that art behaviors might be adaptive without becoming universal.

In Chapter 3, I observed that a tiny, heritable advantage would spread to 99 percent of the population over 4,000 generations; but I added the qualification "other things being equal," which they often are not. The success of the advantageous feature could be swamped by genetic drift, that is, by fluctuations in the distribution of genes in the population caused not by selection but by random combinatorial factors. Or it could be wiped out by changes in the environment. Despite their long-term prior adaptive success, the dinosaurs were extinguished by climatic and other changes consequent on increased volcanic activity and a major meteor strike. Or the basis of the trait might be so genetically complex that it is only weakly heritable. It might involve so many genes

that, in the combination within the child of the parents' genetic matter, all the relevant ones do not often get passed on. Or it could be out-competed, so to speak, by some change in another species or in other members of the home species, to the point where it becomes a liability. Or the feature might remain advantageous only on condition that it does not spread through the population, so that it stays in balance with some other trait that others possess. Perhaps having a hawkish personality is fitness-enhancing only if most people have dovish temperaments, for example.

With these qualifications in mind, it could be that art behaviors are adaptive but only for a minority of virtuosos. It would be necessary to argue that artistic talents are heritable—otherwise they would not be transmissible; but that they are only weakly heritable—otherwise they would have become universal. This would be consistent with what is known of the family lineages parented by acknowledged artistic geniuses: heritability of creativity is modest and lower than that for general intelligence.

How could high-level art behaviors result in improving the fitness of those who have them? Sexual selection provides one possibility. Expertise as an artist or performer typically depends on long training, relentless practice, skill, creativity, imagination, and single-minded dedication. In other words, art-creative behaviors are costly and those who perfect them forego many opportunities for an easier life. If artists flourish despite their self-imposed handicap, they thereby display their biological fitness; and this display must be an honest one because it cannot easily be forged. As a result, they are more attractive to potential mates than are less well-equipped competitors.

This possibility—that art behaviors could be evolutionarily adaptive but only for a minority—is rarely considered by those who argue that art is a product of evolution. Most adaptationists regarding art prefer the view that art is now universal because those who displayed the appropriate behaviors in the past were thereby able to out-parent their lackluster competitors. Art behaviors became universal because of the comparative advantages they conferred. Because these are the dominant theories, I will focus on the claim about universality.

Does every person engage in art behaviors?

In Chapter 2, I suggested that art is pan-cultural and historically ancient. We know of no people who are without dancing, drawing, storytelling, acting, or music, for example, and these are all practiced at a skillful and sophisticated level by at least some people in every culture. Is art also universal in the sense of being something that every individual participates in?

How we answer depends crucially on two things: how high we set the bar for something qualifying as art; and whether we count art's appreciators or only its makers in the story. If we were to assume as art only the sophisticated high art of Western societies (perhaps also including the court and religious art of India, China, Japan, Southeast Asia, and the Middle East)—which is art made by a handful of artists and appreciated by a comparatively small minority of the community's members—art plainly would not be universal. But I have already suggested that we should consider

art in a broader perspective, just as we did with the aesthetic. Accordingly, I would see this small "a" notion of art as encompassing domestic, folk, decorative, popular, and mass art. It is such art that is likely to be historically oldest and that is engaged with most widely. Small "a" art is rarely simple or crude, but it frequently has wide appeal and easy accessibility. Of course, art often becomes arcane and specialized over time. Such art targets an audience of cognoscenti who can appreciate its self-referential nature and obscure allusions. But high art emerges from and builds on traditions of small "a" arts and rarely replaces them. So it is appropriate here to privilege the modest, popular forms of art over the more esoteric versions that led in the West to modernism and postmodernism.

In this regard, consider the discussion of literature as adaptive. Those who apply evolutionary psychology to the interpretation of literary works have often discussed works now regarded as high art: *The Iliad*, *The Odyssey*, Shakespeare's plays, the novels of Leo Tolstoy, Jane Austen, Charles Dickens, and the like. They have been chided for this. But most of these theorists are keenly aware of the need also to consider non-Western literatures, prehistoric theater, folk tales, oral narratives, myths, epics, legends, popular fiction, and children's stories. Nonsense rhymes, popular song lyrics, TV scripts, and comics all may provide material for analysis.

What does the claim that art behaviors are near-universal amount to? Must more or less every individual be fluent or at least minimally competent in all her culture's art forms? Or is it sufficient that she have the required degree of competence in at least one of her culture's art forms? And are we considering abilities she actually has attained or ones she merely has the potential to acquire?

Given how time-consuming and demanding in other ways engagement with art can be, it seems reasonable to interpret the universality doctrine as satisfied if the person is competent in at least one of her culture's art forms, especially if we are talking about attained rather than potential competence. And when it comes to art activities that require extremely hard-won skills, such as carving marble, it might be reasonable to focus on potential capacities rather than actual abilities. In fact, though, it is very common for people to have a working competence with many of their culture's art forms, even where they have their particular favorites. Most literate people read the occasional novel or poem, dancing is a common pastime, almost everyone enjoys some kind of music, few people are indifferent to popular dramas, and the vast majority are drawn to some pictorial or sculpted depictions.

It might be objected that most people are passive recipients of art, rather than creators or performers, but this would not be fair. As members of the art audience we are not passive. We are liable to sing or dance along with the music. We try to puzzle out the mystery or solve the crime before the private eye does. We are caught up in the love story and feel for the protagonists. We study how the painter has captured the textures and lighting of the various materials and items shown in the still life. In short, art calls for appreciation and this demands of the audience that it comprehend what is going on in terms of the message, the medium, and how they

interact. When we see the production of art not as a self-focused act of creativity but as a social transaction, the suggestion that everyone regularly engages in some art behaviors is credible.

Besides, if the level of art-creative competence is not set too high, many people will be capable of realizing it, at least in one or another art form. The world is full of hobby painters, whittlers and sewers, people who sing in the shower, dancers, and spinners of stories. This invites the question: does everyone qualify as an artist? If they do then clearly a strong version of the thesis concerning art's universality would be established. And again this leads us to consider what level of art-behavioral competence makes for artistry. I do so by first considering the case of music.

Art-behavioral competence

Music making comprises a range of different activities, such as composing, improvising, or performing. Each of these might take a variety of forms. Performing, for example, might take the form of instancing a composition, creating an improvisation, rehearsing, musical doodling, singing along with someone else's recording or performance. It could involve such actions as whistling, humming, singing, slapping one's body, playing a musical instrument, or using some other item as if it were a musical instrument. Music responding behaviors include acts of listening to music with understanding, pleasure, and appreciation. They also include dancing, moving to music, coordinating to a beat (aka entrainment), and so on.

In evaluating possible connections between evolution and music behaviors, it is necessary to consider issues of scope and of level. The question of scope asks how many kinds of music behaviors individuals must be capable of engaging in if they are to count as musically fluent. In practice, it looks as if almost all adults (without hearing defects or relevant neural deficits) are music responders, whereas, at the other end of the spectrum, composers make up a small minority. But there could be many explanations for this and the issue probably should be about capacities rather than the frequency of their actualization. We can reasonably expect that the kind of musical fluency that would connect music behaviors to evolution requires that many people can produce novel musical ideas, not only understand them when they encounter them. And it is probably true that they are capable of this, so long as we accept that the ideas in question are, for example, structured rhythmic patterns or simple 4-measure melodies without accompaniment.

With the suggestion that musically competent adults are likely to be capable of composing at least *simple* melodies, we move to the question about the level at which the relevant behaviors are exercised if the connection with evolution is to be minimally plausible. There are many music behaviors and each of them could be practiced at different levels, ranging from a stumbling, incomplete grasp of the relevant behavior through full competence to virtuosic mastery. I take full competence in *listening* behaviors to involve something like the following: the listener has appropriate expectations from moment to moment about what will come next in the music,

recognizes most performers' errors as such, and sometimes knows what would have been correct instead. He also experiences the flux of tension, release, and closure in the music's progress, so that he knows, for instance, if a piece was completed or, instead, interrupted. He will be familiar with the appropriate genres and conventions—with the stylistic and other differences that separate jazz from rock or rock from country and western, for instance. He will also know relevant traditions of works. For instance, he will know that Elvis Presley came before Dire Straits and he will have listened to many of the recordings that took audiences from the one to the other and beyond. And he will appreciate how the song that is his present focus draws on, refers to, or repudiates these conventions and traditions.

Although I don't specify them here, I assume it is also possible similarly to spell out criteria for what counts as full competence in composition and performance.

Plainly an individual may engage at different levels in different music behaviors. She is a good dancer and listener but a poor singer and composer. Other individuals will display different ranges of competence in their various music behaviors. Nevertheless and overall, it seems reasonable to regard music making as a universal behavior.

The ancient Greek Aristides Quintilianus wrote:

> There is certainly no action among men that is carried out without music. Sacred hymns and offerings are adorned with music, specific feats and the festal assemblies of cities exult in it, wars and marches are both aroused and composed through music. It makes sailing and rowing and the most difficult of the handicrafts not burdensome by providing an encouragement for the work. It has even been employed by some of the barbarians in their funeral rites to break off the extreme of passion by means of melody.

And Darwin observed that the enjoyment of music and the capacity to produce music "are present, though in a very rude condition," in people of all races. Many authors suggest that music is universal among adults. In addition, non-participatory, motionless listening is surely a comparatively recent development in the human experience of music.

We should be able to produce a similar inventory for the art behaviors appropriate to competence in other art forms. In all cases, familiarity with genres, traditions, conventions, and other works will be essential, but this knowledge usually is acquired via exposure and osmosis, by a person's immersion in her culture, and need not require formal study.

The fluent consumer of literature will be able both to read with a high level of comprehension and to write. She will appreciate some of the techniques of the storyteller's craft and difficulties posed to the author by his materials. She will have the imaginative skill to project into minds and worlds with which she is not familiar, to fill out implied details of those worlds that are not made explicit by the author, and to engage intellectually and emotionally with the characters. She anticipates the story's trajectory and reevaluates this constantly as the tale unfolds.

Similarly, someone who regards a painting with understanding will be sensitive to the treatment of composition, light, color, and perspective, to the way in which the manner of representation projects a certain way of viewing or thinking about the depicted subject, to the connection between how the surface is marked and what it depicts, and so on.

The person who views dance is sensitive to the bodily control the dancers show, to their subjection to gravity, and to the difficulty of achieving what comes across as effortless. She notes the energy and dynamism or grace and fluidity of the movement. She follows the drama and emotion that is projected. She tracks form and arrangement. If relevant, she looks for coordination and synchrony between the dancers and between the dancers and the music.

Art's universality

If the human interest in art is to count as universal, we might require only that everyone attain competence in one of their culture's art forms. The majority of people go so far beyond this level, however, that we could easily make the standard more demanding. Most people are expert in sub-forms of art—think how knowledgeable many people are about movies or popular music—and most people plainly reach a medium level of competence in many of their culture's art forms. Moreover, so extensive is the active participation of amateurs in art-creative behaviors that many achieve executive low-level competence in their favored art form and can be counted as artists to that extent. The claim that art behaviors are (virtually) universal is met, I believe.

Is the content of art cross-culturally meaningful and similar?

The second question asked of the aesthetic—is it cross-culturally comprehensible?—also raises interesting issues when directed to art.

One reason to doubt that art can be understood and appreciated by someone who is foreign to the culture in which it is created was given at the close of Chapter 1: the fullest appreciation of an artwork includes consideration of its artistic properties, and these are accessible only to someone who recognizes its style, the history of related works, allusions, references, and symbols that it contains, and so on. Artworks take their significance from their location in art traditions. The larger part of art can be concerned with complex symbolic and semantic content as well as riddled with cross-textual allusions, references, and repudiations to which the cultural outsider is blind. For instance, one work may contain elements satirizing another, or a third will presume familiarity with the conventions of spy novels. Knowledge of such matters cannot be read simply from the artwork's outward appearance and will not be apparent to someone situated outside the artwork's home culture.

Even so, partial forms of artistic understanding and appreciation are likely between cultures. As humans, we share the same perceptual systems; and how the arts are created and presented is at least in part a function of how those shared systems operate. This is apparent in structural universals in music and the stimulation in the visual arts of perceptual processes concerned with recognition, attention, field organization, and the like.

As humans we share much more than this, however. The lifeways of culturally diverse peoples, along with the concerns and emotions to which these give rise, run on parallel tracks. Inevitably, people from all cultures tend to be fascinated by depiction, dramatization, or narration of archetypal themes: romance and sex, inter-generational conflict, self-sacrificing altruism, destructive ambition. They are also fascinated by certain familiar dualities: birth–death, peace–war, love–lust, love–hate, love–jealousy, health–illness, selflessness–selfishness, family–self, individual–group, crime–punishment, health–disease. And there is even evidence that music's emotional expressiveness sometimes remains recognizable to cultural outsiders.

Because the recalcitrant qualities of the physical media that artists use are apparent to anyone, those foreign to a culture are often in a position to appreciate the virtuosic skill in artworks from otherwise unfamiliar traditions. And much art involves the body as among its media (as in drama, music, and dance) or depicts the body. Some art, especially dance, features the body. Inevitably the beauty of the body and its operation is cross-culturally available in the appreciation of such art, to the extent that human physical beauty and the outward show of intelligence, emotion, and personality are the same.

What all this suggests is that we are likely to have partial perceptual access to the aesthetic qualities and some of the artistic properties of artworks in foreign cultures, despite our ignorance of their artistic traditions, conventions, and practices. Indeed, I have already proposed that we can identify prehistoric and tribal art as such by the salience of the aesthetic properties they present to perception. It is to be expected that cultures begin with art that is appealing in part because of its universally accessible aesthetic features, even if symbolic and other more culturally encoded meanings are also present at the outset and become dominant later.

Nevertheless, we should be mindful of the way in which the significance of aesthetic and artistic universals can be inflected by their cultural setting, so that their meaning can no longer be read straightforwardly. According to the surveys of Komar and Melamid, people universally favor green and blue among the colors. But think how colors can often take on arbitrary cultural associations. In some societies white represents purity, and in others it represents death. In some societies red stands for passion, and in others for success. Though widely favored, green and blue could come to have quite different, though positive, meanings in different cultures.

If a person could learn the art-relevant conventions and histories of another culture only by steeping herself in it, much as those who are born to it are immersed in it, its art will be opaque to outsiders. But if it is easy to recognize many of the relevant

conventions and if this can be done from the outside, as it were, or by dipping only a few toes into the topic culture, the outsider's grasp of what is universal may take her quickly to an appropriate though partial understanding of the nature of artworks that are foreign to her. She may need to acknowledge the atmosphere of tradition in which they are enveloped, but perhaps she is positioned to do this merely as an interested cultural tourist.

How long does it take to become as habituated to a foreign culture as its natives are? Years at least, possibly decades. And surely it would take as long to become a connoisseur of their most sophisticated arts. Consider poetry. For the fullest appreciation a person would have to have a complete mastery of the language so that he could follow its most subtle and arcane uses—its novel jokes, word plays, metaphors, and so forth. As well he would need a profound knowledge of its canonic poems, poetic forms, the goals of its poets, and the functions of poetry within the society. He would also need intimate familiarity with all that its poetic works might mention or allude to, such as the other arts and the society's history, religions, ideals, institutions, paradigms, class or caste structure, mores, and so on. And the relevant skills and knowledge must be so deeply ingrained that they come unbidden to inform his experience of the poem as it is directly encountered, not wielded self-consciously in an attempt to deduce after the fact what appreciating the poem most likely is like for those with the deepest enjoyment of its art.

Recall, though, that our question is one about whether a foreigner can recognize and minimally appreciate the art of another society, not what it takes to be an expert. Cultural outsiders clearly lack the background and experience that is necessary for connoisseurship, but perhaps they can get by with much less when it comes to identifying at least some foreign artworks and recognizing their most artistically important features. Indeed, perhaps the kind of cultural grounding that can be achieved in weeks rather than years may suffice.

The art audience in the West has had to come to terms with quite radical stylistic revolutions in its own history—for instance, in the shifts to Impressionism and Cubism in painting or in the move to atonality in classical music. Though some people claimed to find these departures incomprehensible (and even offensive), that was surely an exaggerated reaction and more often indicated a failure to see the artistic *point* of what was done than a failure to see what was done as such.

Take Cubism after its early "analytic" phase. Despite the departure both from a fixed viewpoint and from vanishing-point perspective, it is not so difficult, after all, to see what is represented within a cubistically fragmented perspective. It seems to me that the split-image perspectivalism used in paintings and carvings of the Amerindians of northwest America is similar in being easily mastered by those not familiar with it. The same applies to the vertically distorted perspectives in Chinese paintings, the frequent departure from perspectivally "correct" spatial relations in medieval art, and "plan" perspectives in ancient Egyptian art. Their depictive import is soon laid bare. Likewise it is fairly obvious that the iconography and proportion of much figurative Southeast

Asian art derive more directly from the puppets of the shadow puppet play than from "life."

In a fascinating experiment, Balinese and American musicians were compared in their ability to predict the continuations of Balinese melodies that were unknown to them. As expected, the Balinese were much more certain and accurate predictors than the Americans, but the latter, who were near the theoretical limit of cluelessness at the beginning of the melody, adapted rapidly over its course. Though the most successful American musician was worse than the least successful Balinese musician, on average the American musicians performed much better than chance. Indirect evidence of the operation of underlying universals in the musical reactions of the two groups is indicated by the fact that, although the Americans did worse than the Balinese, they were more certain of what happens next at the same points where the Balinese were more certain of what happens next.

This suggests that exposure to a musical style based on a very different scale and tonal system can lead to a working understanding of its melodic syntax within a surprisingly short period. In this case, exposure plus simple feedback apparently can lead musicians from one social background to bootstrap their way into alien-sounding music without immersing themselves for years in the culture from which the music derives. In other words, even if musical universals are tweaked by culture with the result that all elements must be appropriately contextualized if their significance is to be appreciated, that process of tweaking might be decoded with comparatively little effort.

We cannot communicate with the cave painters of the ancient past, but in other cases the process of learning the basics of another culture's art can be facilitated and accelerated by asking the locals or by reading about it. Tourist guidebooks usually contain essays that are extremely helpful and enlightening on the features, principles, and aesthetic ideals of indigenous art forms, and local artists are frequently happy to talk about what they do and why. Again, my point is about how accessible these sources are and about how far we can get by using them. The road of the would-be connoisseur is a long and arduous one, but the path of the aspiring dilettante is mercifully very much shorter and easier.

My claim is not that all art can be recognized for what it is by foreigners. In the rarified world of avant-garde Western art, much of what is offered could not be experienced under the appropriate art-characterizing descriptions by people lacking prior experience of recent Western Fine Art. The same is true, I suspect, in other traditions that have become extremely symbolic, stylized, or self-referential. An example is that of Australian Aboriginals' "dot" paintings of the western deserts or bark paintings of north-eastern Arnhem Land. It would be very unlikely that a foreign viewer could infer in these paintings their mapping of ancestral lands and mythical histories, even through prolonged inspection, without resort to the commentary of cultural insiders.

My conclusion is not that foreigners can fully understand another culture's art merely by peeking over the border fence. The best artists in all cultures produce

complex works richly layered with meanings to which only those who share their art traditions, forms of life, and ways of thinking are positioned to appreciate deeply. My contention is this more modest one: because of what is universal in human nature and art, and because of how comparatively easy it can be to learn what is necessary to penetrate the veil that culture lays over these, foreigners can often acknowledge art that is alien to them by achieving a crude and partial, but nonetheless genuine and informed, understanding of it.

Art and human nature

I have offered the view that art behaviors are universal and that this is at least suggestive of their connection with our evolved human nature. Ellen Dissanayake holds that, when we also recognize that they are ancient in origin and a source of intrinsic pleasure, a strong case is thereby made for considering them as centrally connected to the way of life pursued by our ancestors and as an aspect of our shared human nature. A similar view was defended in 1897 by Ernst Grosse. He noted that art behaviors are costly in time, energy, and resources, yet they are pursued for their own sake. On this basis he concluded that art is adaptive and, like many who later reached the same conclusion, he thought the benefits it provides accrue to the social group.

> We have therefore been convinced from the first that primitive art, besides its immediate aesthetic significance, possesses also a practical importance to the hunting peoples . . . The most efficient and most beneficent effect which art exercises over the life of peoples consists in the strengthening and extension of the social bonds to which it contributes.

The issue is far from settled, however. Even if art is universal in the way suggested, it remains to be seen if this can be attributed to evolution rather than to culture alone. And if there is a connection with evolution, we need to consider whether art is an accidental by-product or is adaptive in its own right. To discriminate between these two possibilities, it will be important to understand what, if anything, art is selected for. It is not sufficient in making the case that art behaviors are adaptive to show merely that art pleases us or has positive effects. Reading, writing, and mathematics have those but are not adaptations. They are not inherited propensities that emerge spontaneously in the course of natural development. Rather, they have to be taught and transmitted culturally. Producing the relevant demonstrations for art is far from easy, as I now suggest and as I will illustrate further in Part III.

A cautionary tale about feathers and feet

The first feathers evolved for thermoregulation. The descendants of some ancient bird types, such as emus and penguins, have no feathers suitable for flight. Yet most people would regard flight as an adaptation in its own right, not as a by-product (aka spandrel) of avian thermoregulation. And they are surely right to do so. Flight comes at a cost.

This is why some species on predator-free islands revert to flightlessness. Under most conditions, flight outweighs these costs with greater benefits toward avian survival and reproduction. But if it is an adaptation, where do we locate that? We do so not in the origins of feathers but in certain structural modifications to specific feathers—along with other flight-facilitating alterations in bone structure, musculature, and the like—all of which changes made avian flight possible.

I draw two morals from this story. The first is the general point that judgment is needed about whether something should count as a spandrel or as an adaptation. We must consider not whether it is a by-product of some earlier adaptation but its current role in the organism's lifeway. Evolution always builds on what already exists. This helps to make clear why so little of the possible "design space" is exploited by evolution. For example, it explains why so many living creatures display four- or six-limbed basic body plans. This is why, even if the outcome is adaptive, it sometimes exhibits an improvisatory, jury-rigged character. Bipedalism was adaptive for our ancestors but we are also heir to the back problems and pains that go with it.

Great caution is necessary in arriving at the judgment that some bit of behavior is adaptive though. It is not sufficient merely to note that the behavior is important and useful to the creature. The philosopher of biology Daniel C. Dennett claims that the claw of *Archaeopteryx*, the first known bird, was perfectly adapted to perching on branches. Another philosopher of science, Robert C. Richardson, points out, however, that the accepted view is that *Archaeopteryx* descended from theropods—dinosaurs—with the same foot structure, which was used to grasp prey. Moreover, the claws of *Archaeopteryx* were not modified to make them more suitable for perching. He concludes:

> Even if *Archaeopteryx* chose to sit in trees, as it might have, the foot is still a derived structure and an adaptation for a terrestrial rather than an arboreal form of life.

The second moral to draw is that stories of a trait's or behavior's evolutionary origin can be irrelevant to its current function, whether that function is adaptive or not. With this in mind, we might question the interest of demonstrating that some forms of aesthetic reaction or art making were ancestral responses to ancient environments or circumstances. We are physically removed from the environments in which our forebears lived and culturally removed from their ways of thinking. By studying the past, we might learn about the origins of some of our modern behaviors, but it might be doubted that this is relevant to explaining their current relevance or justification.

In this vein, Ronald Moore, an aesthetician, writes about accounts of landscape aesthetics as founded in the reactions of primordial foragers to habitats that were friendly or antithetical to their way of life:

> At most, it would explain how we came to think of some things as beautiful and others not, leaving untouched the question of why we persist in thinking this way and why we defend our judgments with reasons that have little or nothing to do with our prehistoric past.

Despite the second moral that I have just drawn, I think Moore is mistaken in this particular case. Working out why this is so is useful in clarifying some important issues.

Even where an adaptation is transcended in its significance by future changes and circumstances, so that it departs from its earlier functions, it might not thereby be eradicated. The desire for fat and sugar clearly is not adaptive for modern Westerners as it was for our Pleistocene ancestors, but it is no less present; and acknowledging as much might be relevant to considering what is involved in countering it. It is not only the origins of these preferences but also their persistence that the biological account is intended to explain.

And sometimes their persistence suggests that they are deeply embedded in the human psyche. Some aesthetic tastes are plainly mutable and culturally arbitrary, but not all are like that. In Part II, we will review our present-day aesthetic reactions to nonhuman animals, to landscapes, and to our fellow humans. At least in part, these are all plausibly rooted in the evolved nature of our distant forebears. Of course, our modern circumstances can affect the role now played by these preferences and how we express them, but that does not show that they have become irrelevant. The aesthetic appeal of a landscape might not motivate a modern-day urbanite to grab a spear and go hunting, but it is likely to influence where she would like to live, what pictures she hangs on the wall of her office, where she would choose to holiday.

In making a similar point, the geographer Jay Appleton notes that the use of contraception, rather than making sexual intercourse pointless, enables people "to gratify their inborn inclinations in isolation from any ulterior functional process." He continues:

> In much the same way those other mechanisms, which seem to prompt forms of behaviour conducive to the achievement of other biological requirements through the encouragement of favourable environmental relationships, do not peter out simply because what we infer to be the "end-process" is no longer attainable solely through their agency. We do not say that because our survival does not depend on our catching a rabbit or eluding a cannibal, therefore there is no point in attempting to see without being seen. We say rather that release from the obligation to use these mechanisms for self-preservation enables us to gratify these biological inclinations in isolation from the exposure to real, uncontrollable hazards, such as was probably experienced by our ancestors and is still experienced by most animals and some humans today.

Yet this appeal to the consequences of the fact that some aesthetic tastes come to us as part of the shared human nature we have inherited from the past—still assuming that connection is demonstrated, of course—can be subject to further questioning. The nature and instincts we are considering are those of our genes, all in the service of reproduction and genetic transmission, this being how evolutionary success is measured. But as organisms we have goals that we do not share with our genes. For example, many people choose to limit the number of their children, though they are capable of successfully raising more to adulthood. So it always remains to ask of some instinctual pressure to do this or that: this is what my genes would have me do, but is it

what I should do? Does my agenda coincide with that of my genes? Demonstrating that some tendency resides in our nature does not entail that we should follow it.

I accept that there is no one-step argument from *my nature and instincts push me in this direction* to *this is the route I must take*. But the connection need not be as tight as this to be important. If our life-plans more often than not line up with what our genes naturally incline us to do, there is a prima facie reason for assuming we should follow our instincts. By "line up" I do not mean that we should follow our instincts just in case our plan is to maximize our reproductive potential. I assume, rather, that part of our plan is to achieve well-being and abiding pleasure. Such states are often consequent on following our instincts, because this is the common way in which nature motivates creatures to pursue their genes' interests. Grant Hildebrand, an historian of art and architecture, makes the point this way:

> In reflecting on the various settings and experiences of our lives, we should be able to find some fairly close matches between characteristics we like and characteristics that would have improved our chances of survival.

So, we should follow our instincts for the satisfaction this usually produces, provided there is no reason to think that the pleasure will be outweighed or that some higher-order goal should take priority. With aesthetics it will often be the case that the rewards it yields do not subvert our biological agendas. To the extent that our desire to engage with the aesthetic is instinctive, there often is no reason to see this as being at odds with our organism-level interests.

Here, then, is the answer to Moore's final complaint: that the *reasons* we give for our judgments and preferences "have little or nothing to do with our prehistoric past." The reasons that evolutionary psychologists give for the aesthetic habitat preferences of our distant predecessors are ones connecting such preferences to the biological agenda of reproductive success. Those need not be the reasons that our forebears appealed to in making their choices, however. They need not have calculated in such terms, or at all. More likely they chose what looked beautiful and attractive, what felt less threatening and stressful, without looking ahead to the vigor of the lineages they would parent. We, their heirs, share with them the aesthetic preferences that in fact contributed to their successful legacy, but when we exercise those preferences we do not thereby look back to their ancient past, just as they did not look forward to our distant future.

On the origins of art

I cautioned that an account of some behavior's evolutionary origin and function might be irrelevant to understanding its current uses and value, which may have transcended and lost contact with their past. But I also argued against Ronald Moore that elements of human nature can persist and, though they perhaps find new uses and modes of expression in present-day circumstances, accounts of their origins can have explanatory relevance to appreciating their current roles. In making this argument, I was careful to

follow the example which Moore introduced—landscape preferences. Had the subject been hairstyles, my argument would not have stood for long. Those tastes seem to be ephemeral and arbitrary compared to our aesthetic reactions to landscape.

Nor am I confident that my argument would work for the arts. It might be very difficult to discern their origins and the evolutionary significance of the functions they first served. But in any case that might be largely irrelevant to assessing whether they are adaptive in their current functions, which may be very different from their original ones. Consider this example: it is highly unlikely that those who painted the walls of the caves at Chauvet and Lascaux did so in order to impress potential mates with their skill and flare. If that was the plan, why were the paintings made so difficult to access and inspect? But this observation cannot be made to count against the theory that art now primarily serves the agenda of sexual selection.

As will become apparent in Part III, many adaptationists about art direct their attention to speculation about art's origins. Such matters have considerable intrinsic interest, I allow. But I suspect that it is widely but erroneously assumed that the tale about the origin of this or that art form also must be relevant to appreciating its present, possibly adaptive, function. This is controversial. If music originated in infant-directed speech, with its distinctive sing-song character, that would help us not one jot in assessing the significance and function of Beethoven's late string quartets. We must be cautious, then, in assuming that art has always served the same human interests in the same way and in focusing on its ancient as against its modern attributes. More generally, we should be wary of moving too hastily from evidence for the universality of art behaviors and for their abiding value and interest to the conclusion that they were adaptive for our distant ancestors. They might have once been spandrels but took on adaptive functions later. Or they might have become universal because they are pleasurable without thereby being adaptive at all.

PART II

The Aesthetic

Introduction

In Part II, we will focus on connections between humans' aesthetic sensibilities and evolution. We begin with humans' aesthetic appreciation of nonhuman animals, a topic that is widely neglected. This gap provides me with an opportunity to develop novel applications of the account of aesthetic experience offered in Chapter 1. And it allows me to demonstrate the diversity of aesthetic interests and judgments. While evolutionarily-based aesthetic experiences have a place in our response to nonhuman animals, they can be accompanied by aesthetic reactions with quite different drivers. These further aesthetic responses are sometimes complementary and sometimes opposed to the ones with an evolutionary basis. The aesthetic is many-faceted. Even if there is a connection between our aesthetic experiences and evolution, the complexity and variety of our aesthetic reactions to animals shows that this is at best only part of the story.

Chapter 6 turns to the aesthetics of landscape and environment, a subject that has received attention from evolutionary psychologists. They argue that we are aesthetically attracted to aspects of our environment that in the past contributed to the flourishing of our humanoid forebears. This idea is interesting and highly plausible. Nevertheless, I think evolutionary psychologists overstate their case in advocating the "savanna hypothesis," according to which we have a marked preference for savanna landscapes, these being the African home of the first anatomically modern humans and their immediate predecessors. It is more appropriate to concede our ready adaptability to an extraordinarily wide variety of habitats and to acknowledge the flexibility of our landscape preferences.

In Chapter 7, I will consider the subject of human beauty. I do so with some trepidation. Indeed, when planning this book I hoped I might avoid the topic altogether, so politically fraught is it. It is so because when evolutionary psychologists discuss human beauty they focus mainly on female sexual attractiveness in the context of mate selection. Not only is that approach infuriatingly reductive, it makes it difficult to draw a connection between human beauty and beauty in nonhuman objects.

Rather than countering by emphasizing the many non-sexual forms that human beauty can take or by shifting attention from sex to the more culturally malleable notion of gender, I take on the evolutionary psychologists directly by considering female beauty and arguing that this requires a broader account than is usually provided. Human beauty is much more about social self-presentation and self-definition than about mate selection. As well as establishing a balanced context for reflection on human beauty, this approach makes it plausible to acknowledge the aesthetic dimension in judgments about, and responses to, beauty of this kind.

5

Humans' Aesthetic Appreciation of Nonhuman Animals

While the ethics of our relationships with nonhuman animals has received attention from philosophers, our aesthetic attitudes to animals—henceforth I drop the qualifier "nonhuman"—have been largely and surprisingly ignored by aestheticians. Similarly, evolutionary psychologists have shown little interest in the topic, except to suggest that the presence of dangerous predators is an aesthetic negative for an environment, whereas undisturbed, peacefully feeding animals that humans can hunt create an aesthetic positive. As Randy Thornhill puts it:

> beauty is hypothesized to be the perception of ancestral cues to available animal food and safety from predators as revealed in the behavior of nonhuman animals in one's environment.

A second point that is regularly noted is that humans have a natural aversion to spiders and snakes and, accordingly, find them ugly or repulsive. But given what a significant part of the environment animals, birds, and insects are, the power animals had over our cave-painting ancestors, their ongoing charm and fascination for contemporary humans, and the history of our dependence on them for food, tools, clothing, fuel, labor, sport, and companionship—given all this, the comparative silence of evolutionary psychologists and others on the aesthetic dimension of this relation is quite astonishing.

In this chapter we will consider the kinds of biological imperatives that might underlie our aesthetic reactions to animals. We will also examine aesthetic approaches to animals that may be biologically rooted but are not adaptive, and we will go on to consider yet other aesthetic reactions that are plainly cultural. Indeed, I will set out no fewer than nine distinct bases for aesthetic responses to animals along a continuum from the biologically conditioned to the purely fanciful.

Apart from outlining an account of humans' aesthetic appreciation of animals, including its possible biological underpinnings, this chapter serves two agendas. It will draw attention to the wider, non-biological remit of the aesthetic. Even if aesthetic experience first arose to give impetus to behaviors with adaptive or other evolutionary significance, the aesthetic focus readily ranges over all contexts. So it is worth reminding ourselves of its ubiquity and cultural shaping. Second, this chapter will apply many of the general principles of aesthetic experience that were defended in Chapter 1. There I argued for the legitimacy of aesthetic reactions based on partial, possibly

morally questionable, approaches that do not treat the animal that is their focus solely in terms of its identity or interests. That issue resurfaces here. I will also defend the aesthetic character of responses to animals that would be dismissed by Kantian aesthetic formalists as non-aesthetic on the grounds that they are too cognitive and conceptually loaded, or, alternatively, because they are too simple and straightforward.

A history of humans' relations with animals

In order to motivate the arguments that follow, it is vital that I establish the long-standing importance of humans' relationship with animals, the intimacy of that relationship, and recognition of our biological, emotional, and psychological continuity with animals.

To start with the obvious, we have a close biological connection to animals because we too are animals. We share with them common ancestors. Primates are our nearest allies but humans share more than 50 percent of their DNA with fish.

What is more important for the purposes of this chapter, humans have always interacted with animals. Our ancestors depended on animals for food and clothing. Some of the animals they faced were dangerous or competed with them for food and shelter. In order to survive, our species needed to develop a subtle understanding of animals—of their natural histories, habits, needs, and vulnerabilities. For this reason, an observation by the philosopher Ludwig Wittgenstein—if a lion could talk we would not understand him—is puzzling. His idea seems to be that our form of life is so different from theirs that we could find no common vocabulary with which to communicate across the void. This is hard to credit. Lions and humans are mammals. Like us, lions need to eat, breathe, drink, and sleep. They mate, give birth, and suckle their young. If it spoke, the lion might say: "Don't you hate it when the flies crawl up your nose!" or "Have you seen the gazelles yet today?" In fact, animals do have ways of communicating with us, if not by words. Picture the dog that fetches its lead and sits before its master with unconcealed impatient eagerness. Or the cat that, having strolled to the closed door, turns to fix its human servant with an imperious gaze. As well, we can often correctly interpret the signs with which animals betray their moods and feelings—pricked ears, swishing tail, bared teeth, hissing, and the like.

Dogs became camp followers long ago. They joined the fireside about 15–12 ka, becoming work animals and pets. They remain our closest animal companions. In the case of the Australian Aborigines, dingo pups were raised without being much used in hunting or as work animals, and perhaps this pattern was repeated elsewhere. Dogs are among the few animals to look where the finger points instead of at the pointing finger, and they are probably unique in finding humans' yawning contagious. These are signs of how their selective breeding by humans has shaped them to attend to and interact with people.

Animal parts were buried with *Homo* species from 100 ka. The first example of a domesticated dog buried with (and embraced by) a human is from 12–10 ka.

Cemeteries in southern Scandinavia dating to around 7 ka include dogs that received ritual burial, and horses and dogs were sometimes buried with people.

Cats are not easily trained but they discovered that humans are malleable and can be made to respond to their charms. The first record of a cat buried close beside a human is from Cyprus 9.5 ka, and their domestication is dated from this time.

The religious-cum-ritual-cum-symbolic power of animals cannot be overestimated. In prehistoric times, humans apparently identified directly with animals and took them as gods or as fellow members of the community. They believed themselves to be descended from animal ancestors. Indeed, animals feature in the creation myths of almost all human societies. For instance, Australian Aborigines tell of the exploits of kangaroos, emus, and other creatures from which they take themselves to be descended. The site of Çatal Hüyük in Turkey provides clear evidence of the ritual treatment of bulls' horns about 8.2 ka. Evidence of totemism is apparent at the 7,800-year-old cemetery at Oleneostrovski Mogilnik in Karelia. There are two clusters of graves, one associated with effigies of an elk and the other with effigies of a snake. Later, animals were powerful symbols to the Egyptians—at different times, the ram, cow, ibis, cat, ape, and falcon were sacred.

No less ubiquitous than tales and depictions of ancestral animals are stories of talking animals, changelings (people who become animals and vice versa), and therianthropes (beings that are part person and part animal). One of the earliest and most powerful therianthrope representations is the figurine from Hohlenstein-Stadel cave, a lion-headed person carved from mammoth ivory and standing more than 1 foot (28 centimeters) tall that dates from 32 ka. European cave art also shows therianthropes. And marsupial-headed humans are pictured in the Dynamic rock art of Arnhem Land, northern Australia, which dates from 10 ka.

As just indicated, representations of animals clearly had the utmost power and importance for our ancient predecessors. When *Homo sapiens* descended with candles and lamps into the subterranean depths of underground caves to paint on their walls in the period 35–12 ka, it was not flowers and trees they drew. Indeed, and this is surely remarkable, neither was it mainly people. Rather, they depicted cave bears, horses, bison, mammoths, deer, and bulls (aurochsen). The "hall of bulls" in Lascaux cave has bull-pictures up to 17 feet (5 meters) in length and above head height. These cave pictures of animals are realistic and closely observed, whereas pictures of humans are both few in number and schematic. In fact, the animal depictions are so accurate that we can learn things about extinct species from them that we can't get from the bone record alone. As I contended in the Introduction to Part I, these countless animal depictions are among the first artifacts with a compelling claim to the title of art, though they presumably also had religious or spiritual significance. As I also noted, rock art in Australia is of a similar antiquity and the same may apply in Africa. Meanwhile, the oldest buildings apparently connected with human worship, which are at Göbekli Tepe (Kurdish: *Girê Navokê*) in Turkey and date to 11.5 ka, contain T-shaped monoliths decorated with fine reliefs of lions, bulls, boars, foxes, gazelles, asses, snakes

and other reptiles, insects, spiders, and birds. Similar carvings have been found at Nevali Çori in eastern Turkey, a site of the same age.

About 10 ka, with the move from hunting and foraging to village life, our forebears began to domesticate and farm animals, especially sheep, goats, pigs, cattle, horses, and fowl. By 9 ka, domesticated sheep and goats were the principal source of meat in the Near and Middle East. Dairy cattle were kept in Egypt and Mesopotamia from 6 ka. Some domesticated animals—horses, donkeys, water buffalo, elephants, and camels, for instance—were put to work. Animals were also used for sport and in ritual sacrifices. By comparison, the people of the Americas domesticated few animal species, however.

Companion animals also were common. In a famous passage in *The Odyssey*, after twenty years' separation, the decrepit and mangy dog Argus recognizes his disguised master and wags a greeting, which brings a tear to Odysseus' eye. By 2 ka, Roman dogs of a variety of breeds, including large fighting dogs and small lap dogs, were as highly domesticated as they are now. At the same time, dogs resembling present-day Pekinese were probably already being bred in China. Medieval lords and knights slept with dogs at their feet and were depicted in tombs as buried that way. The possession of "decorative" pets was sometimes a badge of high status, including in Greek times and the Middle Ages, though such pets were not always well regarded before the nineteenth century. Cat-keeping spread round the Mediterranean by 2.5 ka and to the rest of Europe by 2 ka. Meanwhile, affectionate pet-keeping not motivated by utilitarian considerations was widespread among indigenous peoples of the Americas when they were first encountered by Europeans. Pets have been recorded in virtually all traditional societies. By the European Enlightenment, thinkers such as Jean-Jacques Rousseau and Jeremy Bentham argued that people who caused unnecessary suffering to animals thereby acted immorally.

Nor did the domestication of some species mitigate the symbolic potency of animals. The description of battles in *The Iliad* invoked the imagery of lions, boars, and bulls. The Greek god Zeus was symbolized by the eagle, as was his Roman equivalent, Jupiter. The change of ethos that went with the Christian era saw lions, bulls, horses, eagles, and falcons—all of which were popular with the Greeks and Assyrians—give way to a symbolism that featured fish, sheep, and doves. Yet within a few centuries evangelists were associated with the long-time favorite animal icons: the winged lion for Mark, the bull for Luke, and the eagle for John. Lions, unicorns, white harts, and the like were featured in heraldry. In Central America, the god Huitzilopochtli was represented as a hummingbird.

About 2.55 ka, Aesop collected or created hundreds of fables concerning animals and the moral lessons that could be learned from, or illustrated by, them. Some astrological signs are of animals and the Chinese years are named for them. People born under these signs or in a given year are supposed to display some of the characteristics of the animal they token.

Meanwhile, therianthropes remained evocative and popular. Anubis, an Egyptian god, was a jackal-headed man, and other gods were crocodile-, hawk-, and ram-headed. Greek mythology included centaurs, satyrs, gorgons, the hydra, and the Minotaur. Hindus worship the elephant-headed god, Ganesha. Inhabitants of Easter Island adopted a birdman cult.

Animals have always been prominent in art. Egyptian and Greek buildings, artifacts, sculptures, and paintings showed animals. In the Christian era, the engravers of breviaries and psalters decorated the text and margins with animals and birds. By the Middle Ages some books, known as bestiaries, were devoted to depictions of animals, though they often contained fantastic creatures. By the late fifteenth and early sixteenth centuries, serious attention was often paid to the accuracy of depiction. This is apparent, for instance, in the horses of da Vinci and Michelangelo. Hieronymus Bosch's *Temptation of St Anthony* of about 1500 provides a striking case. It shows all manner of bizarre animal and bird concoctions, but includes accurate representations of the goldfinch *(Carduelis carduelis)* and barn owl *(Tyto alba)*. Raffaello's Vatican fresco of 1518–19 shows God's creation of the animals. As well as fairly accurate depictions of a lion, tiger, elephant, pig, dog, rabbit, ox, bull, donkey, horse, deer, and various species of birds, the painting includes a misshapen rhinoceros, a unicorn, and a camel-like creature with a small single horn protruding from its forehead! Other examples of graphic animal representations were provided by Albert Dürer, not only in his wonderful studies of the hare but also in a walrus (1521) and, from a description, a surprisingly convincing rhinoceros (1515). Later times saw the genre of *animalier*—still lifes featuring dead animals and vivid depictions of animals hunted or at bay. The rise of animal iconography in seventeenth-century Dutch and Flemish painting played an important role in shaping the attitude to animals at that time. Diego Velazquez, George Stubbs, and Edgar Degas were masters of animal portraiture, and the golden age of scientific animal depiction included artists such as Thomas Bewick and John James Audubon.

What is remarkable, I think, is that none of this has changed for us. Millions of animals, fish, and birds are treasured as pets. The number of dogs that are kept as home pets in the United States is put at 52 million. The worldwide number of cats living with humans is estimated at 600 million. In addition, animals retain their emblematic status. The American eagle and British lion contend against the Russian bear. States' coats of arms display animals. For example, the Australian one features the emu and the kangaroo. We may no longer worship animals, but as an aspect of our secular religions we name our sports teams and cars after them. And it is not as if contemporary humans have outgrown stories in which animals show human characteristics or vice versa. Cartoons and films are full of talking mice, ducks, dogs, cats, birds, lions, pigs, skunks, coyotes, horses, roadrunners, zebras, giraffes, rabbits, and so on. Popular fiction regularly invokes therianthropes, changelings, hybrids, and the botched experiment that leaves its unfortunate subject with supernatural powers and animal parts. Entertainments feature mermaids, vampires, werewolves, and frogs that become princes

when kissed by princesses. Indeed, a few people have subjected themselves to plastic surgery to turn themselves into living therianthropes. And returning to art, Goya and Picasso were obsessed with the bull, David Hockney, William Wegman, and Lucian Freud have celebrated dogs, and Jill Greenberg and Robin Schwartz portray monkeys and nonhuman primates.

This is all the more impressive when we recall that many contemporary humans live in fabricated city environments and are insulated and alienated from the natural environment. Unlike our ancestors who hunted, killed, carried, skinned, gutted, butchered, and cooked the animals they ate, most of us buy antiseptically packaged cuts of meat or pre-cooked meals that look nothing like the animals whose flesh is among their ingredients. I suspect that, as a result of this separation, we are both more sentimental and more barbaric in our treatment of animals than our ancestors were.

On the one hand, we have battery farms and factory fishing. We kill huge numbers of animals for food in purpose-made slaughterhouses. We experiment on caged animals and test all manner of products on them. We hunt animals not because our survival depends on doing so but for sport. We pit animals against other animals. And organizations with the goal of preventing human cruelty to animals seem never to run short of work. Moreover, most people are profoundly ignorant about animals. Attitudes of indifference, fear, and economic exploitation are often predominant. Ambivalence to animals—that we are their custodians versus that they are here solely for our use and benefit—is expressed, for instance, in the Christian Bible.

On the other hand, however, we have organizations for the prevention of cruelty to animals, most of which were founded in the nineteenth century. More generally, beginning around 1500 there was a gradual change in the attitude to animals. Rather than being regarded as machines that could be used and disposed of to suit our ends, they were more often acknowledged as capable of suffering and as deserving care and respect. Nowadays, we treat our pets as if they are fully-fledged members of the family and we feed them royally. Many people no longer regard it as politically acceptable to wear fur. We attempt to rehabilitate oiled seabirds and injured birds of prey. We have banned many blood sports. TV channels are devoted to natural history shows featuring animals. Many of us care passionately about endangered species, especially if they are of the aesthetically attractive kind, and we are sometimes prepared to take action on a global scale to protect them. We desire not only that they survive but also that they live in the manner and places for which they are suited. Children are inevitably fascinated by and naturally drawn to animals. Our cities are filled with millions of companion animals, and cohabitation with them has important therapeutic benefits for their owners. (Pets are responsive to contact, sometimes devoted, sometimes affectionate, and non-judgmental. Proximity to them provides physical and emotional benefits, such as companionship, a sense of security or comfort, and reduced blood pressure. Their care also provides structure and ritual. And they are comparatively undemanding and uncomplicated.) So, even if our relationship to animals is not the one our distant ancestors had, our attraction to them runs very deep indeed.

Many will agree with the following analogy drawn by the philosopher and environmentalist Holmes Rolston III, likening animals to groups of humans who are not in positions of social control:

> What a culture does with its wildlife reveals the character of that culture, as surely as what it does to its blacks, poor, women, handicapped, and powerless.

His view echoes an observation widely attributed to Mahatma Gandhi:

> The greatness of a nation and its moral progress can be judged by the ways its animals are treated.

And the sociobiologist E. O. Wilson deliberately understates the case when he suggests:

> The phylogenetic continuity of life with humanity seems an adequate reason by itself to tolerate the continued existence of apes and other organisms. This does not diminish humanity—it raises the status of nonhuman creatures.

Aesthetic response

Our interest in animals is not exclusively gustatory, sartorial, scientific, religious, sporting, artistic, or therapeutic. We respond aesthetically to them. In other words, we find their appearances and other properties that animals display to be intrinsically appealing, beautiful, awesome, repulsive, or pathetic. And some of our aesthetic responses connect to their role in our forerunners' evolution.

Our aesthetic response to animals is consistent with a larger pattern. This is one in which we create and seek aesthetic value, as well as other kinds of value, in the world at large—in natural environments, human appearances and qualities of character, and in human artifacts, not only artworks but also in ordinary practical items. But why, exactly, do we find animals aesthetically compelling? And is this a decadent response available only to modern-day humans who are less enmeshed with and dependent on nature in the raw?

The importance of animals to humans, our identification with them as other living creatures with drives, experiences, and emotions, and the closeness of many of our relationships with them, all these are apparent from our prehistory to the present. But our ancestors' appreciation of the importance in their lives of animals did not require that their interest in animals took on an aesthetic hue. Nevertheless, there are reasons to think that it most likely did so. The aesthetic runs as deep as any other of the frameworks and values that humans share, so I suspect that our ancient ancestors would not have confined their aesthetic interest only to landscapes, environments, and the appearance and character of their fellow humans. In fact, some aesthetic responses to animals appear to be automatic and universal. We find many baby mammals as cute and appealing as human babies, and we are awed by vast aggregations of animals on migration. What is more, our ancestors depended for their survival on their understanding of animals. One way of ingraining and vivifying such wisdom would be by

marking it with prominent aesthetic values or disvalues and the heightened emotions that go with these. With this in mind, the first place to look when considering the aesthetic appeal of animals is to factors that shaped our species' evolutionary psychology.

Biological groundings for our aesthetic interests in animals

It is plausible that we are genetically disposed to respond aesthetically to animals, either positively or negatively, because in the distant past such responses were adaptive in that they guided the judgments of our successful ancestors. That is, such responses promoted their survival or avoided their harm. And in addition, the disposition to respond in this fashion was genetically transmissible from parents to their offspring. As the evolutionary psychologists Harold Herzog and Gordon Burghardt recommend:

> Let us entertain the idea that cultural variation dances upon a deep, genetically shaped reservoir of universal predilections and emotions. Perhaps behind the apparent diversity of attitudes [to animals] are some underlying biological processes that are the result of natural selection.

Cross-overs from human to animal aesthetics

There are some obvious cross-overs between human and animal aesthetics. Beauty frequently serves as a marker of fitness, as I will emphasize further in Chapter 7. Among the human fitness indicators that we esteem are grace, strength, balance, dexterity, agility, and athleticism. Animals also display such qualities, often to a superhuman degree, and we not only admire their doing so but can also find this attractive or sublime. Because such features are almost inevitably relevant to the animals' own fitness and it is apparent to us, the response need not involve an inappropriate projection of human standards onto the animal world. Rather, these aesthetic evaluations are directly relevant to understanding the nature of the animal, to appreciating its strengths and weaknesses, its threats and defenses.

In other cases the application of our human preferences to animals falsifies their nature by anthropomorphizing them. The examples I have in mind are ones in which we find them aesthetically appealing because we inappropriately attribute to them human personality, agency, life-plans, self-consciousness, or unduly high levels of cognition and calculation. Or we credit them with sophisticated emotions such as empathy, sympathy, hope, and regret. For instance, we might consider ants to be virtuously diligent, a stallion to be noble, the hippopotamus to be obese, and the owl to be wise. If such ways of thinking lead us to find beauty, sublimity, or their opposites, they are aesthetic, even if they misrepresent the animal, as I argued in Chapter 1.

Among the aesthetic responses generated by an anthropomorphizing attitude toward animals two kinds deserve special mention because we are impelled so strongly to adopt them. We are programmed to find human babies attractive, and animals that

happen to share some of the markers of babyishness—large eyes, soft features, large heads, recessive chins—are also often appealing on this score. The attractive and pleasing appearance of the koala, some owls, and some cows probably depends on this effect. Over the years, Disney's animators made Mickey Mouse less like a rodent and more like a human child, presumably to make his appearance more pleasing. As well, the young of many mammalian species share with human babies the neotenous (youthful) facial characteristics that we find irresistibly cute. They also often move with the doddery awkwardness that in human toddlers triggers in us feelings of aesthetic enchantment along with care and tenderness. And we can be charmed by other babyish signs of dependence, such as a lamb's eager suckling or dozy kittens snuggling close to their mother's body.

In the case of some domestic animals, rather than adopting an anthropomorphic attitude to some of their natural features, we modify their appearance to make them more elegant and beautiful. As well as breeding them to be more useful and compliant, we sometimes "improve" them to increase their aesthetic appeal (to humans). Outstanding examples are the koi (carp) of Japan, the cattle of the East African Dinka, tusked pigs bred in Papua New Guinea, and many ornamental breeds of cats and dogs. Darwin frequently referred to pigeon fanciers and the aesthetic effects they cultivated in their birds.

> One of the most remarkable features in our domesticated races is that we see in them adaptation, not indeed to the animal's or plant's own good, but to man's use or fancy.

Indeed, animal husbandry provided an insightful model for the workings of sexual selection:

> If man can in a short time give elegant carriage and beauty to his bantams according to his standards of beauty, I can see no good reason to doubt that female birds, by selecting, during thousands of generations, the most melodious or beautiful males, according to their standard of beauty, might produce a marked effect.

There are further respects in which animals are subject to human aesthetic preferences and biases. We generally like animals that are more rather than less like us as regards development, size, cognition, emotionality, sociality, breeding, parenting, manner of locomotion, and texture. Herzog and Burghardt make the point by claiming that we are

> biased toward species with which we can at least have the illusion we are communicating or at least recognize their signals for what they are.

I would put a different spin on our partiality to species situated near to us on the tree of life. As a highly social species we are mind-readers dedicated to working out what others think and feel. We extend this interest, where we can, to animals. But of course this is possible only where their lifeways, primary needs, and perceptual, cognitive, and affective systems approximate to our own. While the outcome of this process may be

the projection of anthropomorphic illusions that falsify the animals they are directed to, on other occasions the result might be a closer appreciation of what we have in common. It is precisely this kind of identification and sensitivity that would make for a successful human hunter—one who can predict where animals will be, how they will interact, how they will move as they feed, how they will guard against predators, and so on. And this sense of fellow feeling with animals undoubtedly can lay the basis for an aesthetic response to them.

One way in which it can do so is by leading us to admire and take pleasure in their adaptedness. In this case, we focus on fitness indicators that are directly relevant to the animals themselves, rather than being drawn only to those that we value for also marking fitness in humans. Consider, for example, the exquisite camouflage of a nesting woodcock or delight in the complex relation exhibited among all the creatures that live on a coral reef.

The experience of seeing a Bar-tailed Godwit *(Limosa lapponica)* feeding languidly on the shoreline can be transfigured by awareness that it is among the world's most dynamic long-distance migrants, with a range and navigational precision that matches those of our most sophisticated planes. Ornithologists came to suspect, though they could hardly credit it, that Bar-tailed Godwits fly directly from the coast of Alaska to their wintering grounds in New Zealand, a distance of 6,000 miles (11,500 kilometers). A satellite-tracked female in September 2007 proved them right. She flew non-stop for eight days and hardly deviated from the shortest possible route.

Of course, one might gaze indifferently at the bird despite one's knowledge of its prowess. Aesthetic responses are rarely *required*, even when they can be appropriate. But to the person awed by the wonder of its feat, the bird's slender, one-pound (half-kilogram) frame seems sublimely charged with latent energy.

As is apparent from these examples, the appreciation of animals in terms of their own biological agendas, rather than ours alone, is liable to require a background of relevant information concerning natural history and the species in question. Admiration of this kind is cognitive and self-conscious. The further our empathies and sensibilities are from the species in question, the more deliberate must be our adoption of an attitude that regards the creature in terms of the life form that nature has mapped for it.

Another human bias that is a source of aesthetic experience is largely unreflective and automatic: we are attracted to (or repelled by) various sensory arrays that are conspicuously exhibited in the animal world. Many animals display to attract their mates. They develop antlers, beards, colored wattles, strange excrescences, and the like. We too can find the display beautiful or awesome. This occurs, I assume, because our senses chime with theirs. That is, they present perceptual arrays that are significant for members of their own species, but those same arrays trigger and stimulate our perceptual systems in ways that are aesthetically pleasing, presumably because we share related perceptual systems and some of their perceptual preferences and prejudices. In this case, the most obvious examples are unlike us. They are colorful birds, such as the toucan, or highly and variably patterned animals, such as cuttlefish. Insects, especially butterflies,

moths, and dragonflies, often also appeal aesthetically in a similar fashion. And, in addition, flowering plants display to attract their pollinators and we take aesthetic pleasure in their appearance.

It is not only the formal combination of colors or patterns that strikes our senses as attractive. The jaunty antlers of a mature stag, the constructions of bowerbirds, and the mating dances, flights, and songs of many animals and birds can all strike us as naturally beautiful. Having once seen it, who could forget the charm and grace of the courtship dance of cranes on snow-covered fields in the fading light of evening? In other words, we can find the social displays and interactions of animals intrinsically enthralling and beguiling. The rippling call of a curlew over the moor, the getaway of a startled hare, a glimpse of a secretive and elusive creature, the howl of a wolf at the moon, the sight of a breaching whale, the spectacle of a predator in the act of killing, the haunting wail of a loon across a mountain lake, these and countless other animal behaviors can be powerfully evocative, either in themselves or by being emblematic of particular landscapes, seasons, and life patterns. (In the second movement of his 6th Symphony Beethoven combines the calls of a quail and cuckoo with the song of a nightingale. The distinctive habitat preferences of these bird species precisely locate the listener at a border where coppice woodland meets arable land.) Such experiences, with their rich associations, can arouse strong aesthetic feelings of wonder and delight, terror and awe.

As was initially predicted, while the line of argument pursued so far draws attention to a variety of ways in which our natures and predilections can dispose us to respond aesthetically to animals, it does not bear out the thesis that these aesthetic responses to animals are adaptive. We started with the generalization to animals of established human aesthetic preferences—for signs of fitness, of babyishness, and for various perceptual patterns and associations. We also considered how, by extending our drive to understand the cognitive and affective lives of other humans to animals, we can come to identify and empathize with them. And as part of this project, we can consider their lives in relation to their own biological agendas. These also are matters to which we can adopt an aesthetic stance.

Some of the resulting aesthetic experiences may be maladaptive. Those that involve inappropriate attributions to animals of human characteristics are likely to be so. They lead us to misunderstand the animals' behaviors. Genuine natural history knowledge is likely to be more evolutionarily useful.

And where the generalization of human preferences for babyish qualities and for colorful patterns seems unforced and unavoidable, it is hard to discern any evolutionary advantage that our choices could generate. Rather, these aesthetic responses seem to be by-products of adaptations that lie elsewhere—to care for our own babies, to make fine color discriminations, and to seek order in the world as it presents to our senses. The importance of fine color discrimination, for instance, is likely to lie in detecting ripeness, health, and other qualities of fruits, seeds, and plants, in locating useful salts and minerals, and in identifying states of health and emotion in humans, rather than in providing aesthetic rapture at a butterfly's palette of colors.

Meanwhile, of the behaviors I've discussed, the one that strikes me as most likely to be adaptive for our ancestors—that is, attaining an intimate practical knowledge of the animals and ecological systems around them, both in relation to humans and on their own terms—is not plainly driven by the aesthetic response to which it may give rise. Here the aesthetic response appears to give expression to the knowledge, but it is the practical wisdom rather than this form of its expression that makes it important for survival. I did allow that such knowledge might be more readily attained and acquired if it comes tinged with aesthetic pleasure or negativity. But I expect that it is the non-aesthetic pleasure that goes with finding the food one needs, or the non-aesthetic fear of finding oneself too near a major predator, that plays the primary role here.

Animals as part of an ecological aesthetic

As I will explain further in Chapter 6, evolutionary psychologists have argued not only that our ancestors sought habitats that enhanced their survival but also that, over time, their valuing of such habitats developed as an aesthetic preference. Without calculating or even understanding why, humans came to regard such habitats not only as desirable but also as beautiful or pleasing. In that case, the presence of most animals and birds will already make a contribution to that aesthetic value. Not only do they count positively as food or as usefully signaling approaching weather or the presence of predators, their occurrence testifies generally to the environment's health and fecundity. So, most animals provide an aesthetic plus for the surroundings in which they appear.

We might speculate more particularly that animal kinds took on an aesthetic character that was shaped by their roles in the environment of our ancestors. Those that were harmless and good to eat or useful in other ways would take on an appealing appearance. Think of deer. Those that caused disease would come to be despised, not only as vermin but also as dirty and ugly. Consider mosquitoes, cockroaches, or bloated ticks or leeches. And those that were feared as dangerous would be experienced as scary and ugly, as spiders are. Or they would take on the awesome quality of the sublime, provided our predecessors were at a safe distance. Think of satiated big cats. Or again, the sheer number of some creature would be experienced as sublime.

Developing the theme, John D. Barrow, a physicist and mathematician, observes:

> Large animals were once both a danger and a ready source of abundant food. Our instinctive attraction to them, tempered by fear and respect, looks like a remnant of a reaction that increased the likelihood of survival, as compared with a response of total fear and isolation, or one of reckless familiarity. Animals were the key to our ancestors' survival. It is not surprising that instinctive reactions to them evolved and spread.

This idea seems highly plausible when we focus on creatures that elicit a negative response. Among the most disliked creatures are those that are thought of as dangerous or that bite or sting—cockroach, mosquito, wasp, rat, snake, and (unfairly) bat are at the top of the list—and many of these strike us as ugly. And we can see readily enough how an aversion to these species could have adaptive value, since many of them are

vectors of disease or are more directly dangerous to humans. Admittedly, we find big cats sublime rather than ugly, but that acknowledges their fierce grandeur and presupposes that we are safe from them.

The case for the likelihood of the positive aesthetic response to animals that were useful as food and the like is less clear, I think. We might be more likely to develop a positive aesthetic response to the prepared food than to the living animal, to the roast joint rather than to the warthog it came from. And the most liked animal types (nowadays in the US, excluding pets) are apparently the swan, robin, and butterfly, which suggests that non-adaptive aesthetic preferences are more to the fore than ones with the potential to contribute to human biological fitness.

But if true, perhaps this reflects the extent to which our aesthetic preferences have departed from those of our foraging forebears, who lived so much more intimately with the animals they ate than we do. And not only did they hunt those animals, they used the animals' bones, ivory, and antlers for tools, their hides for clothes, their teeth for ornaments, and probably used their blood and fat in rituals as present-day hunter-gatherers do. The intensity of their obsession with animals is there to be read in ancient cave and rock art, though it is true that they did not always depict the most common local food species. Given the fascination that game species and mega-fauna undoubtedly held for them, it would be surprising if the central role of these animals in their hunting lifeways did not invest encounters with those animals with responses of elevated emotion that could easily take on an aesthetic character.

Are there other human attitudes or behaviors toward animals that could be adaptive? Herzog and Burghardt propose two. Individuals who could exploit, tame, and effectively care for domestic stock would have an advantage, they propose, as would those who favor rare animals.

I am skeptical about whether the complex and varied skills of wrangling and animal husbandry, however useful to those who acquire them, could qualify as adaptations, especially if we hold the traditional view that adaptations must be genetically transmitted. But in any case, there is nothing here beyond what has been argued earlier to suggest that there is an aesthetic dimension to such talents; and it is not part of the brief that Herzog and Burghardt set themselves to take on that issue.

Meanwhile, the idea that we often have an aesthetic reaction to what is rare is plausible, but how is that reaction adaptive? Herzog and Burghardt argue that our interest in rare animals

> may be derived from the value put upon rare animals in early human history. Rare animals or their body parts played important roles in rituals, costumes, medicine, and social status.

This speculation strikes me as implausible. It is simply not true that the most humanly useful animals were always the least common. And while the human display of things that are rare, whether animal or not, can signify wealth and status (because of the cost in time or resources involved in acquiring such items), it is the status, not the manner of marking it, that is adaptive. And where we value what is rare without wanting to

possess it, probably the source adaptation for the response is curiosity. Though curiosity is exercised everywhere, in an environment to which we are habituated it is naturally excited and rewarded more by what is unfamiliar.

Whether or not the response is adaptive, it is true that we frequently value encounters with what is rare or unusual and such encounters can take on an aesthetic tinge. Lilly-Marlene Russow, a philosopher, makes this central in describing the aesthetic appeal of animals. Though she mentions their beauty, awesomeness, and adaptedness as sources of our aesthetic response to them, in defending the aesthetic worth of species she stresses the value of our rare meetings with individuals of endangered species.

It is true, I think, that a creature's rarity can sometimes add to the attractiveness of its appearance. Even a dowdy bird can look beautiful to a birdwatcher if it is rare in a given area. But I doubt that rarity alone can confer aesthetic credit. Plague-bearing fleas would be unlikely to increase in beauty were we to be successful in drastically lowering their number. It is likely that rarity adds value only by piggybacking on some other aesthetic merit, such as the initial attractiveness of the species' members.

As well as a species' low membership, other forms of rarity might feature in our aesthetic experience of animals. For instance, an individual may be markedly unusual or aberrant within its species. It is not common, however, that what makes an individual aberrant as a member of its species is also aesthetically improving. No doubt this is because typicality and formal integrity are expected in biological kinds, not merely matters of statistical regularity. So, in the animal kingdom, only certain types of individual rarity are likely to be found valuable by human aesthetes, as against being considered abominations. Among these are conditions that affect bodily color or markings, such as albinism, leucism, erythrism, and melanism.

Yet another kind of rarity is that in which a species displays features that are uncommon in its genus or for animals more generally. The length of the giraffe's neck and the zebra's complex black and white striping are examples. The rarity of such features can be a factor in the aesthetic experience to which their contemplation might give rise. But in this variety of rarity, as in the two discussed above, it is likely that the apprehension of rarity does not alone initiate aesthetic pleasure, but rather that it augments aesthetic inclinations stimulated by some other aspect of the animal.

Non-biological groundings for aesthetic responses to animals

Where the aesthetic response to an animal depends on or is supplemented by awareness of its rarity, the connection with biology is at best indirect and distant. Some other aesthetic approaches to animals have no biological basis at all.

We might regard animals as works of art and appreciate their aesthetic properties as we would do for artworks. Some people have done so quite literally. Probably one

such was Archdeacon William Paley in his *Natural Theology; or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature* of 1802. Paley regarded beauty of form as a general property of all animal species and as the product of God's art and skill. His view echoes a medieval theological tradition that affirms God as the source of all the world's beauty.

Non-creationists can adopt the same attitude to nature imaginatively. They can entertain the thought that animals are living artworks and appreciate them accordingly. They listen to the songs of the nightingale or of the humpback whale as if these are musical compositions, just as they might regard foggy beachscapes in terms of J. M. W. Turner's paintings, or sun-dappled meadows and haystacks as Impressionist creations.

Instead of relating nature imaginatively to art, as was just described, an alternative is the self-conscious adoption of an aesthetic attitude that abstracts and distances what is viewed, both from its natural realm and from its living, organic existence, so that it can be appreciated purely as a formal, expressive, or sensory arrangement. For instance, birds of paradise could be viewed as kinetic, kaleidoscopic sculptures. Nick Zangwill, a defender of Kantian formalism in aesthetics, writes:

> Consider the elegant and somewhat dainty beauty of a polar bear swimming underwater . . . Need one consider the underwater-swimming polar bear as a beautiful *living* thing or a beautiful *natural* thing or just as a beautiful *thing*? I think this last will do . . . [As a spectacle] it has a free, formal beauty.

Overview

So far I have discussed a number of bases for humans' aesthetic interest in animals. Indeed, the goal was to display the multiplicity of aesthetic approaches to animals and the extent to which some of them are distanced from evolutionary considerations. To recapitulate, they are:

1. We aesthetically admire features in them that are similarly appealing in humans. Among these are human fitness indicators, such as grace. Such an interest sometimes tracks features that are incidentally relevant to the animal's fitness, but in other cases involves inappropriate anthropomorphism, including the attribution to animals of human personalities. One strong response that seems to be automatically triggered is a positive reaction to animals with features like those of human babies. Another is to nonhuman baby mammals.
2. As part of our constant project of reading the minds and characters of others, including other animals where this is possible, we favor and find appealing animals that are like us.
3. We also reflect on their nonhuman natures and appreciate their adaptedness to their ways of life.

4. The animal's color, form, or movement automatically triggers our sensory biases in a positive fashion.
5. We resonate to animals' mutual displays, social interactions, or environmental locatedness. This response may contribute to understanding animals in terms of their life paths and it can bring in wider ecological perspectives.
6. Animals are included in our environmental aesthetic tastes, either as indicators of the state of the environment as this is relevant to humans or by virtue of their direct roles—for example, as food, vermin, predators—in our ancestors' lives.
7. Rarity can add aesthetic value to an animal's initial aesthetic interest. An animal can be rare or unusual because the species has few members, in virtue of its individual characteristics, or because its species displays features that are unusual for its genus or class.
8. We admire animals' aesthetic character as a result of viewing them literally as God's artworks or imaginatively as pseudo-artworks.
9. We abstract their appearances from their natural context in order to engage aesthetically with these as formal, expressive, or sensory arrays.

Some of these sources of aesthetic experience appear to have a biological grounding (1–6) but only 6 is likely to be directly adaptive, while 2, 3, and 5 may be indirectly so by enhancing the understanding and instincts that make for success in human hunters of animals. Regarding animals in terms of human fitness characteristics and reacting to their triggering of our perceptual biases are likely to be non-adaptive by-products of behaviors that are adaptive elsewhere. Others (8, 9, and probably 7) are the product of cultural learning.

The rich variety possible in aesthetic reactions is illustrated by the way in which these various kinds of response can interact. Sometimes they can be mutually reinforcing. Where what is adaptive for us is also adaptive to the animal that is the aesthetic reaction's focus, 1, 3, and 5 may be involved. More generally, our aesthetic engagement with animals can be stimulated simultaneously via multiple routes. For instance, with deer we might respond to their elegance (1), to the large-eyed, baby-like faces of the does (1), because they signify the health of the environment (6), because they had a positive status as a game animal for our ancestors (6) and remain iconic in this respect for us (5), because of the skill with which they move so silently and dexterously through woods and thickets (3), because we empathize with the solicitude they show to their young (2), and because they are uncommon in the local environment (7).

In other cases, however, different bases for an aesthetic response might work against each other. For instance, we might admire the snake as beautiful, but only by self-consciously putting to one side the tendency to view it as a poisonous threat that as such is ugly, repulsive, forbidding, or threateningly sublime (6). In admiring the snake we might adopt the aesthetic attitude that abstracts away from the living creature to formal, expressive, and sensory features its appearance presents (9). Or instead, perhaps we become so interested in the lives of snakes that the primitive fear response is

inhibited and we marvel to see the exquisiteness with which each species meshes with and enriches its environment (3).

In yet further cases, one kind of aesthetic response might be facilitated by another on the list, as when the aesthetic interest stimulated by peacocks is augmented on encountering an albino one (7).

Sometimes the response is likely to be direct and unreflective (1, 2, 4, and 6), while at others it is more often deliberately adopted (3, 5, 8, and 9). The rarity of an animal might affect us in either mode, I suspect. Where it is reflective (in 3, 5, 8 but not 9), the response is usually of a kind that might be educated and refined, both by practice and by acquiring further relevant information. In most responses, the fact that the target is a living animal is important, while in others (4 and 8) this might be only indirectly pertinent or (9) even irrelevant. Among those approaches that focus on the living animal, some (3, sometimes 1 and 5) provide knowledge of its nature as such, though only 3 specifically targets this knowledge. With the exception of 3, all the responses are motivated and guided by our human biases and interests.

Of the various routes to aesthetic experience outlined here, the Kantian formalist is likely to focus on 9—that in which we abstract from the animal's appearance a formal array and respond to that. He will regard 4—where the animal triggers human sensory biases in a pleasing fashion—as engendering responses that are non-aesthetic, being too simple and unreflective. The kind of experiences that go with 3, 5, 7, and 8—appreciating animals' adaptedness to their way of life, resonating with their mutual displays or environmental locatedness, appreciating their rarity, or considering them as works of art—is too conceptualized to count as aesthetic for the Kantian. While that elicited by 1, 2, and 6—admiring in animals indicators of human fitness, favoring animals that are like us, and responding to animals according to their roles in our ancestors' lives—is too close to human interests and purposes.

By contrast, the theorist who insists that animals must be appreciated *for their own sake as animals* emphasizes 3—how they are matched to their lifeways—and those examples of 1 and 4 that succeed in tracking what is relevant to the animals' capacities and survival. But this theorist will class the other routes as leading to improper responses, either because they involve deliberately ignoring the animal's intrinsic nature or because our perception of this is distorted by the intrusion of human interests and values.

Those who regard aesthetic experience primarily as a natural, often unreflective response emerging out of our normal engagement with the everyday might highlight 1, 2, 4, and 6. Whereas those who take our engagement with art as the paradigm would emphasize 8—considering animals as works of art; and perhaps also 7 and 9—appreciating their rarity or ignoring their animality to treat them formally as sensory arrays.

In Chapter 1, I defended a broad account of the aesthetic that encompasses all the kinds of experience described in this chapter, and I outlined my objections to narrower conceptions: aesthetic experience can be both simple and cognitively complex, it can be "interested" in functionality and motivated by human purposes. It can be partial,

even shallow. It can be directed to the everyday and nature. And it can engage all the senses.

Objections

I will not re-litigate those earlier arguments, but in this section I will offer replies to further objections that might be proposed against my account of the range of aesthetic responses that might be directed to animals.

The first complains that I present humans' aesthetic experience of animals as sometimes functionally valuable—that is, as valued for the sake of evolutionary benefits; when I should describe it as intrinsically important—that is, as valued for its own sake. If we find animals beautiful or awesome, this is because we react positively to their aesthetic characteristics without regard to the roles they played in the lives of our distant ancestors, say, or of how they resemble humans in some of their attributes, or of how they are rare.

I argued in Chapter 1 that a concern with functionality need not be opposed to aesthetic judgment—indeed, the judgment of functional beauty links the two—so we need not accept the posited opposition between them. But for this particular objection a different reply is in order: although I have offered a functional (evolutionary) account of the bases of some types of aesthetic interest we take in animals, I have not suggested that considerations of utility always feature in the experience. When a modern-day tourist is moved by the beauty of some pristine landscape, of course it is not the case that she calculates that it provides good hunting, caves for shelter, drinking water, and the like. Rather, she finds the beauty of the scene in the way it beckons to and charms her. That is, she experiences the beauty as intrinsic to the scene. Similarly, we contemporary humans are prepared to pay more for houses that catch the sun, are elevated, and provide prospects of water and woods because we find them attractive and pleasant, not because these preferences mimic those of our ancestors. All this is consistent, however, with the view that adaptive pressures shaped the preferences we inherited from our forebears.

Indeed, it is common for evolution to make adaptively useful behaviors self-motivating—in other words pleasurable in themselves, so that they are pursued for their own sakes—rather than relying on the agent consciously to make the evolutionarily relevant calculations for herself. When we recall that adaptive success is scored in terms of the fecund descendants a person breeds, and that success measured that way is not always conducive to the person's flourishing as an individual, we can see that calculations in terms of self-interest could be maladaptive. It is a good thing that we find sex pleasurable, babies irresistible, and our own children fascinating and fulfilling, given how costly they are in terms of time and resources to produce and raise!

A second objection observes that, when we consciously consider the adaptedness of animals, we find that all thriving creatures are well adapted to their environments and manners of existence, but we do not find all of them aesthetically appealing. Hyenas

and vultures, for instance, have unattractive appearances, and learning about the life for which they are so perfectly adapted is liable to decrease their appeal yet further, not to enhance it. The same is true when we focus on parts or aspects of animals. The pig's snout might be ideal for snuffling out food and the bat's facial appendages might be superbly designed for echo-location, but learning of this takes nothing from the aesthetic ugliness they display.

I allow that a person could consider the functional adaptedness of animals or of their parts without thereby looking to find aesthetic properties in this and without having a positive aesthetic reaction. It may be that his experience disregards the item's aesthetic features and is not found intrinsically appreciable in an aesthetic manner, with only the information thereby extracted being valued. Alternatively, it could be that the attempt to consider that experience from an aesthetic point of view is blocked or counterbalanced by other aesthetic reactions of a negative kind. For instance, we might find hyenas and vultures unappealing because of their roles as dangers, competitors, and as scavengers in our ancestors' lives, or see the small-eyed, long-nosed faces of pigs as unattractive, or equate the bat's facial excrescences with disfiguring mutations.

Some people may not be able to move beyond such negative reactions. Others can, however. Provided such a person perceives and delights in the exquisite fine-tuning of the animal or its features to its environment and mode of life, I see no reason to deny that her experience is aesthetic. She is like the ornithologist who sees the Bar-tailed Godwit as an awesome traveler, and I see no reason to withhold the term aesthetic from her response. In other words, we are likely to find "ugly" animals aesthetically appealing, I think, provided we can focus on their way of life and their adaptedness to it.

The final objection maintains that my account, with its evolutionary tilt, underestimates the important role played by culture in directing our aesthetic taste toward animals.

My primary goal is to describe the *roots* of our aesthetic preferences with respect to animals, and because these often appear to run deep, indeed to reflect a human nature we share in common, I have placed the emphasis accordingly. It is not my purpose to downplay culture, however, or to deny the intimacy of the relation between nature and nurture. Many of our desires, preferences, and behaviors may be biologically grounded, even where the manner of their expression is influenced by our cultural locations. The deep-seated tendency to display manual dexterity and other skills might be demonstrated in one case by hitting a stone with a stick and in another by fine control of the computer's flight simulator. Similarly, even if the propensity to create and enjoy art has a biological foundation, what can count as art at any given time depends on what has been art up to that time and who presents it, both of which in turn are contingent on the historical path of the art tradition in question.

When it comes to the aesthetics of animals, I think there is less room for cross-cultural variation than there is within art. Nevertheless, there can be no denying the significance of cultural factors in directing our approach to animals. For instance, which

animals count as rare will depend on where we happen to be, not only in terms of habitat but also with respect to the history of the human use of animals in the area and the human modification of the environment. It is also relevant that humans control the breeding of some species or populations of animals and that they sometimes appeal to aesthetic criteria in deciding what features to breed for. (Sometimes this is to the animal's detriment. For instance, the flat noses of Persian and Himalayan cats make their breathing difficult and cause health problems.) Meanwhile, a person's knowledge of natural history, both practical and theoretical, depends on his cultural circumstances and opportunities, and this in turn affects how his experience of animals can be cognitively informed. Similarly, if a person approaches nature through the prism of art, the shape of that prism will be dictated by his knowledge of his culture's art.

Some of our aesthetic responses to animals, such as the reaction to cockroaches, seem basic and reflex-like. Yet even these can be subject to cultural correction or alteration, as is apparent from the fact that the people of some cultures are repelled by insects that in other cultures are relished as culinary delicacies. Dogs are eaten in some societies and kept as pets in others. As well, there is room for a range of individual differences concerning such matters. Tarantulas, snakes, rats, and ferrets are kept as pets by some people, who appreciate them aesthetically. Many animal lovers are also meat-eaters. And some people favor bloodsports, such as cockfighting, and see the birds' mortal combat in positive aesthetic terms.

As regards food, there is no doubt that humans can be very flexible in what they eat. Of course, this creates scope for the exclusion of potentially nourishing creatures from the menu for purely social reasons. Note the many and various religious prohibitions on eating this or that creature at this or that time. And children are taught to swallow their culture's food values and norms along with the meal, with the result that distinctive cultural food preferences are readily transmitted. Moreover, we might find it impossible to bring ourselves to eat (or keep down) some exotic foodstuff that otherwise would be nourishing. Most of us would react that way to cooked human flesh, I guess. So differences in cuisine are to be expected from culture to culture. We can also anticipate, however, that extreme conditions of starvation might lead people to be willing to try foods they would not otherwise countenance. It is not difficult to imagine circumstances under which a rat might be viewed as a mouth-watering morsel.

As for individual differences, they are consistent with an account that assumes an underlying human nature. And it is often the case that those who adopt unusual pets that might generally be viewed in negative aesthetic terms have the aim of proving their unconventional, independent, or rebellious natures, even if they also have genuine aesthetic preferences for the animals they choose. It has been observed that pet owners like animals that resemble their appearance, or that they use their pets in other ways as emblematic of their wider tastes and self-image.

So it is not my goal to undersell the importance of culture or individual taste in the aesthetic approach we take to animals. Indeed, I have been concerned to illustrate the wide variety of sources for aesthetic experiences of animals, including the purely

cultural. But I do not interpret the diversity of our attitudes and responses to animals as showing that we are entirely free of biologically rooted aesthetic inclinations. Rather, I see them as pointing to the flexibility of a human nature that emerges from the complex interaction of the genotype—the totality of the individual's genetic inheritance—with its environment.

6

Landscape Aesthetics

In Chapter 4, I made reference to the national surveys conducted by Vitaly Komar and Alexander Melamid. They asked people what they would prefer to see in paintings, but I interpreted the responses to the questions as revealing people's preferences about landscapes.

The first survey was of 1,001 adults in the US. The result was at about a 95 percent confidence level—that is, there was only a 1 in 20 likelihood that the results were thrown up by chance. There were follow-up focus groups and town hall meetings. Further surveys were conducted in China, Denmark, Finland, France, Iceland, Kenya, Russia, Turkey, and Ukraine. Together, these ten countries are said to represent 32 percent of the world's population. There are apparently some minor differences between the surveys, though none of these appear to bias the results of the questions concerning animals, habitats, and human subjects.

Melamid summed up the results this way:

> In every country the favorite color is blue, and almost everywhere green is second . . . Everywhere [the] people want outdoor scenes, with wild animals, water, trees, and some people . . . Except for China, of course, which is a really special case . . . where [the] majority is not sure about almost everything . . . [Those Chinese who are sure] want a blue landscape . . . with domestic animals. This is the breakthrough: Chinese alone clearly prefer the domestic animals. They [also] are [the] only people we have polled who want portraits [that is, studio pictures of animals rather than showing them in a natural setting].

Melamid is right to insist on the clear preference for showing animals in natural rather than in posed studio settings (66 percent vs 7 percent aggregated; in US alone, 89 percent vs 4 percent); and, in general, for outdoor scenes over interiors (66 percent vs 6 percent; in US alone, 88 percent vs 5 percent). But many of the other results are more equivocal than his account indicates. In the aggregated result, domesticated animals come out ahead of wild ones (30 percent vs 26 percent; in US alone, 27 percent vs 51 percent) and many wanted both (23 percent; in US alone, 7 percent). While the inclusion of people was favored, there was division over whether they should be historical, ordinary, or both (respectively 25 percent, 25 percent, 28 percent; in US alone, 6 percent, 41 percent, 50 percent) and over whether there should be one person or a group (30 percent vs 26 percent; in US alone, 34 percent vs 48 percent). Of those who liked outdoor scenes better in the US survey, 49 percent opted for lakes/rivers/

oceans, 19 percent for forests, and 18 percent for fields/rural, with only 5 percent for houses/buildings and 3 percent for cities. (The aggregated results for the same question are not provided.) It may be true, as Melamid says, that many people wanted to see trees, but only "forests" in the previously mentioned question refers to them explicitly. Moreover, a significant minority have a predilection for farmed over wild landscape.

It is tempting to read the results this way: that there is a universal preference for natural landscapes showing (potable) water, (open) vegetation, (game) animals, and people (relatives and members of our group), all of which were essential for the survival of our ancient predecessors. For generation after generation before the Holocene (about 10 ka), our Pleistocene forerunners sought such habitats in order to promote their survival. Our liking for such landscapes is aesthetic in character. We have those tastes because our distant ancestors also experienced similar aesthetic preferences and passed them down to us: either they are genetic or we have a genetic disposition to learn and remember responses of this kind more readily than others. And now to tie the knot with evolution more closely: the landscape aesthetic of our foraging forebears of the late Pleistocene and earlier was adaptive for them. They were guided by their aesthetic predilections to choose habitats that happened to be ones in which they could raise comparatively more offspring. Other people lacking an aesthetic sense, or with different habitat tastes, had comparatively fewer offspring and are not among our ancestors. Denis Dutton sums up:

> This fundamental attraction to certain types of landscape is not socially constructed but is present in human nature as an inheritance from the Pleistocene, the 1.6 million years during which human beings evolved.

The biophilia hypothesis

The sociobiologist E. O. Wilson writes:

> Our relationship to Nature is primal. The emotions it evokes arose during the forgotten prehistory of mankind, and hence are deep and shadowed . . . [I]t would be quite extraordinary to find that all the rules of learning bias related to the ancestral world have been erased during the past several thousand years.

He introduced the term "biophilia"—"the innate tendency to focus on life and lifelike processes"—as a label for the attraction nature holds for the human mind and sensibility. Roger Ulrich, a behavioral scientist, glosses the biophilia thesis as follows:

> Regarding biophilia, the basic proposition is that certain advantages associated with natural settings during evolution were so critical for survival as to favor selection of individuals with a disposition to acquire, and then retain, various adaptive positive/approach responses to unthreatening natural configurations and elements. From this it follows as a remnant of evolution, modern humans might have a biologically prepared readiness to learn and persistently retain certain positive responses to nature but reveal no such preparedness for urban or modern elements and configurations.

The thesis is widely supported by evolutionary psychologists and others.

The suffix "philia"—that is, love of—indicates the emotionally charged character of the response, which is typically construed as an aesthetic one. It is not as if we impersonally arrive at some intellectual judgment of the positive (or negative) value of some habitat; rather, the reaction is deep and visceral.

It is sometimes suggested that the judgment had to be rapid—spontaneous and uncalculating—because natural selection favored speed as well as accuracy. I am not sure that this claim is convincing. It is to be expected that people might reflect deeply and take their time when considering where to live. Provided the risk of exploring an environment in depth is low, given our lengthy breeding season it would pay not to be too hasty in assessing a potential home. The evolutionary psychologist Judith Heerwagen and ecologist Gordon Orians provide a more plausible model: there is a fast, "emotional" assessment as to whether to stay or move on. This takes account of direct or indirect signs of edible species, water, and the like. If the initial decision is to stay, a much slower and more cognitive evaluation is undertaken, probably over days or weeks. This considers signs of the long-term productivity and safety of the environment and leads to a decision to remain longer or to search elsewhere.

When we consider the behavior of our pre-human Hominin ancestors though, it is relevant to acknowledge their limited cognitive and communicative capacities. If they were to survive and reproduce successfully, they had to distinguish desirable from undesirable habitats. For them, this could not be a matter of deep ratiocination or elaborate discussion; rather, it would involve being drawn to one but not to another tract of land.

Does this get us to the conclusion that our ancestors relied on an aesthetic sense in choosing where to live? Not exactly. Finding a habitat desirable is not the same as finding it beautiful. Unfortunately, most of those who write on landscape aesthetics equate the two without argument. That is, they make the error I identified as common among scientists in Chapter 1: that of regarding as aesthetic any perceptually based evaluation.

Here are some examples. Stephen Kaplan, an environmental psychologist, maintains that a response is aesthetic provided it is a positive or negative affective reaction not based on conscious cognition and, of course, suggests that the environment elicits such reactions. Paul Trout, an English literature academic, writes:

> Our humanoid ancestors found physically pleasurable (one might say "beautiful") those geographical areas and those natural and human events that promoted their survival.

Jay Appleton holds:

> The satisfaction which we derive from the contemplation of an environment, and which we call "aesthetic," arises from a spontaneous reaction to that environment as a habitat, that is to say as a place which affords the opportunity for achieving our simple biological needs.

As I noted in Chapter 1, what is attractive is not always beautiful. We can be drawn to things for other reasons. Nevertheless, this is not the place to dig in our heels, I think. Given the broad account of the aesthetic I defended in Chapter 1, the reactions to landscape discussed by evolutionary psychologists and others almost certainly do qualify as aesthetic. Aesthetic reactions vivify the attractiveness or otherwise of their objects, thereby bringing their objects into salience. That is how the reaction takes on its functional role in the ecology of the individual, how it more strongly comes to guide their behavior. That, I assume, is what finally justifies the equation by evolutionary psychologists of the positive (or negative) reaction to landscapes with an aesthetic response. And this equation is made more plausible by the aesthetic character of the equivalent response among present-day humans.

The environment of evolutionary adaptedness

In Chapter 3, I introduced the notion of the environment of evolutionary adaptedness. The idea is that many of the human behaviors we see today are inherited from our Pleistocene ancestors for whom they were adaptive in addressing the challenges they faced in the environment of the time. On this view, the environment consisted of a stable set of specific elements or posed a uniform set of problems that constrained the lives of our predecessors. Features that allowed our ancestors to reproduce comparatively more successfully under the given constraints and that could be passed to their offspring were adaptive. For instance, it is commonly suggested that full bipedalism went with a change from foraging in an arboreal, forest habitat to hunting and gathering in open grassland, where the ability to scan the distance and to carry tools and bags were advantageous. We are the heirs and possessors of those prior adaptations. Accordingly, with knowledge of human nature and of the environment of our ancestors, we should be able to work out what is adaptive and how this served to promote human evolution.

Evolutionary psychologists have approached the issue of the environment of evolutionary adaptation as it applies to humans in several ways. They consider what humans would need in order to flourish under the conditions of the late Paleolithic. Alternatively they attempt more precisely to identify the actual environment in which modern humans evolved. In the following I consider both approaches.

The Garden of Eden

What would be the optimal environment in which small groups of hunter-gatherers could flourish? Their first necessity was potable water. This might be collected as rain, or melted from snow or ice, but the most convenient sources would be springs, rivers, or lakes. Next was food. Because we are omnivores there are many possibilities: plant matter (including leaves, roots, berries, fruit, and nuts), honey, insects, meat (derived from birds, reptiles, fish, shellfish, other sea foods, and mammals, and including muscle, organs, fat, and marrow from bones), perhaps along with some mineral salts. An

abundance of food would be desirable, either in the form of plentiful quantities of a few favored species or because the habitat sustains a high variety of flora and fauna. Ideally, seasonal variations would not be too extreme or, alternatively, different foods would become available on a seasonal basis.

Another environmental consideration was the provision of a base where the group could keep safe. Caves, for example, provided shelter from the weather and were defensible against predators. Also important for safety was the possibility of overviewing the area and navigating within it while minimizing the risks of ambush by predators or of injury. With this in mind, the base camp could be located in an elevated position and there should be open areas of traversable ground at the camp and at places where food would be gathered or where hunting would occur. Multiple sites offering prospect and refuge would be valuable in the group's home range.

Stephen Kaplan characterizes the features we would seek in a landscape at a higher level of abstraction. They are complexity (the number and kinds of elements in the scene), coherence (the ease with which one can understand the scene's organization), and legibility (the navigability of the scene).

The presence of signs of human habitation

Some authors suppose that signs of human presence in an area—the smoke of cooking fires, for example—offered an aesthetic positive. Obviously such signs were indicative in general of the habitability of the area, but I am skeptical that they would cause the unthinking aesthetic responses discussed so far. Among our distant ancestors, the sight of home and hearth surely would have a heart-warming effect, as would recognition of their allies and group members. But a hostile response to strangers is too common for people not to be wary in humanly occupied settings that are unfamiliar to them. Between small bands of foraging peoples, the course of social relationships was likely to involve careful plotting. How our ancient ancestors were affected by evidence of the presence of people they did not know is likely to depend on the history and conditions of their social experience. The resulting feelings would not have been instinctual and were as likely to be negative as positive.

The situation for present-day people living in peaceful communities is different. We are likely to respond positively to signs of human habitation in the landscape, even where we are in unfamiliar territory. In general, such signs indicate the accessibility of the environment and the availability of assistance, should it be needed. But matters were unlikely to have been so predictable for our distant predecessors, so it is unlikely that they shared our attitude to such signs.

The winding road and mystery

I am doubtful also about another claim: that we appreciate the sense of mystery in an environment that hints at possibilities beyond its boundary, for instance, with a path that disappears round the edge of a mountain. Waxing lyrical, Dutton describes the

view of a winding road that is sometimes lost in a forest and that is finally glimpsed far up the valley.

> Such scenes can cause people to stop in their tracks, transfixed by the intense sense of longing and beauty, determined to explore that valley, to see where the road leads. We are where we are today because our primordial ancestors followed paths and riverbanks over the horizon.

Yet talk of roads and paths is fanciful or metaphoric. Small groups of hunter-gatherers travelling on foot and without domestic animals were very unlikely to mark the land by their passage in a fashion that could be seen at a far distance.

The presupposition here appears to be that we are dynamic explorers, excited to push beyond the next ridge or to pass through the surrounding forest in order to discover the hidden, preferably greener grasses that lie in our future. The backstory, I suspect, is the fact that commentators are impressed by the apparently rapid spread of *Homo sapiens* following their emergence from north-eastern Africa about 70 ka. Those who eventually turned west reached Britain by 30 ka. Others arrived in Australia as early as 50 ka. They crossed by land into north-west America by 15 ka and settled the north of South America by 12 ka. Robin Dunbar, an evolutionary psychologist, describes these migrations variously as "racing," "surging," and "explosive expansion."

When we compare the distances to the timespans involved, however, the rate of movement can look leisurely. Admittedly, the routes taken no doubt were indirect, but even allowing for that, the rate of progress is modest. Given the dates mentioned earlier, people could get from Alaska to Peru at a rate of 2 miles (or less than 3 kilometers) per year by the direct route. From Turkey to Britain, Turkey to Australia, and Turkey to eastern Siberia the rate is considerably less than 1 mile per year. Joseph S. Weiner, an evolution theorist and physiologist, says:

> The expansion of the *sapiens* species went on slowly and inexorably . . . So slow was the expansion of pre-agricultural populations . . .

I do not mean to deny that we are a curious and exploratory species or that foragers would not be nomadic or migratory, but it would be a mistake to underestimate the comfort of familiar territory and the terror posed by the unknown. After all, if one has reached maturity in a habitat, that fact is prima facie evidence of its suitability and explains why adults tend to prefer the environments with which they are most familiar. If we really are more inclined to be home bodies than global sprinters, it is not plausible to suggest that the mystery of distant landscapes has a magnetic fascination for us. The inclination toward mystery in landscape recorded in present-day surveys may be real enough, but I doubt that the same reaction was present in our ancient ancestors.

Empirical evidence for the hypothesis

Evidence in favor of the biological foundation of our universal and ancient aesthetic reactions to nature comes from a variety of sources. Preference studies have shown that people favor urban environments that include plants over ones that do not, and gardens

and parkland over predominantly urban environments. By contrast, thick forest and desert are assessed negatively as places to live. Moreover, our life choices bear out these predilections. People garden and decorate their houses and offices with plants and pictures of natural scenes. The most highly priced real estate inevitably provides an elevated outlook over parkland with water or sea. As E. O. Wilson puts it:

> The favored living place of most peoples is a prominence near water from which parkland can be viewed. On such heights are found the abodes of the powerful and rich . . . In ancient, more practical times the topography provided a place to retreat and a sweeping prospect from which to spot the distant approach of storms and enemy forces . . .

Other studies show the psychological, health, and recovery benefits of natural landscapes. Leisure activities in such habitats reduce stress and create broadly positive emotional shifts. Views of urban landscapes with vegetation produce less anxiety than those of urban settings without vegetation. Hospital rooms and prison cells without outlooks or pictures of nature have a long-term detrimental effect on health and recovery from stress. It has been suggested that the reduction of stress can improve performance on higher cognitive tasks and that exposure to natural settings may improve long-term memory, language skills, and creative thinking.

Consideration of landscape paintings further supports central tenets of the theory. As compared to paintings of sunrise, paintings of sunset (when people should most wish to be under shelter) are higher in refuge symbols, such as lighted buildings with smoke coming from their chimneys, and the people in the paintings are closer to the refuges shown. Meanwhile, paintings by women have a higher degree of refuge symbolism than men's, which emphasize prospects more. When John Constable's sketches are compared with his finished paintings, it is apparent that he supplemented the scenes with refuges, water, animals, and people, and where necessary opened the view to the horizon. Both Constable and J. M. W. Turner paid more attention than their predecessors to clouds as harbingers of the weather and used this to color the emotional tone of their works.

Where landscape is the subject of photography, film, cartoon, and literary or poetic description, the work's form and expressive character often depend on the emphasis given to features indicative of prospect, refuge, and hazard—the latter being environmental features that threaten risk, injury, or confusion.

It is also observed that landscape design, urban planning, and interior architecture all create their own versions of positive landscape features of prospect and refuge and are assessed aesthetically on this basis. Appleton proposes:

> Golf is a parody of primitive environmental experience in which the basic relationship of man to habitat is expressed in a system of stylized equivalents whose identity is very thinly disguised.

The inhabitants of a housing project designed by Le Corbusier in 1920–21 modified the stark buildings to incorporate more refuge characteristics and plants.

Most of this evidence is inconclusive, however. As was noted earlier, while landscapes are favored, a significant percentage of people prefer landscapes that show clear marks of human alteration over wilderness. Moreover, most people are profoundly insensitive to the history of landscape and take environments tailored by human intervention over centuries to be "natural." If you ask someone to name her favorite natural environment she is liable to choose the Tuscan countryside, the English Lake District, Greek olive groves, or similar sites that have been extensively modified by tree-felling, grazing, and cultivation. For us, insulated as we usually are from nature's dangers and extremes, the essence of "nature" is calming rather than threatening. As a result our forays into nature readily warm our feelings. But our primordial precursors were constantly immersed in a more hostile, less tamed environment. Even E. O. Wilson acknowledges the point:

> For millions of years human beings simply went at nature with everything they had, scrounging food and fighting off predators across a known world of a few square miles.

So we should be wary of assuming that the studies just discussed speak to our ancient predecessors' response to the environment in which they lived.

Poison oak, mosquitoes, and saber-toothed tigers

The picture so far is too idealized—too much for which "philia" is an appropriate response and not enough that calls forth fear and loathing. We need also to consider how the environment can conspire against human flourishing and how our forebears responded to such factors. That is, we need to take account of what hazards or perils they faced. After all, negative responses to dangerous or otherwise unfavorable environments would be no less adaptive than positive reactions to favorable environments. If there is the connection posited between human landscape preferences and our evolved natures, we should expect the negative to be no less obvious than the positive.

Waterless areas, oceans, and saline lakes would be unattractive. The same would apply to places with extreme temperature or altitude. Unnavigable swamps, trackless deserts, and thick tropical forest would be uncomfortable.

Tundra, ice sheets, and open grassland plains without trees offer neither prospect nor refuge. In literary works, closed forests go with depression and fear and open plains without trees are described as desolate. Land that can support only meager vegetation or few animals would be viewed negatively, as would be habitats with large numbers of dead or dying plants and animals. Excessive numbers of dangerous predators count against an environment, as does the presence of mortally threatening poisonous creatures, such as snakes and spiders, and poisonous or stinging plants. Habitats with many biting insects, or in which humans find themselves carrying internal or external parasites, would be shunned, as would areas in which disease and illness are common. (In listing the features of the optimal environment, we should have included medicinal plants!)

Of course, our Paleolithic forerunners could not entirely avoid environmental negatives. For instance, land that sustains large numbers of grazing animals is bound

also to attract predators that not only compete with human hunters but also pose a danger to them. And lice, ticks, fleas, intestinal worms, and the like have had a long and intimate association with their human hosts. In practice, our ancestors would have had to make the best of where they were or could move to. But the negatives, although not always avoidable, would not have been welcomed. According to the aesthetic theory of the human environment, these blemishes would have been seen as ugly or repellant, as undermining the beauty of otherwise attractive sites.

The savanna hypothesis

It is one thing to reason from human needs and vulnerabilities to what would be desirable or undesirable in the habitat of our foraging predecessors. It is another thing to determine the concrete environmental challenges they faced and how they adapted to meet them. In considering this latter issue, evolutionary psychologists have developed the "savanna hypothesis." The central claim here is that our Hominin and *Homo sapiens* ancestors all evolved in Africa and that the habitat crucial for the selection of their adaptations was the savannas that appeared at the time.

As a habitat, savanna features open grassland interspersed with stands of trees or clumps of bushes. It became the home of large herds of grazing animals. (It produces more harvestable food than equatorial forest and both wetter and drier habitats.) These animals would have been a vital source of food, whether hunted or scavenged. For our ancestors, wide-canopied, low-branching acacia trees on the plains and wooded areas offered refuge from ground predators and views over the grassland.

It has been claimed that evidence for the ongoing attraction to present-day people of savanna habitats is indicated by their favoring (pictures of) low-branching broad-topped trees over alternatives, and by their ability to discriminate in favor of high- over low-quality savanna tree shapes. More generally, it is thought that we model our parklands, with their scattered stands of trees in grassland, open vistas to the horizon, water features, and grazing animals, on the savanna. E. O. Wilson again:

> For most of deep history, human beings lived in tropical and subtropical savanna in East Africa . . . In similar topography modern people choose their residence and design their parks and gardens . . . In their gardens they plant trees that resemble the acacias, sterculias, and other native trees of the African savannas.

One study, widely cited as revealing a vestigial, genetic bias toward savanna habitats, was conducted by John D. Balling, a psychologist, and John H. Falk, an education researcher. They tested US citizens of a spread of ages with photographs of habitats: unlike older age groups, children of 8 and 11 years of age significantly preferred savanna over deciduous and coniferous forests as places they would like to live. (A respect in which this result is startling is that few such children would have had first-hand experience of the pictured habitat—African savanna.) Balling and Falk hold that "younger children, with overall less experience, are more likely to reveal some innate predisposition," which is overridden in later years by fondness for more familiar

environments. They were cautious in interpreting their findings as giving "limited support for the hypothesis that people have some innate preference for savanna-like environments."

In a later experiment, conducted by the sociologist Elizabeth Lyons, similar outcomes were obtained; but she argues that these are a function of cultural, gender, and age factors. In particular, she questions whether the youthful preference for "savanna" connects with the African savanna as against savanna-like parks and backyards in which American children spend much of their time. A further experiment, by the human behavior researchers Erich Synek and Karl Grammer, shows a partial replication of the original results. They interpret these results not as showing a genetically disposed preference for savanna but as an incidental consequence of a perceptual processing bias present in younger children. Young children prefer pictures of low structural complexity; the taste for pictorial complexity increases with age. Pictures of savanna are low in complexity as regards the density of trees and jaggedness and height of the horizon compared to pictures of more mountainous woodland habitats.

If the interpretations of Lyons or of Synek and Grammer are correct, young children are not responding to the African habitat pictured, in which case the savanna hypothesis is not vindicated by their choices. A recent, more multi-dimensional study of US college students perhaps also counts against the savanna hypothesis. Of the six major environment types—desert, tundra, grassland, coniferous forest, deciduous forest, and tropical forest—tundra and coniferous forest were the most favored (judged in terms of scenic beauty, interest, etc.). Grassland, the environment nearest to savanna, was the least favored.

The main case against there being an environment of evolutionary adaptedness

The coherence of the story about the environment of evolutionary adaptedness is open to doubt. The thesis assumes that strong selection and adaptation in our species' distant past was followed by stabilization of traits. These traits then were apparently unaffected by significant changes in the physical environments we occupied in our global dispersal. And they were unaffected also by dramatic alteration to our social and cultural environment. These scenarios seem implausible. In addition, some aspects of brain chemistry suggest that modern humans could not have evolved on the savanna because a marine diet was essential for the neural changes that went with their emergence as a species.

However, the most compelling arguments against the claim that humans are adapted to an ancestral environment reject the claimed existence of such a habitat. Environmental variability and instability call into question the idea that there was some specific physical habitat in response to which Hominins developed their distinctive features, such as bipedalism and increasing brain size. And further, our knowledge of the social environment of our primordial ancestors is insufficient for us to be confident about

their way of life and about the circumstances to which they had to adapt. These objections can be applied specifically to the savanna hypothesis but they have implications more broadly for the enterprise of identifying connections between ancient environments and our evolved human nature.

Dramatic changes in climate and habitat in the period show there was no stable environment of evolutionary adaptation

There is now considerable evidence that our Hominin ancestors, rather than thriving mainly in a savanna habitat, lived in a variety of habitats, including forest, and that the spread of grassland (and the savanna) came later in their development than was previously thought. Bipedalism, increased brain size, and complex sociality are associated more with environmental variability than stability.

Studies have revealed that the period leading up to *Homo sapiens* was one of considerable environmental and climatic change, so much so that nothing counts as *the* Pleistocene environment. For example, fossil plant and pollen evidence shows that there were dramatic and frequent fluctuations in climate and vegetation when our predecessors were evolving—for instance, 1.8–1.7 ma at Olduvai Gorge, Tanzania, where *Homo habilis* was first found and described—and more generally over the past 5 million years. And at the time when psychologically modern humans emerged, the environment and climate were similarly volatile. In the period spanning the last Ice Age (75–15 ka), there were 21 events in the northern hemisphere in which an initial warming by 18°F (10°C) or more within a few decades was followed by a gradual cooling over about 1,000 years. Rapid changes in climate and vegetation that went with such patterns are apparent in a cave used by Neanderthals between 57 and 37 ka. Evan Hadingham, an archaeologist, concludes:

> Just as it is hard to imagine the passing of thousands and thousands of years in the archaeological layers, so, too, it is difficult to visualize the innumerable swings between open and forested landscapes, between arid and humid climates.

Similarly, the archaeologist Paul Mellars records significant environmental and cultural changes, including the cessation of cave art, which coincided with the end of the last glacial period about 12 ka.

Having reviewed the literature on marine oxygen isotope data, ocean dust records, analysis of wind-blown sand and soil, fossil pollen sequences, soil isotopes, and estimates of rainfall, temperature, and abundance of fauna as indicators of the habitat in which Hominin evolution took place (5 ma to 50 ka), the paleoanthropologist Richard Potts sums up the situation as follows:

> Our analysis reveals that habitats of this period underwent large revisions and that populations were subject to strong inconsistencies in selective environment. Considering the actual evidence, the view often propounded by evolutionary psychologists, who have made a large impact on the study of human cognitive evolution, needs to be reassessed. It is patently incorrect to characterize

the human ancestral environment as a set of specific repetitive elements, statistical regularities, or uniform problems which the cognitive mechanisms unique to humans are designed to solve. This portrait of the Pleistocene environment should be discarded and with it the view that the human mind is composed mainly of innate special-purpose devices or algorithms tied to a particular array of past adaptive possibilities.

The social environment was more important

I have just suggested that it is not clear that there was a stable, single, physical environment to which our primordial ancestors adapted. But even if there were, our ignorance of the social environment that our predecessors shaped for themselves, and of how this affected their relative fitness, makes it impossible in most cases to determine what was adaptive and what not. The crucial point here is that, for our species, the social environment is even more crucial to our survival and success than the physical one. (In listing the features of the optimal environment, we should have included belonging to a cooperative and loving group that has peaceful neighbors!) In general, evolutionary psychologists who discuss the environment of evolutionary adaptation pay surprisingly little attention to the relevance of the fact that it was made up of other humans.

We do not know the size of the groups in which our late Pleistocene predecessors lived—estimates range from 25 to several thousand. We are largely ignorant of the number of children they tended to have (as a function of birth spacing, infanticide, and mortality), of their mating practices (serial monogamy, polyandry, polygamy, mixed), of their group structure (whether they had family units of some kind or, instead, a core of children and females with satellite males), of their group hierarchy (matrilineal, patrilineal, shared or divided power), of their religious beliefs and how these were expressed in ritual practices, of the pattern and procedures of resource distribution within the group, of their attitudes to the sick and injured, of their adult life expectancy, or of their home range and seasonal or general mobility. We are uncertain about their practices of inter- and intra-group trade, about their attitudes to inter- and intra-group conflict, about their approaches to group territoriality, about the incidence of inter-group fighting, and about the mobility of personnel between groups.

Meanwhile, though we can study present-day hunter-gatherers, not only do they differ significantly from each other, but also we cannot be sure how accurately they recapitulate the circumstances of our ancient relatives. As the evolutionary biologist Robert Foley observes:

> Human populations were diversifying and dispersing during the period of evolving anatomical modernity, and there was subsequently at least partial genetic isolation of many populations . . . The EEA [environment of evolutionary adaptedness] is a concept that stresses the universal nature of the human evolutionary heritage, but the fact that geographical diversification occurred

during the period when the modern hunter-gatherer way of life evolved means that any association between hunter-gathering and the EEA will be relatively weak.

I don't deny that we can make shrewd guesses about our ancestors' social circumstances, but there are simply too many uncertainties and too many fitness-relevant variables to take into consideration for us to be confident about the plausibility of any account of the overall picture.

People live in all habitats and express aesthetic preferences for those in which they are raised

I noted earlier that certain habitats—shifting sands, swamps, arctic wastes, featureless flat plains, barren tundra, and dense tropical forest—should produce aesthetically negative responses because they are not readily conducive to human survival. But the fact is that humans have colonized all such habitats and have successfully occupied them for millennia. And it was not as if this occurred only because people were forced into suboptimal habitats by massive overpopulation in better ones. Moreover, the aesthetic landscape preferences of adults incline to the natural habitats with which they are most familiar, rather than to exotic ones. So instead of being seen as ugly (or at best sublime), such apparently negative habitats can be a source of aesthetic pleasure. It is far from clear how this is consistent with the thesis of an environment of evolutionary adaptedness or the landscape aesthetic that is most widely espoused by evolutionary psychologists.

As their successful settlement makes clear, all such habitats are ones in which humans can survive. Sometimes there is a degree of adaptation of the body and physiology to the local conditions. Those who live at altitude become more efficient at extracting oxygen from the atmosphere. Those who live in polar temperatures tend to become shorter in stature and with shorter limbs to conserve the area through which heat can be lost from the body. But by far the most important factors in making such habitats survivable are cooperation, the shared wisdom of a profound knowledge of how the environment can be exploited for food and other resources, and a repertoire of appropriate skills and accompanying technologies.

Of course, it takes a significant degree of knowledge for anyone to survive in the wild over a sustained period. Even I could probably keep myself alive for a time in temperate woodland toward the end of summer, but I would die within days in these more extreme environments. That is why they are so forbidding to me. But the arid wastes of northern Australia might strike an Aborigine very differently, not only because she is in her ancestral lands but also because she can see the food and water that are invisible to me, because she can navigate to the resources she needs, because she knows how and when to conserve her energy, and so on. There is a relativity here of aesthetic inclination to knowledge and experience that does not directly conform to the landscape aesthetic as advocated above.

Alternatives to the evolutionary psychologists' account of landscape aesthetic taste

In this section, I will outline three alternative stories about our taste in landscape: that its basis is purely cultural, that we have adapted at different times to multiple habitats, and that, rather than being adapted to one or more habitats, we are adapted to respond flexibly to the affordances that a variety of habitats offer. I reject the first two in favor of the third.

The role of culture in habitat preference

I have emphasized how the successful negotiation of all environments requires a considerable degree of social cooperation and taught knowledge, skills, and technologies. This must have been so for at least several million years in our Hominin past. So we cannot deny the centrality of culture, construing that term broadly, in our interaction with the environment. And this point is dramatized further by the success with which humans have settled extreme environments.

In addition, we should be sensitive to changing fashion in human attitudes to landscape. Whereas earlier untamed nature was regularly perceived as ugly and fearful, in the eighteenth century the British were drawn to the picturesque in nature; and European and American Romantics in the nineteenth century found rugged, wild land sublime. In the late twentieth century, what was suddenly seen as the negative impact of human actions on the wider environment played a major role in the rise of conservation movements and Green politics. Obviously there was a cultural impetus to these alterations in prevailing sensibilities.

Yet the evidence suggests that, whatever the role of culture in channeling and directing our preferences, there is a strong undercurrent of widely shared responses to natural environments. By far the majority of the world's human population live in sub-tropical and temperate maritime environments that, if they were not already of the parkland or farmland variety, have been extensively modified to conform to that type. I doubt that this is an accidental result of cultural bias. Most people want to feel the warmth of the sun on their back, to hear gently flowing water, to see trees and grass, to have open vistas that show the horizon, even if those who are born in deserts, equatorial forest, or on the arctic ice can accommodate themselves to their different environmental circumstances. Although they are variable and malleable, I do not think that everyone's landscape preferences are entirely and arbitrarily cultural in origin.

Have we adapted to different kinds of habitats?

Consider the deer mouse. Deer mice occupy different kinds of habitats: those raised in fields prefer fields, whereas those raised in woods prefer woods, though fields are a more favorable habitat other things being equal. If young born in fields are moved to pens in woods, they retain a strong preference for fields. Indeed, the preference persists through twenty generations of their descendants, so the basis for the preference must be

partly genetic. Despite this genetic bias, some individuals are sometimes able to override its force, given that the species occupies diverse habitats. If what is otherwise the most desirable habitat becomes overpopulated, it will be in the interests of individuals to exploit other habitats if they can, and if the population later drops, it will be in the interests of individuals in marginal habitats to filter back to the most optimal one.

John Tyler Bonner, an evolutionary biologist, sums up the situation this way:

> A character, such as habitat selection, can be simultaneously genetically fixed and environmentally triggered because of a historical accident. Each method of determination of the character may be the result of selection, but selection at different times in the evolutionary history of the animal. The fact that they both exist at one time is assumed to be because the first to appear was not erased by the appearance of the second.

In effect, different populations or races of the deer mouse have adapted to different habitats.

Are humans like the deer mouse? Are different groups genetically programmed to be adapted to different habitats, but with individuals genetically inclined to favor their ancestral environment (whichever one that was), yet also capable on occasion of migrating to a different habitat where that might provide a selective advantage? There is some plausibility to the suggestion, given that humans do show signs of compensatory adaptation to suboptimal altitude and temperature extremes, and given also that we are often strongly attached to the look, smell, and sound of our home countryside; and despite this, finally, that we also frequently opt to migrate to habitats perceived as easier or friendlier. But on the other hand, as a species we have occupied every kind of habitat—even, for months at a time, the open ocean on ships, oil rigs, and lighthouses—without this leading to biological modification suggestive of adaptation. And when we have domesticated new environments, this has not been because a narrow range of desired habitats had become degraded through overpopulation or overexploitation.

It is unlikely that different human populations are adapted to the different habitats they occupy, except rarely and then only in rather small ways.

The relevant adaptation is our environmental plasticity

Rather than having adapted at different times to many different habitats, it is more plausible to suggest that we are not adapted to any in particular, but rather that we have evolved to have the flexibility to make ourselves at home pretty much wherever we find ourselves. This would be an appropriate response to the environmental variety and inconstancy that our human and Hominin predecessors encountered.

This is the thesis of variability selection defended by Potts. He writes:

> Hominid evolution has produced morphological and geographic specialists committed to certain dietary and climatic conditions. It has also yielded species that excel in behavioral novelty,

diversity, and highly sophisticated use of environmental data. With its metabolically expensive brain and sophisticated social networks, *Homo sapiens* is an extreme example of the latter type of species. Its evolution and singular persistence are, according to the variability-selection hypothesis, intimately linked to the environmental instability that has characterized the Hominid era.

Overview

In this chapter, I have criticized the savanna hypothesis and the assumption that there was a particular environment to which our ancestors were adapted, one that governed their landscape tastes, these being tastes we have acquired from them. But my view is not completely negative. The fact is that we need food, water, and shelter wherever we find ourselves and whatever form our social life takes. This alone may establish a baseline landscape aesthetic that is applied to varying local conditions. So the simple story with which we started strikes me as entirely plausible.

Suitably qualified it goes like this: some physical habitats are obviously more congenial than others to human flourishing, even if it is true that we often have shown the cognitive resourcefulness and drive to survive successfully under much more demanding climatic and environmental conditions. The congenial habitats are so because they provide more of what we need and make it less costly in terms of time, resources, and energy to obtain, they pose fewer dangers, and they are more predictable and reliable. They were like the Garden of Eden described earlier, but also with some big cats and bears, snakes and spiders, mosquitoes, body lice, and tapeworms. People who were naturally drawn to such habitats, who found them appealing and pleasing, would have had an edge in reproductive success over those who were not. They would also have been less stressed and more content with their surroundings than those who lived in more demanding circumstances. Similarly, those who recognized the threats and challenges of adverse habitats and turned away from those habitats toward congenial ones were thereby advantaged, other things being equal.

The appeal of friendly habitats and the repulsion of unfriendly ones would inevitably take on an aesthetic color, I think. The one would come to strike the perceiver as beautiful, the other as ugly or perhaps as sublime though forbidding. And to the extent that such preferences are heritable, or the capacities easily to acquire and retain them are heritable, and given also that the environmental conditions for human flourishing and well-being remain available, modern-day humans tend to share the same aesthetic preferences. In these respects there is a natural environmental aesthetic.

Congenial physical habitats are not sufficient to guarantee human flourishing, however. People in them can be destroyed by natural disasters, such as epidemics, earthquakes, tsunamis, and volcanic eruptions. But more to the point, their attractiveness counts for little if they are shared with other groups that resort often to violent conflict, or if our team members are uncooperative, unreliable, and argumentative. In the next chapter, I will consider human beauty and link it to the social conditions that make for peaceful cooperation.

7

The Aesthetics of Human Beauty

Human beauty comes in a great variety of forms. There is beauty in virtuous character—in acts of courage, justice, and compassion, for instance. There is beauty of intellect—in displays of wisdom, knowledge, and precise reasoning, for example. And in spirituality—in attitudes such as those showing love, devotion, acquiescence, and aestheticism. Also, human physical beauty appears in many guises. There is the beauty of a baby's smile, of foal-like youthful awkwardness, of aged dignity. We can find beauty in the strength and athleticism of a sportsperson, in the grace of a dancer, and in the manual dexterity of an artisan. But when evolutionary psychologists turn to human beauty, they focus almost exclusively on youthful female sexual attractiveness and consider it mostly in the context of mate selection.

Why *female* beauty? The generalized answer is because heterosexual men value beauty in women, whereas women value status, control of resources, intelligence, and kindness in men. Why *youthful* beauty? Again the generalized answer is because heterosexual—hereafter I drop this qualifier, though it applies throughout—men aged above 25 favor mates who are younger than they are and women prefer men who are older.

While these generalizations do seem to be clearly supported by intra- and cross-cultural evidence, some qualifications are immediately in order. It is possible that the data underestimate the extent to which women value physical male characteristics. There is plenty of evidence to suggest that women prefer men who are tall, have prominent jaws, display upper body strength, and have flat stomachs. And these qualities might rank for women above those mentioned earlier when they are selecting not the intended father of their children but the candidate for a temporary liaison. (It is under similar circumstances that men give pre-eminence to physical attractiveness in women.) Meanwhile, when men are choosing the potential mothers of their children, they become as fussy as women are about status, kindness, and intelligence in their partners. In selecting long-term mates, both sexes aim to get the highest quality partner and future co-parent that they can, given what they have to offer, and much more than outward appearance is relevant to this judgment of quality.

The analysis of human beauty in terms of female sexual attractiveness has two consequences. First, it reduces women's value to their bodies' appearance. And it sets the highest value on bodies they will possess for perhaps no more than twenty years, or that they might never attain. It thereby stereotypes them and characterizes their social

positions and roles as biologically determined. Such views insult women and demean us all. Because evolutionary psychologists are not always sensitive in how they present their theories, it is not surprising that many women find their views offensive. Nevertheless, I do not think that evolutionary psychology is inevitably committed to reduction, stereotyping, and determinism, so I believe it can provide a more credible and complex account of human sexuality than its critics suppose.

The second consequence of the equation of human beauty with physical sexual attractiveness is that it makes the notion of human beauty appear to have nothing in common with the kind of beauty that is aesthetic. Whatever the ordinary concept of aesthetic beauty comes to, it is not about lust and sex. Prettiness is distinct from the beauty of art, as we know from many harrowing but beautiful works of art, such as Shakespeare's *King Lear* or Picasso's *Guernica*. We might have expected our interest in human beauty to provide the foremost and most obvious example of a connection between the aesthetic and evolution, but the account of human beauty that dominates the writings of evolutionary psychologists does not invite that interpretation.

I will argue that we need a broader account of human beauty—not only by including the varieties of non-sexual human non-physical beauty that I listed previously, but also by expanding our understanding of the kind of physical beauty that interests the evolutionary psychologist. That account will allow us to see that physical beauty typically presents a genuinely aesthetic character to the human world. It will also show, incidentally, why we should resist reduction, stereotyping, and determinacy in the discussion of human physical beauty. But before I get to that part of the agenda, I briefly review the literature on youthful female beauty.

Human physical beauty

According to evolutionary psychologists, we find beautiful and are attracted to features that are honest signals of fitness. When it comes to mate selection, the relevant signs of fitness are indicators of health and immunity, fertility, and the viability of future offspring. Hence the title of a paper on the subject by the evolutionary psychologist Donald Symons: "Beauty is in the adaptations of the beholder."

Bodily symmetry and proportion testify to a history of health. The face, in particular, is a strong indicator, and what makes the face beautiful is symmetry and hypernormalcy (averageness). Long, glossy hair, a clear complexion, white teeth, and clear eyewhites and pupils are also indicative of the absence of disease or malnutrition. These same markers are described as characteristic of female beauty in medieval texts.

Interestingly, we are also drawn to and find beautiful unusual faces, provided they fall within the extremes of the normal range. This is probably an example of what is called the "peak-shift effect," in which the exaggeration of a desirable feature makes it more beautiful. Darwin observed:

If all our women were to become as beautiful as the Venus de' Medici, we should for a time be charmed; but we should soon wish for variety; and as soon as we had obtained variety, we should wish to see certain characters a little exaggerated beyond the then existing common standard.

Fertility in men is indicated by an adult but youthful and muscled body, vigor, and good health generally. But because he donates so little at the time of fertilization and his major contribution is providing security and resources for future children and their mother, the relevant indicators of male worthiness are more social than physical. In a woman, fertility is indicated by age—again the face offers the best clues—breasts, suitable fat depositions, and body shape. Bodily markers that distinguish human women from the mature females of other primate species, and that therefore indicate the operation of selection on the basis of male preferences, include round, plump breasts and buttocks, skin smoothness and depilation, and a low waist-to-hip ratio. Studies suggest that a waist-to-hip ratio of about 0.7 correlates with men's judgments of the beauty of women's bodies. (The lower the number, the more wasp-like the build. Men and post-menopausal women of "normal" weight are about 0.9.) This, plus an appropriate body weight, show a woman to be sexually mature, probably not pregnant, and endowed with the energy resources to sustain pregnancy.

Concern for the viability of future offspring is apparent firstly in the incest-blocking "Westermarck effect," according to which people raised together from a very young age do not find each other sexually attractive. As a result, the risks of damaging the genetic stock of offspring through inbreeding are avoided. It emerges also in behaviors that are likely to promote the child's genetic diversity and immunity from disease. At the fertile time of the month, women are attracted to men according to their odor (among other things no doubt), with the result that they favor men with immune systems that are different and complementary to their own. And both sexes can find strangers and newcomers to their group—in other words, potential sources of higher genetic diversity—alluring.

Because we are in competition for mates of quality, it is not surprising that we enhance our best physical features and try to minimize our worst ones when we can. Here is an obvious but significant point: people go to huge lengths to improve or accentuate the beauty of their appearance. They use make-up, decoration, and ornament. They adopt various styles of grooming and hairdressing. Their clothing is often designed to present their body one way or another—as well as to cover it, to show status, to suit a social situation, and to display personality. They alter their bodies in ways ranging from exercising for the sake of bigger muscles or dieting to lose weight, to piercing, tattooing, scarification, and more extreme effects that are deemed culturally to signify status or to accentuate beauty.

If attractiveness is to track fitness, it must be a reliable and honest signal, but we fake it where we can. If men are seeking a mate, they might lie about their wealth and resources and pretend to be more sharing and caring than they actually are. Correspondingly, women might lie about their age and conceal their sexual histories. When

it comes to physical appearance, men might wear lifts, pad their shoulders, have their teeth whitened, and don a toupee. Women might wear corsets and uplifting padded bras, and they might pluck, shave, and dye their hair, or wear wigs or hair extensions. As a comparatively recent innovation there is the option of cosmetic surgery—facelifts, the remodeling of facial features, tummy tucks, liposuction, breast implants, and hair transplants.

But notice that most of these alterations to physical appearance are more about improving one's social look and position than about fooling a potential long-term partner. They are most common as attempts to hold age at bay; the young have far less need of them. And in any case, courtship is usually sufficiently extended that one can gain a shrewd idea of the package under the wrapping.

Our beautiful ancestors

Evolutionary psychologists claim to have shown that the markers of human physical beauty are cross-cultural and shaped by evolution. Either these markers signal health and fecundity generally; or, in the case of secondary sexual characteristics, they are molded by sexual selection to please the other sex, in which case they might answer to initially arbitrary preferences but might also signal fitness. Given their model of human evolution, these psychologists must maintain that our ancient ancestors were attracted to and found beautiful the physical characteristics we also like. As regards the physical features discussed above, I assume they are correct, though some explaining remains to be done.

Given the high infant mortality that was likely in the late Paleolithic, would it not be more strategic to prefer as mates older, already successful breeders, rather than the young? Among male chimpanzees, already successful mothers are the most desirable sexual partners.

In the case of a woman in the Pleistocene choosing a partner, there is a lot to be said for this plan. It provides the opportunity to see what resources he has accumulated, how faithful he is, and how supportive he is of his children and their mother. But on the other hand a portion of his resources are already committed, and if he is such a good mate and father he should not be prepared to risk what he has in order to take up with someone new. He would have to be so well-endowed that he could afford to keep multiple wives and all their children equally well. A better bet overall would be a younger, childless mate with strong potential for future resources and status. Most likely, the best male mate would be old enough to display credible potential and a commitment to fidelity, but not so old as to be already committed elsewhere.

In the case of a man choosing a long-term partner, the strategy of targeting a successful breeder has one benefit: women who have already borne children are less likely to die in childbirth. Nevertheless, there would be strong reasons for preferring a youthful, childless partner. A new wife at 20 has triple the reproductive potential of a new wife at 30, measured as the average potential offspring a female could produce for

the remainder of her life. Given that they will nurse their children for several years, thereby suppressing fertility, and given also the risks of miscarriage and stillbirth, the mothers of the late Paleolithic might be expected to bear a comparatively small number of children. If there were regular food shortages, it could take them some time after weaning to become fit again for pregnancy. Also, the value of having small numbers of high quality children would make women desire to limit the chances of conception rather than to seek pregnancy. So we can surmise that large families would have been abnormal.

If it is true that men of the late Paleolithic favored as mates young women with a waist-to-hip ratio of 0.7, how can we explain fat Venus figurines from the period? While all the men shown in Paleolithic drawings are lean, only 10 percent of the far greater number of women would be described as slim and many are obese. Few women of the time would have possessed such figures. For that matter, neither would they have gone naked and been without pubic hair, which is how they are often depicted.

R. Dale Guthrie, a natural historian, argues against different interpretations of these fat Venuses: that they are goddesses in matriarchal societies, are pregnant rather than fat, are magic aids to pregnancy, and are self-portraits. In Guthrie's view, these representations are, instead, typical of erotica produced by adolescent males: the heads, arms, and feet are de-emphasized to the point of disappearing, the erogenous hot zones are overt and enlarged, yet the waist-to-hip ratio is appealing to men, coming in at 0.655. (Note that ancient footprints of adolescents have been found in caves marked with what are widely interpreted as erotic drawings.) Guthrie also suggests that, because of the comparative scarcity of food, men attracted to voluptuous women were likely to leave more descendants, and, in addition, that women would typically be at their chubbiest when fertile.

These claims are plausible. We know that at different times and places a high body mass index may be regarded as beautiful in a woman provided she retains her curviness, whereas very extreme bonyness is regarded as unattractive everywhere. I suspect that few men find very thin women attractive on account of their thinness. The vast majority of cultures have bodily ideals that tend toward fatness, especially for women, and Moor and Tuareg societies have ideals of female obesity. Peter J. Brown, an anthropologist, records that nine out of ten societies in Human Relations Area Files show a preference for women with fat hips and legs. It is common for people of both sexes in many societies to associate plumpness with health and happiness. Also, many societies ritually fatten girls and young women for marriage, and chubbiness in a wife can signal her husband's success as a provider. In some societies (Zulu, highland New Guinea, Polynesia), fatness is associated not so much with sexiness as with high status, however.

Nevertheless, there is a degree of cultural relativity in these judgments, as Western ideals of female thinness make clear. Overweight women were identified as healthy but not as attractive by men in Barbados and Pakistan. Men in Barbados, Pakistan, Poland,

and Austria rated normal weight female figures as the most attractive, whereas men in Britain, China, Cyprus, and Ukraine rated underweight figures as more attractive. It has been proposed that a low waist-to-hip ratio is favored only where resources are abundant. Otherwise, males prefer a higher waist-to-hip ratio and higher body mass index.

In some contexts, rather than being driven by male preferences, the social norms might depend more on competition between women, whose ideals for female body shape might differ from men's. It is not difficult to see how this could occur. If being thin is good, being thinner than other women might always seem better. And this competition may be for comparative status within the group of a woman's female peers, rather than in order to be sexually attractive to men. Striving to maintain an anorexic body type may be more about status and self-control than sexual attractiveness. Female thinness is associated with status in industrialized societies that have a reliable and effectively distributed food supply.

Let us try to connect the dots. Plump people must have access to ample food. Food can be a scarce and valuable resource. Moreover, menstruation ceases if a woman's body fat falls too low, so fertility depends on regular access to foods that can be stored as fat. For our ancient foraging ancestors and for much of human history since, the food supply was irregular and the technology of food preservation was limited. Short seasons of plenty were probably set against longer periods of shortage. Under such conditions people would gorge when they had the chance. No wonder if a ripe, womanly figure would be considered sexy and that, generally, corpulence went with happiness or high status.

The psychologist Paul C. Rosenblatt observes:

> In a world where food is often scarce and nutritional and digestive-tract illness often epidemic, plumpness is an indication of wealth and health.

And David Perrett, a psychologist, puts the cultural relativity of weight preferences in perspective:

> Weight is an indicator of health for people the world over, but what counts as a healthy weight will vary as to whether in your circumstances a coronary or starvation is more likely to get you.

In many other respects, however, Paleolithic sexual preferences and notions of erotic beauty would now be all too familiar. Compared to modern Westerners, signs of damage, disease, and ill health would have been more common, standards of personal grooming and hygiene would have been lower, and the number of potential mates would have been significantly more limited. Our Paleolithic precursors would not have been as beautiful as we are, their beauty faded earlier, and for them death regularly came before old age. There is evidence that only a small percentage of our pre-human European ancestors (*Homo heidelbergensis*) lived to be more than 30 years of age, with about two-thirds dead before the age of 20, and less than half of extinct and modern hunter-gatherers reached 40 years of age, with less than a quarter surviving to 50.

Beauty and culture

We do not have to believe that human sexuality is about gender and that gender is completely constructed by arbitrary cultural conditions to be irritated by the implication that women's biological destiny is to primp and pluck themselves and to squeeze into corsets that make their waist-to-hip ratio lower, all for the sake of men's delectation. It is no consolation to be assured that we are all in a stiff market of competition for mates, the outcome of which is that most of us will not measure up to our partner's ideal and that most of us will settle for something far short of our ideal in the opposite sex. And there is not much solace in being reminded that we like what is average and call it beauty.

A more relevant response might take this form: evolution thrives on individual difference, not sameness. Not all men respond to exactly the same female physical features or types. Not all women desire the same attributes in men. Moreover, people also often like what is statistically unusual so long as it is not too deviant. When it comes to sexual attraction and relations, there is as much individuality and creative diversity as in other areas of life in which personal taste plays a role.

The same applies when we shift to the level of culture. Even if there are universal biological underpinnings, the cultural expression of these is creative and flexible. Consider the various norms for make-up and hair styling in different historical epochs and in different cultures, both for men and women. As well, recall the introduction of arbitrary preferences that soon can distinguish one culture's ideas of beauty from another's. Perhaps men in one group admire women with long necks and in another the women esteem men for how high they can jump from a standing start. If such preferences are just a little more common than their opposites and other alternatives, the workings of sexual selection through time can create unusually long-necked women in the first culture and higher jumping men in the other.

Evolutionary psychologists tend to overlook cultural or individual differences through their preoccupation with cross-cultural universals. In consequence, though a place for culture is allowed in their story, they tend to present culture as a veneer laid over the biological base. The river of culture might always meander, so it might be thought, but the gravity of biology constrains that river's ultimate direction. So, to take an example, there can be many cultural factors, such as ones of race, class, caste, or religion, that limit a person's selection of a mate by prohibiting certain cross-boundary partnerships. And particular cultures can arbitrarily favor this thing or that—nose bones, powdered wigs, distended earlobes—as contributing to beauty. But even if cultural factors set constraints on when and where the biological drivers of mate selection apply, those constraints could not prevent those drivers from playing their role.

Someone who regards the influence of culture both as more arbitrary and as more important than this when it comes to mate choice has three replies. In many cultures people do not get to select their partners at all. Someone else, usually their parents,

makes the selection for them. Second, such is the fear of the power of female sexuality and so strong is the desire of men to guarantee their wives' fidelity and their control over them that in some cultures women are expected to dress in public in ways that hide their beauty entirely from sight. Finally, those arbitrary cultural practices, rather than complementing the search for a biologically fit partner, can work directly against it. Footbinding can be crippling. Genital mutilation does not seem a good way to set someone up for a happy marriage.

So why did footbinding persist for a thousand years and why are clitoridectomy and infibulation still widely practiced in Africa? Such customs are justified by false beliefs—for instance that footbinding promotes health and fertility or that contact with the clitoris is fatal to a man or a newborn. And they are usually accompanied by social conventions making sure that, if they are not enacted, the woman is unmarriageable and treated as a social pariah. The sad result is that these procedures are often arranged or performed by mothers on their daughters.

These practices typically serve as forms of male-initiated control over women's sexuality. For instance, the Chinese historical record regarding footbinding contains several explicit statements that the intention was to hobble women to promote their seclusion and fidelity.

The evolutionary psychologist might respond by trying to show that such cultural practices are not as opposed to the relevant biological considerations as first appears. Matchmakers who are interested in the quality of the progeny of the people they pair are bound to seek many of the qualities that mark beauty—that is, signs of fitness, status, fertility, health, and so on. (In fact, though, arranged marriages that do not take account of the desires of the principals have a high failure rate.) Even in societies with strict dress codes for women, it is common for women to maximize their beauty as they can. If they must wear a headscarf in public, they may compete in their choice of scarves and in how they are worn. And in most such cultures, the dress codes are less restrictive of single women. Of 138 societies studied, 99 distinguished single from married women by ornament or garment and 49 showed women's family wealth in this manner. By contrast, ornaments showed men's wealth or status in 87 of the societies and only 4 indicated men's marital status this way.

As for footbinding, in the extreme form in which it is crippling it has to be a minority practice because it is a very costly sign of wealth and status. It advertises that the person in question does not have the ambulatory capacity necessary for most kinds of work. In the nineteenth century, those forms of footbinding that became widespread were much less crippling. Happily, the practice was ended in one generation at the onset of the twentieth century as a result of education and the formation of societies whose members pledged that they would not bind their daughters' feet and would not let their sons marry women with bound feet.

As an alternative method of reply, the evolutionary psychologist might allow that cultural practices sometimes work against our genes' agendas. The matchmaker might be looking to maximize the dowry, not the quality of the potential offspring. Clothing

conventions might inhibit the efficacy of mate selection. Genital mutilation could have adverse consequences on the lives and reproductivity of those who are subject to it. After all, some religious communities devote themselves to celibacy. And whole societies can adopt courses of action that lead to their self-destruction. Look at the history of the inhabitants of Rapa Nui (Easter Island). And on a grander scale consider the possibility that the members of a species might act so as to destroy the environment on which their survival depends.

Or it could be argued that the relevant social conventions and institutions serve male evolutionary interests in ways other than by guiding men's mate selections. They might have become, instead, about the exercise and maintenance of power. Much that happens in society is not to the benefit of all of its members but serves the interests of those in control, who are typically men.

The evolutionary psychologist can adopt any or all of these argumentative strategies while allowing that, where mate selection gets a dance on the program, it will be guided at least in part by the processes, signals, and mechanisms he describes.

I am not in sympathy with those who think that biology and human nature have been rendered irrelevant to our lives by the social construction of the cultural worlds we now inhabit. I do not agree with the idea that there is nothing but culture and that we are free to invent ourselves as we choose. I do not accept, for instance, that sex is not a factor in gender. But neither am I content with the modes of reply I have sketched on behalf of the evolutionary psychologist. They place culture and biology in opposition. As I indicated in Chapter 3, I am not attracted to views advocating a strict separation of the roles of biology and culture in our lives.

More particularly I am uncomfortable with the idea that we are naturally selfish or immoral, with this preferably counteracted at a cultural level by higher moral values. Many social institutions and conventions are violent and oppressive toward women as a function of men's desire to guarantee the paternity of their offspring, but such male concerns need not be expressed in these forms. Altruism, a sense of justice, the desire to cooperate with others, yearning for loving relationships—these are no less aspects of human nature than is an inclination to pursue self-interest.

I do not wish to continue the debate between evolutionary psychology and cultural relativists along lines implying that biology and culture are not intimately related and connected. Rather, I prefer to explore some of the synergies between them. Doing so is a crucial step toward my ultimate goal of linking sexual attractiveness in appearance to modes of beauty that are more plainly aesthetic. I am in sympathy with this observation by Frederick Turner:

> One of the most powerful metaphors is indeed sex and reproduction. The most beautiful expressions of plants and animals are their flowers, their mating plumage, their mating rituals. But for those who have experienced beauty most deeply, sexual attraction . . . is only a metaphor for beauty, a precursor of it.

A natural history of love

I speculate that, at some point in the past, creatures from which our species descended experienced lust but were incapable of love. This is not to deny that they were deeply attached and devoted to their partners and offspring. Birds certainly are, but I doubt that they experience anything quite like the mutual identification and emotional satisfaction of love. Later, in a different species, love emerged, not only in the form of parental solicitude but also of romantic attraction between mates. In this species, care of children and their parents' long-term bonding was often motivated and sustained by feelings of love. (For those who think the word "love" is too culturally loaded, substitute infatuation, unusual absorption in, and identification with the interests of another, or intimacy, commitment, and passion.)

It could be that we were the first species to experience romantic love, but I doubt it. It would not be surprising if our Hominin predecessors were also capable of the same feelings. In any case, I suspect mate selection among the first *Homo sapiens* often involved love, though, as now, this was probably only one among many considerations. Given the high degree of close cooperation needed between the band's members if they were to survive, mutual trust and care would have been crucial. Cavemen who clubbed women and dragged them by their hair would not have made desirable mates and would have left few surviving offspring in the late Paleolithic.

Studies have found evidence of romantic love in 147 of 166 cultures, with insufficient evidence either way in 18 of the remaining 19. And romantic love has been identified as a literary universal because of its prominence in a sample of 75 folk tales from various cultures.

Love, I take it, is a complex emotion with far-reaching social conditions, consequences, rules, conventions, and expressions. And if it reaches back at least to the earliest *Homo sapiens*, then in favorable circumstances mate selection in our species was never a purely biological matter. For thousands of years in the foraging past of our human forebears it was a socially complex, culturally influenced business. Given this, the story of mate selection told by evolutionary psychologists should not be thought of as true for most of our distant past, being complicated only in comparatively recent times by the dynamics of our complex, large-scale societies and the cultural practices that mark them. Rather, that story must be considered to be an incomplete, crude sketch of what for our species has always been a socially multifaceted business.

The social side of beauty

Consider the man whose interest is not in casual sex but in choosing the mother of his offspring. As previously indicated, he pays attention to more than physical beauty. Indeed, he rates status and intelligence more highly. But this common way of putting the point does not register the extent to which physical beauty interacts with these other properties.

Picture an outwardly beautiful woman who, when she speaks, reveals that she is embittered, nasty, and vicious. Not only does she become less desirable, she comes to *look* less beautiful. Or, to get further away from appearances, a better way to make the point is to say that the interest in her beauty, which unreflectively seemed to be confined to her physical attributes, is revealed by the negative response as having a wider scope all along. It carried assumptions about how she would perform as a person more broadly. When those assumptions are challenged by her behavior, she is revealed as less beautiful than was supposed.

In "Personal Beauty" of 1854, the evolutionist and philosopher Herbert Spencer wrote:

> It is a common opinion that beauty of character and beauty of aspect are unrelated. I have never been able to reconcile myself to this opinion. Indeed, even those who hold it do so in an incomplete sense; for notwithstanding their theory they continue to manifest surprise when they find a mean deed committed by one of noble countenance—a fact implying that underneath their professed induction lies a still living conviction at variance with it.

Many studies have shown Spencer to be right. We tend to take for granted that excellence in outward appearance predicts excellence in other qualities. We are inclined to assume that good-looking people are intelligent, capable, and nice. For example, women pictured with low waist-to-hip ratios were predicted by males to have many desirable personality characteristics solely on the basis of their appearance. This is known as the "halo effect." Conversely, we are liable to be untrusting and negative toward people whose outward appearance strikes us as ugly, shifty, or too unusual.

Unless we are sensitive to the halo effect, we are often unduly biased in favor of people we perceive as attractive. As a result, we are liable to treat them better, at least initially, than other people we do not know well. Attractive looking people receive higher salaries, are rewarded more often, elicit cooperation more often, and have more positive interactions. When accused of serious crimes, they are less likely to be convicted and, if convicted, receive lighter sentences.

We are wrong to make the presumption in their favor, of course. Perhaps they are intelligent, capable, and nice, but a pretty face and winning smile are not reliable indicators of this. Nevertheless, the tendency to bias bears out my point: the judgment of the beauty of appearance is by no means solely about outward qualities. It is laced with presumptions about the presence of other desirable attributes. If those presumptions are put to the test and roundly defeated, it is rare, I think, that we would revise everything but the judgment of beauty. Though we might now reflect that the person's beauty is no more than skin deep, it is not as if that "no more than" was present in the original assessment.

The same point can be made in a different fashion by considering the notion of health and normalcy invoked for their importance to beauty earlier. As first presented—and in the focus of evolutionary psychology—the concern was with bodily

signs of physical health and immunity to disease. But of course we do not stop there. We want in a partner someone who will raise children to be successful and desirable as adults. That means that we include in the judgment of beauty consideration of the qualities of character and the far-reaching social skills that childrearing calls for. Normalcy includes relating to people in ways appropriate to the situation and to our places and roles in a wider community. A friendly smile, ease of manner, a concern for the self that is properly balanced with care for others and group goods, appropriate contributions to cooperative tasks, honesty, reliability, and much more count toward social normalcy. And the judgment of beauty that reflects our concern with normalcy takes in these considerations, going beyond mere appearances.

So how does the newly balanced story about mate selection look? In choosing a long-term partner, a person considers fitness markers for health and potential fecundity that have been highlighted by evolution as possessing adaptive value under most social circumstances. While the lure of physical attractiveness might trigger interest in a potential long-term partner, many other considerations regarding the capacities and behaviors of the other person will be factored into the decision. These include assessments of social aptitude and status, insofar as these are relevant to predicting reproductive success.

This process of mate selection is mutual, with each not only choosing but also having to be chosen by the other. In consequence, each has to be aware not only of what he or she finds desirable, but also of what is fancied by his or her potential partner; and each aims, as far as he or she can, to satisfy the other's preference, not only as regards the outward show of beauty but in terms of personality, character, and all the broader behaviors relevant to playing our roles within the community.

This is not to say that we always get things exactly right. A man might mistakenly believe that women like a bodybuilder's physique and that they will take an expensive sports car as a sign of status. A woman might mistakenly believe that men notice fashion details in clothing and that they have a preference for catwalk thinness. Nevertheless, a realistic assessment of one's own appeal is important. Those who were constantly rebuffed were not our ancestors.

Physical beauty, considered strictly on its own, is only one element in the package of characteristics that makes someone attractive. In the judgment of beauty, all these various qualities interact with each other, so there is no clear borderline between physical attractiveness and social attractiveness.

That is the first step: seeing that physical beauty cannot really be separated from character and performance, because they mesh together and interact when it comes to mate selection. The second step is more radical and takes us further from the orientation to beauty common in the writings of evolutionary psychologists. It is the argument that "physical beauty" is never solely or even mainly about sexual attraction or mate selection. As regards ourselves, it is much more about personal identity and the face that each of us presents to our community, about our daily manner of going about life. In this regard, notice how earlier I stressed not only the ways in which we try to

amplify our beauty, but how this is typically directed more to establishing our social profiles than to attracting mates. As regards our view of others, it is about how we assess their performance more generally as fellow participants in our culture, as potential friends or enemies.

I have mentioned that we incline to an unreflective partiality toward those whom we judge to be beautiful. It is now instructive to notice that this is present in all kinds of social situations, not only when we are looking for short- or long-term sexual partners. Of course we should guard against the errors of judgment to which this bias can lead. And if we do not do so, closer or longer contact provides grounds for seeing how the outwardly beautiful person measures up more widely and for revising our evaluation to eliminate its initial bias. But my main point is this: from both the first- and third-person points of view, the judgment of beauty goes beyond appearances to a wider assessment, and this assessment concerns the target person's social performance generally and often not at all their desirability as a mate.

The point was made, surprisingly, in one of the most influential papers on sexual selection, R. A. Fisher's "The Evolution of Sexual Preference" of 1915. He wrote:

> In the struggle between ethical and aesthetic valuations a curious phenomenon is observable. To the ordinary man the distinction is clear. Beauty is superficial, moral worth fundamental. Beauty interests and pleases the senses, morality governs our motives and guides our actions. And so it comes about that Ephemeral Beauty weighs less than Eternal Right. But in the deepest minds the idea of beauty links itself with one of altogether higher significance; in fact, with nothing less than the mystical appreciation of human personality.

Because so much of our self-esteem and social standing is bound up with how we are evaluated by others, we wish to be admired by members of both sexes. In consequence, when we enter the public sphere, as part of putting our best selves forward we conform to the community's expectations about how we should present ourselves. There are norms about what is appropriate in self-presentation for both men and women. In some societies women are expected to mask or downplay their physical attractiveness and act accordingly. But in modern Western society and many others, the norm is that both sexes are well groomed and make the best of themselves physically. In the social interactions which this facilitates, others are expected to respond positively to that effort; and their doing so enhances the self-confidence and self-esteem of those so acknowledged.

The more positive feedback a person receives, the more he or she grows in confidence and the better he or she plays his or her role or executes his or her tasks. In this respect the earlier mentioned prejudice in favor of beauty might not be the stupid error it at first appears to be: treating people as beautiful can facilitate from them a better performance across a range of social behaviors than otherwise they might be capable of or inclined to deliver. And coming to know that someone is helpful and cooperative can even make that person appear more physically attractive.

The outcome is that any person assesses the desirability and overall attractiveness of both males and females in a wide variety of social circumstances as one among many judgments relevant to predicting and understanding the social behavior and relationships of the members of his or her community. More than that, in subtle and socially appropriate ways, we acknowledge the beauty we find in others of both sexes. It is not only when we consciously calculate a situation that we make such judgments or show such admiration. They are how we are acculturated to view human sociality, and they automatically direct our engagement with others.

Even in those cultures that specifically regulate women's dress in order to mask or de-emphasize attractiveness—among conservative Muslim, Jewish, and Christian sects, for instance—I suspect the plot is similar even if the details are different.

A Muslim woman who dresses in full hijab might in some societies empower herself by wearing jewelry, make-up, and whatever else leads her to feel attractive and self-confident underneath her prescribed garment. What matters from her point of view is that she be recognized and respected at the value that she would like, not that the means she adopts for achieving this are publicly viewable. And even if her options for physical self-presentation are limited in the male world of public commerce, she will spend a portion of her time in contexts where appearance is interpersonally important and the dress restrictions do not apply—for example, in dealing with other women or family members in a domestic context. (Recall that the assessment of beauty which is now our focus, one that is unharnessed from the business of mate selection, is directed as keenly to one's own sex as the other.) And finally note also the importance of the earlier observation that the judgment of physical beauty comes intertwined with aspects of social attractiveness. Even if clothed in full hijab, a woman can present herself as attractive just by being pleasant, appropriately friendly, cooperative, and so on.

Indeed, she may be the beneficiary of a reversed version of the prejudice that benefits the beautiful: if her voice sounds harmonious, her personality comes across as lively and agreeable, and she is well spoken and good mannered, it is not unlikely that those she deals with amplify their impression of her unseen physical attractiveness more than they perhaps ought, and she receives the further admiration and respect that go with that projection.

Human beauty and aesthetics

I have tried to decouple our judgments of human beauty from both the merely physical and the business of mate selection. There is no separating our sense of human beauty from wider considerations of social functioning, and while reflection on those can be relevant to mate selection, in the typical case they are not so because considerations of social functioning are perennially important, while mate selection is not.

It is not my intention to demote the importance of physical beauty, however. Though an interest in physical beauty is often divorced from issues of sexual attraction and mate selection, this gives more scope for beauty's influence to pervade and add

significance to other, more permanent aspects of our lives. In Bali, for example, where the gods value attractiveness in appearance and women dress to display it in making daily ritual offerings, the concern with physical beauty is integral to ways of behaving that give expression to the culture's deepest religious values.

Nor do I mean to anaesthetize the notion of physical beauty by separating it completely from sexual attraction. That is to say, I am not convinced by the suggestion that we are now discussing a de-sexed kind of attractiveness. No one fails to notice the sex of the person with whom he or she is talking. And when they beautify themselves in ways that are socially accepted, people often want to be thought of or recognized as sexually attractive, which is of course quite different from wanting to elicit an overtly sexual response.

Rather, it is a matter of appropriating the culturally and biologically sanctioned symbols of sexuality to put them to work in the tasks of self-definition, self-projection, and self-empowerment. It is a matter of showing oneself as worthy of value by presenting oneself forcefully in ways that are socially valued. Physical beauty provides one dimension along which we assess ourselves and others, and it figures in our bodily self-awareness and identity.

Evolutionary psychologists might be correct to think that our judgment of human beauty derives historically from our concern in assessing the appearance of others for honest signals of their fitness, and right also that we assess others for fitness because we are interested in them as potential mates or sexual rivals. Yet the importance of beauty in appearance plainly is not simply utilitarian in the way their explanation implies. The judgment of and attraction to human beauty rarely is narrowly sexual, nor does it come into play only where mate selection is at issue. To make a point that is compatible with the explanatory agenda of evolutionary psychology but is frequently ignored in the discussions of human beauty: as with food, sleep, exercise, and the attractiveness of babies, nature wisely leads us to attach intrinsic value to what is evolutionarily useful for us, including human beauty.

The pleasure we take in the beauty of human appearances can now be seen, I hope, as much closer to the usual aesthetic response to nonhuman beauty than is implicit in the account that centralizes the place of appearance in mate selection. Because our concern with overall human attractiveness, including the attractiveness of physical appearance, is abstracted from the process of mate selection and persists as a frame through which we view the human social realm as a whole, human attractiveness not surprisingly came to be experienced aesthetically. We find beauty in people, just as we find beauty in the world more generally. And just as we can find beauty in ancestral landscapes though we have no desire to hunt and live there, so we can find beauty in people independently of any desire to mate with them. Only when human beauty is rightly understood in such terms can we see that it reaches beyond the appearance of fertile availability to embrace beauties of appearance at all ages and stages of life. And beyond that again to encompass the more abstract forms of human beauty I mentioned at the outset of this chapter: aspects of character, intellect, and spirituality.

PART III

The Arts

Introduction

In Part III, we will consider possible connections between evolution and art behaviors. By "art behaviors" I mean the practices of creation, presentation, reception, and appreciation of art. Compared to Part II, this section of the book covers many more complex and diverse theories. Because those who write on the topic are often so heavily invested in their ideas, debates in this area are passionate and hotly contested. The literature is messy and complicated. Sometimes the issues are difficult and technical, but equally often it is as if we are dealing with science fiction and utopian fantasy.

In Chapter 8, I will critically review a number of theories proposing that the arts are an adaptation—in other words, that the individual arts all implement the same, single function that is art's evolutionary purpose. The views considered all have fairly obvious defects. These often seem to stem from the search for a common underlying function for art, which leads to simplification and to ignoring many of the diverse functions that art can serve. In general, I am skeptical of the likely success of theories that attempt to bind the various, disparate arts to a single, biologically adaptive drive.

Some of the general theories that will be discussed approach the topic by seeking the common origin of the arts. This leads to further consideration of matters first broached in Chapter 4. Even if we can identify the origins of some of the arts, it is far from clear that this tells us anything of interest about the developed form of that art. If music originated in calls that served to demarcate group territory, for example, that would tell us nothing about what music went on to become, nor would it tell us about the multitude of functions it typically now serves.

The point is important because most evolutionary psychologists adopt the methodological assumption that our species evolved to its present psychology in the late Pleistocene as a result of responding to challenges presented by the environment of evolutionary adaptedness (see Chapter 6). So if they are adaptationists about art, they tend to be committed to the idea that an explanation of the origins of art behaviors will also account for their adaptive significance. They tend also to assume that art cannot have taken on a new evolutionary role. But if there need be no connection between

the mature art form and the behaviors from which it first emerged, it looks as if the evolutionary story tells us little about art as we know it, what its function ought to be, and whether it could acquire an evolutionary significance that transcends its origins.

In Chapter 9, we will consider the option that art is an evolutionary by-product, a spandrel. Music provides a well-rehearsed example. There are many different stories about the adaptation of which it is an alleged by-product and of how it derived from that adaptation. I suggest that this profligacy is as much a problem for the by-product thesis as it is for adaptationist accounts of a given trait where these are various and conflicting.

The view of the evolutionary psychologist Steven Pinker is next to come under the spotlight. He ties music to multiple, diverse adaptations, but that might be a reason to regard music as drawing from them in order to do its own thing, rather than to identify music as their by-product. The chapter closes with a more general argument to the effect that, even if art came to us as a by-product, it would not remain evolutionarily unimportant. As it becomes universal, it sets a standard not only for what is common among people but also for what is normal. Most people are capable of engaging in at least some art behaviors to the appropriate level, as I argued in Chapter 4, but individuals who fail this test inevitably will be perceived as lower in fitness as a result. And while most people attain a satisfactory level of art competence, this does not mean that their doing so comes cheap. Their attainments involve considerable investments of time, knowledge, and, in some cases, practical skills. As a result, there are many ways in which art behaviors can come to signal aspects of fitness.

In Chapter 10, we will explore the proposal that art is a technology. The argument here is that art behaviors draw on very broadly useful adaptations—general intelligence, curiosity, inventiveness, imagination, fine motor control—but are so far removed from them that art behaviors count as products of culture rather than as biological by-products. A proponent of this view is the neuroscientist Aniruddh Patel, who develops his case with respect to music, comparing it to fire. I argue that he does not succeed in showing that music is more likely to be a transformational technology than to be a by-product or adaptation.

Chapter 11 is about individual arts and the different evolutionary adaptations they are alleged to represent. We will begin with a discussion of which arts are most usefully considered. Though there is a significant literature on the psychology and neuroscience of the visual arts, the best examples of adaptationist accounts of art belong to literature and music. Narrative fictions plainly can be a cheap and safe source of valuable knowledge, especially about people's psychologies and personalities and about the wide variety of situations in which they can find themselves. Given the central role of narrative in our lives and given also how much we are attracted to stories, even knowing them to be false, it is not surprising that fictional literature has been proposed as adaptive. Music, by contrast, is not a source of valuable knowledge about the external world, but we are so intensely drawn to it that many people regard our musical predilections as having biological origins, with the result that a wide variety of

theories about music's adaptive potential have been proposed. I will argue, however, that few of these theories are convincing as they stand.

Much as I would like to pull a rabbit from the hat at the end, I fear this will not happen! But I do hope to have some positive conclusions to draw. In Chapter 12, I review the main themes of Part III. Because I reject the account of art as a purely cultural technology, I do think there is a connection between art and biology. I am not convinced, though, that we can be sure whether art behaviors are adaptative or are by-products of adaptations that lie elsewhere. We do not need to settle that issue, however, before we can conclude that art behaviors serve as informationally rich indicators of many dimensions of human fitness. As such, they are relevant to the biological imperatives and interests that affect us as a species.

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General Theories of Art as an Adaptation and the Origins of Art

In this chapter, we will look at theories suggesting that art behaviors are adaptive. The focus falls on general theories applied to all the arts, in other words, on theories that regard all the arts as implementing the same evolutionary purpose. We will also consider if the task is to explain the origin of the practice as revealing its connection with our evolutionary past, or if we should be concerned with art's current functions and uses. But let us start by asking why people care whether art is a biological adaptation.

Why do people care?

What motivates the desire to show that art is an adaptation? Steven Pinker, an evolutionary psychologist, thinks that the goal is to validate or ennoble the arts. He considers this enterprise to be misconceived and maintains that the arts are not adaptations, that there is no good evidence that they are adaptations, and that the function of art is not to bring the community together, which is the most frequently voiced view.

As if attempting to confirm Steven Pinker's diagnosis, Brian Boyd, an English literature academic, maintains that art enables science through the way that it develops our imagination and creativity. He eulogizes the arts in a fashion that is not uncommon:

> Without the art of storytelling, without the human impulse to catch and hold the attention of others through narratives that include agents with expectation-violating, larger-than-life powers, religion could not have arisen; without costume, architecture, and design, without dance and music, without verse and story, ritual could not pass beyond the penitential and sacrificial and engage the community in such awesome affirmations of its identity, values, and connection with forces beyond . . . Art has played a central function in human lives not only in itself but also in giving rise to religion and then reinforcing, through augmenting the impact of ritual, religion's power to cement group cohesion.

As the science writer Philip Ball puts it in his discussion of music:

One can't help feeling that an evolutionary role for music is often seen as the only way it can be afforded its true dignity.

Indeed, some authors are explicit about the point. For instance Koen DePryck, an educationist, claims that the value and future of art depends on its being tied to evolution.

But of course this is not the case. Some of the most valuable human behaviors are not the direct outcome of evolution. Writing, reading, and mathematics are not evolutionary adaptations, as I noted in Chapter 4, but that does not diminish their obvious importance. Moreover, there appears to be no direct correlation between the extent to which an artwork reflects evolved dispositions and the artistic value of that work. Our attraction to babies has a biological foundation, but a painting of a smiling baby is as likely to be deplorable kitsch as it is to be artistically admirable.

Those who defend the idea that literature is an adaptation often have similar but more modest aspirations. For the most part they are professors of English literature, not psychologists, and their goal is to rescue their discipline from the dominant paradigm of the past thirty years, which regards all knowledge as self-referentially circular, the human mind as a blank slate, and all concepts as culturally constructed. Literary Darwinists do not suppose that literature and criticism are sciences, but they are out to redeem their subject from what they view as embarrassingly nonsensical commitments and approaches. They aim to show that there is an objective basis for literary behaviors that is rooted in our biological nature. Their exchanges with critics are often highly polemical and rebarbative.

The topic of art and evolution can excite high passion. Remarks like Pinker's "music is cheesecake for the mind" have been greeted with howls of indignation and scorn. Though Pinker did not intend the observation to be dismissive, many commentators have felt that he demeans music and needs to be answered. Plainly, many people invest a great deal in the importance of tying the arts positively to our evolutionary survival.

A cynic might suppose that what lies in the background is the idea that, if the arts are part of our evolved human nature, then the *study* of them has to be acknowledged as the equal of the sciences. So what is at stake is the standing that should be accorded to the humanities among academic disciplines. But much as we believe in the importance of respect and support for the humanities, that alone does not license us to assume there must be a link with evolution. And even if there were a connection, it would remain necessary to make the argument for the value of the arts. Not all aspects of human nature are admirable on account of their biological origins and long history—consider rape, racism, deceit, and free riding, for instance—and nor is the academic study of these behaviors made more distinguished by their connection with biologically rooted predispositions.

My point is that we should be sensitive to the political dimension of the debate and to the tendency to rationalize deeply felt but untested intuitions.

General versus art-form-specific theories

An important theoretical issue concerns the scope of the theory proposing a connection between art and evolution. The theory might be specific to an art form or it might be general, applying across the board to all art forms.

Why might we think art-specific theories are needed? The arts are various. Some, such as literature, have semantic content. Others, such as purely instrumental music, seemingly do not. And those with content have it in quite different ways, for instance, in terms of pictorial depiction, bodily action, or linguistic utterance. Also, the media of the arts differ: sound, rock, pigment, language, the human body, and so on. It would not be unexpected if the various arts did their things in distinctive ways, producing different evolution-relevant outcomes.

Why might we think an overarching general theory is appropriate? It could be that the arts share a common function and that the contrasts between them are differences merely in the way that function can be implemented—namely, in sound, paint, stories, etc. Ellen Dissanayake's account of art as a form of "making special" and Geoffrey Miller's theory that art is powered by sexual selection are examples of general theories. I concentrate on their views in this chapter. The shortcomings of these particular theories are typical of problems encountered in many discussions attempting to show that art behaviors are evolutionary adaptations. So the lines of criticisms raised against them are relevant for the ways in which they may be generalized. For instance, they can apply also to theories that take individual art forms to be distinctive in their adaptedness, as I illustrate in Chapter 11.

Ideally, to establish a strong, art-specific connection with evolution, art-general theories should identify an evolutionarily significant function performed not only by *all* the arts but also by *only* the arts. If, instead, the relevant function can also be implemented by non-art behaviors, then the underlying connection with evolution is not art-specific. Art behaviors then manifest evolutionary forces, but it is what art shares with non-art practices, not what is distinctive to it as art, that makes the connection.

Besides, it then looks as if the adaptation lies in the underlying common factor rather than in what distinguishes its various manifestations. This is the point Pinker makes when he argues that

> art is a by-product of three other adaptations: the hunger for status, the aesthetic pleasure of experiencing adaptive objects and environments, and the ability to design artifacts to achieve desired ends. On this view art is a pleasure technology, like drugs, erotica, or fine cuisine – a way to purify and concentrate pleasurable stimuli and deliver them to our senses.

Later Pinker reformulated his view, this time suggesting that the arts are by-products of two adaptive traits: motivational systems that give us pleasure when we experience signals that correlate with our evolutionary interests, plus the technological know-how to create purified and concentrated doses of these signals.

In fact, the danger that the search for underlying commonalities reveals art to be a by-product of some more basic adaptation is a problem for both Dissanayake's and Miller's theories. Dissanayake writes that art is closely related to both play and ritual (including ceremony and religion). For her, art, ritual, and play all fall under the umbrella of "making special." But this suggests that what is adaptive is the tendency to make things special, with art only one among many ways of giving effect to the tendency. Similarly, art is only one among many possible forms of sexual display, so Miller's sexual selection theory is also not art-specific. He applies his theory not only to the arts but also to gossip, humor, moral sentiments (such as sympathy, kindness, charity), the fecundity and complexity of language, fashion, ritual, sport, and even self-consciousness. If anything is adaptive here it is the human mind and its cognitive resources when used to advertise evolutionary fitness to potential mates. And art is only one among many possible behaviors that can broadcast that message.

One way of ameliorating this concern and of returning attention to art is by suggesting that art behaviors are specially suited to giving expression to the adaptive trait. Perhaps they magnify its effect more than non-art behaviors that can also implement the adaptation. Both Dissanayake and Miller make such claims. The high level of skill that art involves can make it particularly apt for showing off, which suits Miller's theory. Meanwhile, the care and resources lavished on art suit it to serving as one of the more dramatic forms of making special. Let us attend more closely to the details of these accounts.

Miller: art and sexual selection

Miller argues that the human mind evolved as a courtship machine to attract and entertain candidate sexual partners. The arts, at least at their origins, were adaptations for sexual display. They catered to human interests in creativity and novelty. They are ideal props for showcasing intelligence, insight, inventiveness, dexterity, and other honest signals of fitness that make us attractive as sexual partners. Though women can and do make art, the vast majority of artworks are made by men, Miller claims. He maintains that this is consistent with the greater effort men put into sexual competition and display, despite the lack of marked sexual dimorphism in our species.

Notice there are (at least) two options here as regards the possible reproductive success of artists. First, they produced more children than the average via multiple sexual liaisons, so weight of numbers gave them a disproportionate influence on the gene pool of later generations. Or second, artists attracted higher quality mates. Though they might not have had more children, those they did have inherited their quality and attractiveness. And over the longer term, higher quality wins out.

As it happens, artistic talent of the highest order is only modestly heritable. So it is not surprising that most of the people who advocate sexual selection as the manner in which art behaviors are adaptive are more interested in claiming that artists parent more, rather than better quality, children.

This favors males twice over. In the first instance, it is males who are active in competing for females because the latter are choosy, given their higher investment in producing a child and, for humans, given the huge commitment required to raise a child. And in the second instance, promiscuous males can impregnate more women and thereby father more children than any single woman can give birth to.

Critical discussion of Miller's theory

Miller rightly observes that, even if art's evolutionary function is to attract sexual partners and mates, this need not be what motivates the activity. The creation of art might be pursued because it is self-fulfilling, for example. So his account is not vulnerable to the objection that art behaviors can have motivations other than that of sexual advertisement. But his theory is susceptible if art is not publicly available to potential mates. The anthropologist Kathryn Coe objects on these grounds that Miller cannot account for the cave art of the Upper Paleolithic, much of which was not accessible for public viewing. Similarly, having conceded that art can be used for competitive sexual display, Dissanayake argues that this does not show that the activity *originated* in order to enable such competition.

Now, as I pointed out in Chapter 4, a theory along the lines of Miller's need not set itself to explain the origins of art. It could be that, once established, art was commandeered in the service of sexual selection, which subsequently drove its historical progress. Nevertheless, Miller's account is open to such objections because he repeatedly makes clear that he is more concerned to offer an account of art's origins than of its current evolutionary function. And in any case, we might doubt that sexual advertisement has become the driver for art, even if it is an ancillary use to which art can be put.

On the standard theory of sexual selection, it is sexually mature males who overwhelmingly display to females in courtship contexts. If we adopt the broad view of art that I have recommended, however, a great deal of it is domestic—weaving and needlework, for instance—and not for general show. It is created within the kin group for use by members of that group, rather than being made by professional specialists catering for a wider public. Moreover, a great deal of domestic art is made or performed by women, who are often avid dancers and almost inevitably sing to their babies as well as being the creators of clothing and bodily adornments. In addition, children dance and sing without this appearing to be mock rehearsal for adult flirtation. Celibate religious groups often make music central to their rituals, and Giuseppe Verdi composed *Falstaff* at the age of 80 years, so music does not always serve reproductive ends.

Miller acknowledges this mode of objection and seeks evidence to support the claim that males create by far the majority of artworks and performances. But it is noteworthy that his examples come from the public arena of recent professional art: rock bands, jazz artists, and the like. And it is problematic that the examples are all Western. He also makes the mistake of equating evolutionary sexual success with the number of a man's copulations or partners, rather than with the extensiveness of the lineage he leaves. In

fact, there is an absence of hard evidence that many musicians leave more children. A study of 207 European male composers from between the fourteenth and twentieth centuries showed that they produced significantly fewer children than the general European population. An experimental test of Miller's thesis—that is, that men's artworks serve as fitness indicators in female mate choice—was weakly positive, however.

To my mind the strongest objection to Miller's account is that it comes too cheap. A vast array of behaviors can be harnessed for the purposes of sexual display and competition, even where this is not their primary use. And no doubt this happens with art too. So it is easy to posit a connection between art and sexual display. But to be convincing, Miller's thesis has to be that this was always the central, crucial purpose for art; or, if we drop his claim to account for art's origins, that some time after its origins this became and long has been art's central, crucial purpose. In addition, to give an appropriate art-focus to the account, he probably also should maintain that art is a more effective form of sexual advertisement than most non-art behaviors, including displays of social competence, intelligence, charm, sporting prowess, wealth, prestige, and status, along with overt bodily signs of beauty, fertility, and health. But that is highly doubtful. On the one hand, rich men and sports stars are apparently very attractive to some women. On the other, art serves many purposes other than sexual advertisement, and art behaviors occur naturally in a wide variety of human contexts. As Brian Boyd puts it:

> the very flexibility of human behaviour suggests that sexual selection has been an extra gear for art, not the engine itself.

Joseph Carroll, an English literature academic and editor of an edition of Darwin's *On the Origin of Species*, goes so far as to describe Miller's thesis as "provocative and ultimately frivolous." Ball calls the sexual selection thesis for music "facile." The archaeologist Steven Mithen, also writing about music, describes Miller's supporting arguments as "weak" and his evidence as "fragile."

Four more examples, briefly

Before turning to Dissanayake's theory, I quickly review four more theories about how the arts in general are evolutionarily adaptive. The point here is not to get into details but to note the widely discrepant nature of these accounts.

Brian Boyd maintains that

> the ability to share and shape the attention of others by appeals to common cognitive preferences led to the development of art: to behaviors that focus not on the immediate needs of the here and now, but on directing attention and engaging emotion for its own sake, even toward distant realities and new possibilities.

He suggests that art is an adaptation that serves to draw attention to the art-creator and that promotes positive social interaction. This accounts both for art's origins and for its current function. Captivating the interest of others is important to us because we are an ultra-social species and therefore crave to command their attention. We are also keen to share attention. The person who controls the attention of others attains status and thereby acquires a selective advantage, but we also share attention, which fosters group cohesion and mutual attunement. So art is bifunctional. It provides the advantage of

> getting along (improved cooperation, and therefore participation in more successful groups) *and* getting ahead (improved status within one's own group).

Now, there are many ways of attracting attention to oneself and promoting social interaction. One way is by approaching strangers, introducing oneself, and offering a hand as a preliminary to a conversational exchange. As a method for achieving the same, art creation is outlandish and exaggerated. And, as Pinker asks,

> what's so adaptive about sharing attention, particularly [in the case of fictional literature] attention to events that never happened, other than that people like to do it?

In many contexts, reciting Shakespearian sonnets, painting pictures, or singing the latest hit song would attract attention only because of their social inappropriateness. And where the setting is appropriate, art often serves as a facilitator of joint participation rather than as a lens for focusing attention on its maker or performer. Anyway, art that builds community often is communal rather than individual; or alternatively, those who are united are the members of the audience rather than the artist and audience. For much of our history, art creation was relatively anonymous and the emphasis was more on faithfulness to the tradition than on creativity. Art can be used to acquire status, but this is only one among countless functions it can be put to.

A problem highlighted earlier also applies to this account: if anything here is adaptive, it looks as if it is social status and ultra-sociability. There are very many ways of pursuing and enacting these—including countless non-art behaviors as well as some, but by no means all, art behaviors. So it is quite misleading to characterize art dispositions themselves as the adaptation.

Elizabeth Ralevski, a psychiatrist, also thinks that art is an evolutionary adaptation. According to her, its main purpose is to promote more effectively the individual's self-identity in order to designate more clearly his place in the collective culture. In other words, we use art to differentiate ourselves from the collective in a unique manner and to project the image of our preferred self.

Of course, there is a trivial sense in which a person's art behaviors, along with everything else she does, make up her identity. (I am the one who washed the dishes last night, so that action contributed in part to my being the person I am.) And similarly, a person's art preferences contribute to the larger set of values she holds. But if art is to serve as a badge of identity in the way that Ralevski suggests, this must be a result of its deliberate use to that end. As it were, the person marks himself as someone

who likes a certain, distinctive kind of music, prefers such-and-such particular style in films, chooses to wear a certain type of clothing, and so on.

Art could be used to this end, undoubtedly, but among the many functions it can fulfill, this does not seem to be its primary purpose. Indeed, much art is for private enjoyment rather than public display. Moreover, when it is employed to establish identity, art more often labels the subgroup than the individual. It unites the person with her peers at the same time as it distinguishes the subgroup from the wider community. In particular, their flaunted musical tastes and clothing fashions frequently brand adolescents as separate from older generations. As well, racial or religious minorities often adopt various public displays and aesthetic commitments as a means of contrasting their close-knit kinship with their wider social affiliations.

Walter A. Koch, a semiotician, argues that art is a

> safety valve necessary for the realizations of social (and other) aggression within viable constraints of non-aggressiveness.

Elsewhere he observes:

> "Art" seems to me to be the human adaptation of displacement behavior: *taboo* as "fight" and *noa* (the non-censured counterpart of taboo) as "flight" combine in an amalgam—called "art"—which . . . may permit otherwise censured sexuality to be represented under the cloak of self-contained beauty or sacred functionality.

In other words, art ritually channels aggressive or sexual impulses into socially acceptable behavior. Koch offers this as accounting for art's origins and evolutionary function.

By now the reader may be able anticipate the response: some art sometimes can be used this way or has the suggested effect, but why think this is art's evolutionary purpose and reason for being? Where is the evidence that our ancient forerunners produced comparatively more great-great-grandchildren because they adopted artistic behaviors to this effect?

A fourth rather widespread theory also strikes me as unconvincing. It is the view that art is adaptive, at least in part, for rehearsing and sharpening perceptual skills. For example, Robin Allott, a theorist of evolution and language, maintains that the arts and mathematics constitute a pattern-perceiving or pattern-producing activity prompted by an impulse to explore the world, both outer and inner, and to understand it, resulting in our improved ability to act in it.

This view seems doubtful given how hard-wired our perceptual systems are. At the most basic level, they do not need to be taught how to do their job. But perhaps our perceptual discriminations can be refined by practice. Whether this or that fine-tuning makes one evolutionarily fitter depends, however, on the task at hand. For instance, attention to detail sometimes can amount to failing to see the wood for the trees. And in any case, the kinds of tests of perceptual acuity or pattern processing used by psychologists and others surely would provide a better starting point for perceptual training than a painting by Pieter Bruegel the elder, a poem by Samuel Taylor

Coleridge, or a concerto by Antonio Vivaldi. An interest in the novels of Jane Austen might help us to develop a larger vocabulary, but it need not make us better at seeing the page or at reading. Similarly, an interest in the plays of Shakespeare is unlikely to make us better at observing what occurs on stage or hearing the sounds the actors make. Where are the studies showing that artists are any fitter as perceivers in ordinary settings than the rest of us, due to their artistic attainments? And where are the studies showing that those who much prefer listening to music to contemplating sculpture are less skilled in detecting, say, three-dimensional patterns?

It is more plausible, I think, to argue that literature, drama, and poetry can provide a moral education, along with enhancing our insight into human character and psychology; or that exposure to music might unify and coordinate our group and polish our emotional sensitivities. Such ideas belong to theories about specific arts rather than the arts in general. They will be considered in Chapter 11.

The list of theories could go on. I am not selecting the lamest. Typically, adaptationist theories of art involve no consideration of whether the traits in question are heritable and provide no hard evidence to suggest that they made our ancestors fitter. They point to benefits that art sometimes yields, but do not establish that the relevant behaviors were evolutionarily selected for the sake of those benefits.

The origins of art

In earlier chapters, I pointed out that evolutionary psychologists argue that our species' psychology and behavior were shaped by the conditions under which our Hominin ancestors lived from 5 ma, and were adjusted later with our emergence, 180 ka or earlier, as hunter-gatherers in Africa. Over millennia, natural selection favored those who were comparatively more fit for those ancestral ways of life. Tracking the path of evolutionary adaptation followed by our species involves working out which of our heritable, persistent behaviors and traits suited our predecessors to the challenges of those ancient circumstances. Inevitably, this means that the discussion in evolutionary psychology of the status of this or that behavior as an adaptation or spandrel becomes a story about its origins. The default assumption is that the behavior continues to exercise its original adaptive function, but it may be allowed that, under the very different conditions of contemporary urban life, the behavior has become maladaptive or neutral in its impact on comparative fitness.

An example: Dissanayake's account of art as "making special"

Many theorists approach the issue of art's connection with evolution in the manner just described, that is, they attempt to discern how art might be adaptive by considering its role in the lives of our ancient forebears. By way of illustration consider the theory presented by Ellen Dissanayake. Though I am a critic, it is important to record that hers is among the most developed and nuanced theories arguing that art is an adaptation. And she is to be congratulated for explicitly naming and avoiding some of the more

common faults in accounts of art by evolutionary psychologists. For instance, she appreciates that not all sensory pleasures or preferences are aesthetic. She also questions the aesthetic relevance of recording how visual art plays to our perceptual biases, which is a common theme in neuroscientific approaches to painting. As a result of her sensitivity to this issue, Dissanayake is among the few theorists who attempt to analyze what makes for artistic quality. She also explicitly avoids the loose way of discussing biological fitness that I earlier attributed to Miller, which equates evolutionary success with acts of sexual intercourse rather than with rearing children who go on to be parents in their turn.

Dissanayake is interested in human behavioral predispositions that became universal and innate because they became selected for at the genetic level, having proved to enhance reproductive success. Such behaviors must date back at least to the late Pleistocene, 40–20 ka, since it is then, she thinks, that human biological evolution reached its present condition. Subsequent modifications involved cultural change, a predisposition that is itself based on evolutionary characteristics of the human species. Dissanayake holds that art behaviors, which she characterizes first as patterns or syndromes of creation and response and later as rhythms and modes of mutuality, display the hallmarks of a biological adaptation: art is universal, innate, old, and is a source of intrinsic pleasure. Indeed, she claims that art is essential to the fullest realization of our human nature.

> Art is not something added to us . . . but in large measure is the way we *are*, *Homo aestheticus*, stained through and through.

Dissanayake maintains that art is a form of making special, also known as "elaboration." The human tendency to make things special was first manifested about 100 ka, when functional items were selected in part for their attractiveness or unusualness. At a similar time, decorations or patterns were added to artifacts. The propensity to make things special had adaptive value. Consequently, the art-making practices that followed, appearing along with religion 60–40 ka, inherited a similar functionality. In the case of art, making special or elaboration takes the form of intentionally decorating ourselves and our environment in order to provide aesthetic enjoyment, which sometimes can attain the level of ecstatic states. Typically, art is made for life's sake, not its own. It is often conjoined with ceremony to amplify features already made salient by their ritual selection and function. Art is adaptive because, along with ritual and play, it promotes community benefits that in turn improve the well-being and reproductive potential of society's members. It highlights and affirms what is important to their lives: control over nature, manual competence, group lore, genealogy, wisdom, and values. In addition, it plays a vital role in promoting cooperation, mutual identification, and social cohesiveness.

Dissanayake regards the past with a deep nostalgia born of her sensitivity to the cost imposed on us by the elevation of technology, individualism, hedonism, and an artificial environment that shields us from awareness of the psychological, physical, and social realities of existence.

Not only is advanced man no longer fitted for human life; modern life is no longer fitted for human nature.

Post-eighteenth-century Western art, as well as modern life, has lost its grip on the evolutionary thread that should give it significance, Dissanayake observes. With its detachment from real life, its increasingly esoteric and self-referential embellishment, and its trivialization in postmodern times, recent Western Fine Art has become a private predilection consecrated for the unengaged, overly cognitive apprehension of an elite few.

Critical discussion of Dissanayake's theory

A problem with broad theories focused on art's origin is that they must reduce art to the lowest common denominators apparent at the outset. This comes out in several aspects of Dissanayake's theory. For instance, she argues that there are four criteria of aesthetic quality: tangible relevance, evocative resonance, accessibility coupled with strikingness, and satisfying fullness. The first three are necessary for aesthetic worth, and the last is necessary for the highest levels of aesthetic value. "Super stimuli," such as video games and advertisements, cannot qualify as aesthetically good, she maintains, because they do not provide the deep rewards that go with engaging and meeting concerns motivated by our biological nature.

Dissanayake's criteria of aesthetic and artistic value should be rejected as too broad, however. They are too easily satisfied by items we would not think of in aesthetic terms, such as a video of our child's university graduation or of a horse we've heavily backed winning a major race. Indeed, Dissanayake's criteria are likely to pick out everything that humans find interesting, rather than only things that are distinctively aesthetic or art-connected.

Also too broad is the notion of "making special." As noted earlier, it does not identify an art-specific adaptation because it includes play and ritual as well. Meanwhile, Dissanayake attends to art's form and to matters appreciated intuitively, emotionally, or pre-verbally at the expense of giving due weight to art's content along with its cognitive, symbolic, referential, allusive, or representational nature. Those matters, which surely are central to much great modern art, do not feature in her accounts of art's origins or of the source of its highest aesthetic values. She writes:

My own ethological viewpoint does not treat content—the actual thoughts, wishes, or images inherent in the actions or objects that are being made special (shaped and embellished) . . . I am not particularly concerned with the symbolic character of art: I find its presymbolic sources much more crucial to understanding its nature as a biological endowment.

Here Dissanayake ditches the greater part of art's artiness and intellectual value. And she becomes vulnerable to the charge she makes against other anthropologists and evolutionary psychologists: that they deal with proto-aesthetic behaviors and judgments rather than aesthetic ones, that is, with precursors or ingredients of art and the aesthetic

rather than with the developed behavior. Of course, the latter might emerge only gradually from the former and they might retain much in common, but that does not mean that they can be treated as indistinguishable.

Art and play

Dissanayake argues that art and play are closely related, and she is not alone in doing so. Many authors have suggested that art originated in play. Some bird species and the young of most mammal species play. They usually simulate hunting or combative skills that they will need as adults. But play is especially important in our species. It continues into adulthood. And if we allow that it includes pretense, sport, imagining, and fantasizing, its pervasiveness is undeniable.

Because play develops and trains the young in skills that are important in adulthood, it is widely regarded as an adaptation. Such an account, even if true for other mammals, does not explain the extensive role of imaginative play in human adult life. And whatever we are to say about adult play in our species, a new story will be needed to account for the distinctive ways in which art differs from play if art behaviors are to be characterized as adaptive in their own right. If, as I suspect, the connection between adult play and art is that both accord important roles to creativity, imagination, and intelligence, it might be more profitable to regard them as scaffolded by these general capacities rather than as adaptations in their own right.

The origins of music: a case study

The origin of music has attracted considerable attention from evolutionary psychologists and those working in the psychology of music, and provides an interesting case study. The main theories are that music originated

> in pre-linguistic emotional vocalizations, as a by-product that came as a bonus out of the evolution of language, in infant-directed speech (aka motherese), in mate attraction by males, in bringing about individual cognitive development, in evoking affectively charged memories, in emotionally appreciating the value of sound-making resources or situations in the lives of our ancestors, in effecting the social differentiation of individuals, and as a means to creating group identity and cohesion such as by inciting group effort, by ensuring bonding, synchrony, and coordination, by promoting conflict resolution, by serving as a form of mutual grooming, and by providing group defense of territory.

Other benefits of early music behaviors listed as evolutionarily relevant are perceptual development, motor skill development, and transgenerational communication.

Now, this is a disconcertingly diverse array of proposals! Of course music might have been multifunctional from the outset, but it cannot be the case that all these accounts are true, because some of them are opposed. The same music cannot serve to differentiate the individual from all others in the group and work also to unify the group's members. Music cannot operate through competition to attract attention to individuals and simultaneously cement group solidarity. More generally, theories

tracing music's origins to effects on the individual or the mother-infant dyad—that is, to effects not achieved in a wider public setting—are at odds with group-directed explanations.

Moreover, as hypotheses about how music was originally adaptive, which is the spirit in which these views are generally offered, they are not all plausible, as I will argue in Chapter 11. For the present, the point to note is that some of these proposals refer to proto-musical behaviors—non-linguistic vocal emoting, infant-directed speech, territorial defense calls—that only roughly resemble music proper. Accounts like these do not provide much of an idea as to what functions music proper might be capable of performing. The remaining theories identify functions that music might continue to meet after its originary phase is complete, but it is striking how uninformative they are about the music in question.

After all, music comes in many types and degrees of complexity. What kind of music aids cognitive development? Is all music equally matched for this task? Is music that is suited to social grooming more adaptive than music that incites the war party? To synchronize a group, I suppose the music must have a regular pulse and be accessible, but what else is involved? Is vocal music better than instrumental music for this purpose? And even if music originated in the specified function, has it acquired other functions, and what is their significance in relation to the original one?

My conclusion is that these theories about the origin of music tell us very little about what music is and how it plays its specified role. Consider how varied the current practice of music is, with its many genres, styles, and the like—reggae and symphonies, computer-synthesized techno and concertos for the harmonica, a cappella choirs and marching bands. Note also its many functions—pacifier, arouser, mnemonic, mood regulator, dance accompaniment, background wallpaper, cult badge, focus of silent attention, marching enabler, block to social engagement, facilitator for social engagement, and on and on. Because of this complex diversity in the practices of music, it is difficult to match those practices to the vague and very general theories about how music making arose, which were listed earlier. As Ball puts it:

> it no longer makes much sense to reduce this instinct [to make and enjoy music] to some primitive urging on the savannah [. . . because] cultures elaborate basic instincts out of all recognition or proportion.

In a later Postscript to his "On the Origin and Function of Music" of 1857, Herbert Spencer defended his essay with a clearer understanding than many evolutionary psychologists show today:

> An endeavour to explain the *origin* of music has been dealt with as though it were a theory of music in its entirety. An hypothesis concerning the rudiments has been rejected because it did not account for everything contained in the developed product.

In addition, there is no reason to think that the story about the origins of any of the other arts will be any more illuminating of their current functions, of how in detail

those functions are realized, of what is inevitable and what accidental in the practice, and of whether what has persisted did so by happy fluke or out of evolutionary usefulness.

It might be observed in response that the original adaptive function of art deserves study even if later artistic behavior transcends this, both through creative invention and elaboration of the tradition. But unless "modern" art has set itself self-consciously against its prior adaptive function, as Dissanayake alleges, it is hard to defend the relevance of the story about art's origins to our understanding and appreciation of contemporary art, especially in its more sophisticated variants. Meanwhile, it becomes more pressing to consider whether art now serves different evolutionary agendas.

Feathers and the cochlea

In Chapter 4, I told the parable of the feather as a cautionary tale, teaching the lesson that something's current adaptive function might differ from its original one. For many bird species now, certain features of feathers are adaptations for flight, but that was not the adaptive function originally served by feathers. As a reminder, consider this new example. The cochlea of the human inner ear allows us to experience differences in the pitches of sounds. It developed from the lagena, an organ with which fish detect aquatic vibration and thereby locate the presence of other fish. But this does not mean that humans' pitch detection, which is important for auditory scene analysis and for the appreciation of meaning and mood in speech, is merely a spandrel of an ancient Piscean adaptation. In accounting for the adaptedness of the human cochlea, we should look not to the origins of the relevant organ but either to changes in it or to new ways of employing its features that made it useful for—that is, that enhanced the fitness of—terrestrial creatures, especially humans.

This shows that focusing on the Pleistocene origins of some human trait might fail to uncover an adaptive function it serves currently. Admittedly, this presupposes that *Homo sapiens* has continued to evolve over, say, the past 20,000 years. I noted some evidence of this in Chapter 3: there have been changes in dentition, as well as in adult lactose tolerance of human herders, for instance. More particularly, if we recognize not only that culture is affected by biology but also how cultural change can bring about genetic change—that is, if we accept some version of gene-culture coevolution—it is quite plausible to suppose that some behaviors may have outstripped their origins to take on new adaptive functions.

I think this has at least three important consequences. First, we may be able to appeal to evolution to explain the form that modern art takes. For instance, the novel has a history of only a few hundred years. Reading and writing were invented within the past 5,000 years, but modern printing was not known until about 550 years ago, and literacy became widespread yet more recently. Nevertheless, there is the possibility (mentioned in Chapter 11) that written literature displays evolutionarily relevant traits that are not demonstrable in oral traditions of drama or narrative. The second

consequence is that we should no longer feel compelled to overplay the alleged connections between originary and modern art behaviors. And the third is that, rather than reducing art to the often simpler behaviors and functions it first served, we can take account of the more complex features it later took on and of the role of tradition in the historical development of the arts and their styles.

9

Art as a Spandrel

The evolutionary biologists Stephen Jay Gould and Richard Lewontin introduced the term "spandrel" for evolutionary by-products with no functional significance of their own. They borrowed the term from architecture, taking it to refer to the tapering triangular spaces formed by the intersection of two rounded arches at right angles. In human terms, the best equivalent probably is the armpit, a structure inevitably formed where a movable limb joins the body's trunk. Applications of the term are not confined solely to structural features, however. Both the redness of blood and the whiteness of bone are regarded as spandrels. They are non-functional by-products of the chemical constitutions respectively of blood and bone. And the notion can be extended to refer to aspects of culture and society.

The arts as spandrels

A common view—some think it should be the default assumption—holds that art is a spandrel. Art plainly relies on and exploits perceptual, emotional, and motivational systems that had their evolutionary origins in a much broader context of human and pre-human existence and survival. For example, facial recognition is a crucial human adaptation supported by dedicated neural circuitry, and painted portraiture obviously taps into this system for at least some of its effects and interest. The theory that art is an evolutionary by-product is consistent with its pan-cultural occurrence and universal features, assuming that the adaptation it relates to also is universal. At the same time, the theory that art is a non-adaptive by-product is also consistent with art's cultural malleability and elaboration. If we add to this the observation that, in evolutionary terms, art is good for nothing, despite how much we are drawn to it, the non-adaptationist line on art can seem to be the most attractive option.

Of course, the universality of art is also consistent with its being an adaptation and much shaped by culture. And the claim that art is not useful in evolutionarily relevant ways is contestable. I argued in Chapter 2 that art can be instrumentally valuable and that adaptationists about art claim to locate many fitness-enhancing consequences of art behaviors. But on the one hand, the theories of adaptationists often look to be highly questionable; and on the other, neuroscientists often see the question as settled in favor of the by-product hypothesis by the apparent absence of art-specific brain circuits. In a recent review, the philosophers Johan De Smedt and Helen De Cruz conclude that

the by-product account of art is preferable to the adaptationist view, because the former is more in line with cognitive neuroscience. The cognitive neuroscientific evidence reviewed here provides strong empirical support for the claim that various forms of art, including visual art and music, are attention-grabbing because of their correspondence with evolved propensities of the human neural system.

The issue of how to interpret the neuroscientific evidence is complex and technical, but it will come up in several places so I am going to pause to deal with it here. As just indicated, the *presence* of art-specific neural circuits would provide good evidence that the behaviors they facilitate are adaptive. Some scientists think that there are such circuits, or that brain pathways originally evolved for other purposes have been modified subsequently via our interest in art. Other scientists think that art-specialized brain networks are absent and that art behaviors co-opt neural systems primarily evolved for other tasks. The neural evidence is apparently difficult to interpret. The brain is structurally responsive to learning and training, so it is not straightforward to determine whether neural networks are a consequence of innate inheritance, or alternatively the products of experience. Not surprisingly, then, a third view is that the evidence for art-specialized neural circuits is simply indecisive and that we should be agnostic on the matter.

But now suppose that the issue is resolved and it is revealed that art-specific brain networks do not exist. How is that *absence* to be interpreted? Some would interpret it as indicating that art behaviors are by-products, not adaptations, and this is the view endorsed by De Smedt and De Cruz. Yet others suggest, to the contrary, that old neural propensities might be enlisted without modification for new adaptive ends, so that, while task-dedicated neural structures provide evidence of adaptation, their absence does not count against it. (Though they often talk of modularized behavioral programs in the *mind*, evolutionary psychologists have been wary of equating behavioral modularity with *neural* localization and specificity.) So here is a further issue on which there is disagreement and toward which we might prefer to be agnostic.

The inconclusiveness of the neuroscientific data does not improve the case for regarding art as an adaptation, however. Given how speculative are the positive arguments offered for adaptationist theories of art, many think it remains more reasonable to see art as a spandrel.

Music as a spandrel

Not surprisingly, the position that art is a spandrel has many advocates. Others make the claim not about art in general but about particular art forms. For instance, the neuroscientist Semir Zeki holds that the function of visual art is an extension of the brain's wider purpose, which is the acquisition of knowledge about the world, and he reduces aesthetic experience to a non-cognitive, automated response to the brain's activation.

Instrumental music, with its lack of semantic or representational meaning, is particularly susceptible to the suggestion that it lacks adaptive significance. (It is easier to

come up with survival-enhancing characteristics associated with the enjoyment of literary, dramatic, and visual arts.) Though he went on to suggest that music plays a role in sexual selection, Darwin noted the issue:

> As neither the enjoyment nor the capacity of producing musical notes are faculties of the least use to man in reference to his daily habits of life, they must be ranked amongst the most mysterious with which he is endowed.

Darwin's contemporary and fellow evolutionist Alfred Russel Wallace held that music and dancing are by-products of our brainpower and excessive vitality.

> As with the mathematical, so with the musical faculty, it is impossible to trace any connection between its possession and survival in the struggle for existence. It seems to have arisen as a *result* of social and intellectual advancement, not as a *cause*.

In what was to become probably the most quoted and discussed passage of Steven Pinker's *How the Mind Works* of 1999, the evolutionary psychologist wrote that, of the arts, music shows the clearest signs of not being an adaptation. Having compared music in its effects to recreational drugs, he coined a striking metaphor:

> I suspect that music is auditory cheesecake, an exquisite confection crafted to tickle the sensitive spots of at least six of our mental faculties . . .

these being language (when the music has lyrics), auditory scene analysis, emotional calls, habitat selection (as expressed in musical tone "picturing" of the sea, weather, etc.), motor control (when music leads to dancing), and "something else that makes the whole more than the sum of the parts." In other words, senses and capacities evolved for nonmusical purposes are stimulated by music in a fashion that we find enjoyable, though not to any evolutionary purpose. As we noted in Chapter 8, Pinker subsequently generalized his account to the other arts: they are by-products of perceptual and cognitive mechanisms that tap into our pleasure systems, and they are so effective because they are among the purest, most concentrated stimulants of those systems.

Music psychologists and others leapt to music's defense, with many arguing that music is an adaptation. We will review adaptationist accounts of music in Chapter 11 and criticisms of Pinker's argument shortly. But before we get to that, I consider variants on the theme that music is a spandrel.

More theories of music as a spandrel

Just as there are many competing theories of music's origins, there are a variety of stories about how it is a by-product. And just as adaptationist explanations of a trait can look less convincing when there are many different, competing ones, this is equally true of by-product explanations.

One theory is that language was the target of evolution, and music came along for the ride. In presenting this view, John D. Barrow, a cosmologist and mathematician, says that music "could be an entirely useless elaboration of an ability meant for

something else." Pinker also regards language as the prior adaptation, and the view goes back to Herbert Spencer's "The Origin and Function of Music" of 1857, in which he argued that music is an outgrowth of emotionally heightened speech. The cognitive scientist Dan Sperber is another who sees music as free riding on neural circuitry designed to detect and take pleasure in vocal communication, except that he thinks all this was pre-linguistic.

> The idea, then, is that humans have created a cultural domain, music, which is parasitic on a cognitive module the proper domain of which pre-existed music and had nothing to do with it.

He speculates that this mind module might have been superseded by language processing ones or it might run in parallel with the language modules and be involved in comprehending tone languages, like Mandarin, in which the pitch of otherwise similar syllables affects their meaning.

Others see music as an offshoot of systems dedicated to affective reactions, given that it activates evolutionarily ancient socio-emotional brain circuitry. Or it is maintained that music serves the primary purpose of emotional engagement by building on the human capacity to understand other people as intentional agents and thereby to understand what they desire, intend, feel, and so forth. This capacity is known as "Theory of Mind." Notice that both Pinker, with his reference to emotional calls, and Spencer, with his talk of impassioned speech, also place side bets on a musical connection with emotions.

As this short review shows, the range of suggestions for how music comes to be a spandrel is disconcertingly large. It is a by-product of language, or it is a by-product of the expression or detection of affective states. It is a by-product of a pre-linguistic adaptation or of our capacity to understand other people as conscious agents. As I noted earlier, where many different adaptationist explanations are offered of some bit of behavior, it becomes obvious that theorizing has outstripped the evidence and it is easy to lose faith in the adaptationist project. But it seems to me that non-adaptationist accounts face the same predicament. To be convincing they need to identify the original adaptation and how it gives rise to the spandrel in question. The more disparate the tales told about such matters, the less convincing the overall approach.

Matters are not improved by Pinker's tactic of listing multiple "sensitive spots" that music "tickles" and by adding the weak and pathetic "something else that makes the whole more than the sum of the parts." If music draws on diverse, largely unconnected adaptations, that surely suggests it is taking advantage of them to create a new effect that could have adaptive significance, not that it is a parasite on them all.

What Pinker meant

Commentators have been rightly puzzled by Pinker's cheesecake metaphor and his comparison of music with recreational drugs. The desire of *Homo sapiens* for sweet, fatty foods was presumably adaptive in the Upper Paleolithic when such nourishing foods would be hard to come by. As for now, when the nearest patisserie, McDonald's, or

Starbucks is only a few minutes' drive away, that taste may have become maladaptive. But in neither environment does a desire for sweet, fatty food—for cheesecake—function as a spandrel, so the point of the metaphor is obscure. Nevertheless, it is fairly clear that Pinker did intend to identify music as a non-adaptive by-product.

How should we interpret Pinker's metaphor? He appears to be saying that music operates as a super-stimulus of sensory appetites. The satisfaction of these appetites is intrinsically pleasurable because they are (or were) adaptive. Pinker's claim is that music is designed to act as a hyper-stimulant of our pleasure centers, which is why we value it. It is a spandrel because, despite the pleasure it yields, it provides none of the evolutionary pay-offs that the activation of these systems ordinarily ensures. It co-opts or free rides on the relevant systems without contributing to fitness.

Criticisms of Pinker on music

There are two ways in which we might interpret the claim that music stimulates pleasure to no evolutionary effect. According to the first, which I suspect is the one Pinker has in mind, music stimulates our senses, and thereby is experienced as pleasurable, yet does not provide information about the world, nor provide information we could obtain as efficiently without it. The assumptions here are both that the evolutionary purpose of our senses is to provide knowledge about our environment, including our own bodies, and that the exercise of those senses is a source of pleasure. Music is a rich, attention-grabbing stimulus and its captivation of our senses produces pleasure; but this is all show, without informational substance. It is as useful as a slice of cheesecake at the close of what is already a hearty meal.

I do not find this view very convincing. It is doubtful that the ordinary exercise of our senses is a source of intrinsic pleasure in the way that food, sex, and exercise are. And in addition, the claim that music is useless because lacking in informational content, though widely made, is surely unsatisfactory. Against it, it can be argued that the arts are a special source of cognitive value in that they allow us to explore various scenarios, such as that of the star-crossed lovers in *Romeo and Juliet*, "off-line"—that is, via imaginative engagement. And some theorists extend this account even to purely instrumental music. The ideas here are that such music presents us with and leads us through a virtual environment, or that we experience it imaginatively as a "narrative" about the actions and feelings of a persona we hypothesize. As well, music often plays a crucial role in identity formation and mood regulation. An education in the arts, including music, has been widely held to have a range of carry-over benefits for intelligence, character, emotional and moral sensitivity, and the like. Music lessons raise IQ—that is, general intelligence—and improve certain nonmusical cognitive skills and emotional sensitivities (to a modest extent, as I will document in Chapter 11).

But in any case, we might challenge the idea that the communication of real-world informational content is the sole measure of usefulness. It may be that music is of value precisely because it offers welcome and sometimes needed respite from dealing with the real world. And even behaviors that arise because they help us negotiate the world

are not exclusively used to that end. Most discourse is rather thin in informational content, involving much small talk, chatter, and genuinely idle gossip, not to mention a great deal of grunting and hand-waving, but this would not lead us to regard language as spandrel-like. Admittedly, it is one thing to argue that the arts serve genuinely as sources of information or of other forms of value and quite another to suggest that they improved the comparative evolutionary fitness of our ancestors. But surely it is not implausible to posit connections between what we value in art and qualities relevant to the comparative success of our forebears.

There is a second way in which music's stimulation of pleasure might be spandrel-like. I am not sure that it is what Pinker has in mind, but the idea is invited by his comparison of music with drugs and erotica, and it provokes some intriguing questions, I think. Here is the idea: it may be possible to stimulate the brain's pleasure centers not in the usual way but directly or via deviant causal routes. Examples of the first kind would be the use of narcotics or the pleasure brain-probe of science fiction fame that goes directly to the neural pleasure centers and excites them. The use of the pleasure probe or of narcotics is spandrel-like in that neural pleasure systems which evolved to enhance fitness are co-opted in ways that subvert their role as adaptations. A similar claim might be made for music or the other arts, except that, because these gain admittance via the usual sensory interface, the suggestion will be that they access the pleasure centers via deviant neural routes. The idea, then, is that music or the arts in general take advantage of the evolved pleasure response in a fashion that circumvents the response's adaptive relevance by bypassing the neural routes and structures licensed by evolution.

One kind of evidence that would count strongly for the view that music stimulates pleasure in a causally deviant fashion would be the discovery that musical sounds are processed by non-adaptive, music-specific neural networks rather than by the circuits involved in other kinds of sound and language processing. Brain-imaging evidence counts against this, however. There is considerable overlap between the brain regions used in processing environmental sound and speech, on the one hand, and music, on the other hand, which suggests that musical inputs do not activate the brain differently from other auditory inputs. Meanwhile, views about the existence of music-specific neural pathways and structures are no less contested and various than those mentioned earlier with regard to art-specific brain circuits. From what is known so far, it looks as if the enjoyment of music builds and elaborates on familiar auditory processes, as opposed to short-circuiting them. So, music is not spandrel-like by plugging into our pleasure centers via routes that are unique or strange.

Pinker's critics have offered further grounds for rejecting the comparison between music and recreational drugs. Music behaviors are costly in that they consume time and energy that might be used to evolutionary advantage elsewhere. If they are also non-adaptive, it has been argued, then they should have been selected against. Rather than being ancient and widespread, we should expect them to be recent and marginal, but of course this is the reverse of what we find.

I doubt that this argument is decisive, however. It wrongly suggests that no by-product can be costly. The issue is not simply whether the by-product is costly, but also involves asking whether it lowers the comparative fitness of those who enjoy it. If music is universal, there may be no comparative disadvantage in sustaining its cost. Or if those who commit less effort to music substitute for it engagement with another costly art spandrel, again there need be no comparative disadvantage.

A more promising objection queries Pinker's focus on pleasure as the primary reward that music yields. By no means is all music pleasurable to listen to, and there are many reasons other than the production of pleasure for which music is made and attended to. Also, regarding music mainly as a stimulant trivializes it and disregards its power to transform the brains and lives of those who engage with it. And finally, Pinker's approach indicates an ethnocentric bias: in most cultures, people sing and dance, whereas his model seems to assume that music is the focus of passive, private listening, such as became common in the West only a few centuries ago.

Literature as a spandrel

Of all the arts, it is most widely claimed that literary behaviors are adaptive on account of the information we can learn from them. Even those who take it as the default assumption that the arts are by-products are inclined to treat literature as an exception. Pinker ultimately decides against its being an adaptation, while the evolutionary psychologists John Tooby and Leda Cosmides rule in its favor. I will discuss these adaptationist positions on literature in Chapter 11.

Jerome H. Barkow, an anthropologist, presents a version of the literature-as-spandrel position, though his focus is on TV soaps rather than high literature. He holds that soaps feed off our evolved interest in gossip, which serves as a form of social control.

One of the most developed arguments to the effect that literature is a by-product is presented by William Flesch, an English literature professor. Drawing on the findings of evolutionary psychologists, he argues that we admire people who can bear the cost of being altruistic, which signals their fitness. People who, at their own expense, punish wrongdoers are especially admired, whereas we withdraw cooperation from those who fail to punish wrongdoers.

> We have explicitly evolved the ability and desire to track others and *to learn their stories* precisely in order to punish the guilty.

Fictions tap into this capacity and reward us by telling interesting and satisfying stories, both about social interactions involving altruism and punishment and about the multi-dimensional monitoring and score-keeping on which the rightness or wrongness of social judgments about altruism and punishment depend. We want those deserving of censure to get their comeuppance and we are pleased when they do.

We are fitted to track one another and to track as well how others monitor one another and what they do when they monitor one another. What we wish to track is past behavior in order to respond in the present to that behavior. Fiction recruits this central capacity in human social cognition for taking pleasure in responding to the nonactual.

Flesch does not argue that literature refines our sense of social justice or that it extends our capacity to keep track of social relations. So literature should be seen on his account as a by-product of these evolved social competencies. He does allow that the creation of literature is a costly and thereby an honest signal that literary authors are skillful monitors of social relations and clever interweavers of plots and characters. But the benefits in status that accrue to storytellers from others' acknowledgment of their literary talents are ancillary in his view. In other words, he does not suggest that the authoring of literature is adaptive.

As a theory of literature, the account does seem one-sided. Even if we accept the social importance of detecting and punishing defectors and other free riders—and also acknowledge that Flesch tries to account for love, courage, and much else as involving forms of altruism or its opposite—it seems implausible to think that all good literature centrally displays or illustrates themes concerning social coordination and management. Many stories place the emphasis elsewhere. Consider tales about war and conflict, whimsical fantasy, struggles against or mastery of nature, private guilt, madness, foolishness, myth, communion with spirits, farces, quests, voyages, and so on.

More generally, Flesch's view should be evaluated by comparison with accounts to be offered in Chapter 11 claiming that literature is adaptive. These tend to rely on claims like those which Flesch allows—that authors gain status on account of their talents, or that literature tracks the sincerity and deceptiveness of social relations. But they argue that literature is adaptive on this score, not a by-product. Some adaptationist theories of literature argue not only that it depends on our ability to monitor social relations and on their intrinsic interest for us, but also that it augments our knowledge of such matters and refines the relevant skills in ways that are distinctive to it. They hold that it thereby makes us fitter as participants in the real world; and, finally, claim also that it is a behavior evolved to serve these ends.

Spandrels versus adaptations

Rather than continuing to criticize particular examples of the art-as-spandrel hypothesis, I now adopt a general approach to the issue. I begin by highlighting a point made earlier: non-adaptationist accounts of art need to meet the same standards of argument that adaptationist theories are held to.

At first glance, the view that art is a non-adaptive by-product of evolution is attractive in that it connects art to our evolved human nature, yet apparently avoids the demands of demonstrating how art behaviors enhanced the fitness of our forerunners. But we have already seen from the discussion of feathers in Chapters 4 why

matters are not so simple. Demonstrating that something is a spandrel involves far more than identifying it as a by-product of some prior adaptation from which it operates very differently, because adaptations can be and often are built upon prior adaptations. So, even if it is true that art originally was a by-product of other adaptive behaviors, this does not show that art behaviors have not subsequently taken on adaptive functions in their own right. In consequence, the art-as-spandrel approach does not require less supporting argument than the art-as-adaptation model. Spandrels can be confidently identified as such only after the possibility that they are adaptations is tested and defeated. When the investigation is closed, art may turn out to be a by-product after all, but before we get to that conclusion we have to go down the same hard road as that taken by the person who hopes to show that art is an adaptation.

A second outcome is this: if arguments for the adaptiveness of art are properly regarded as questionable and speculative, arguments for the art-as-spandrel model will inherit these same qualities because they must follow the same path. As I observed earlier in this chapter, non-adaptationists are not immune to the accusation that they are telling Just So stories. They can be as susceptible to this charge as adaptationists are.

Why art is not a meaningless spandrel

Despite having allowed that some theorists treat the non-adaptationist hypothesis as the default assumption, I now argue that art could not remain a mere spandrel, even if it originated as a by-product of some other adaptation. This is because of the significant role it plays in human life. This objection to the art-as-spandrel hypothesis can be summarized in the slogan: *form becomes norm*.

Structural integrity—symmetry, proportion, balance, and a normal disposition of elements—is an indicator of fitness. It signals a history of health and immunity from disease. And for this reason structural integrity is appreciated as an aspect of human attractiveness. For instance, the degree of symmetry of human faces correlates with judgments of their beauty, as was discussed in Chapter 7.

In writings on evolution, navels and male nipples, along with the redness of blood and the whiteness of bone, are sometimes offered as examples of non-adaptive by-products of adaptations. Nevertheless, navels and male nipples count along with eyes, noses, ears, chins, and the like toward structural integrity. They have to be present in the usual number, proportion, and places if a person is to display at least an average amount of fitness. Perhaps that is one reason why young women wear short tops and low-slung jeans and young men go shirtless, why they decorate their navels with studs or jewelry. These behaviors advertise health and attractiveness.

Recall the argument in Chapter 7 to the effect that human beauty encompasses not only physical appearance but also self-presentation and social competence. The same point applies here. "Form" is not restricted solely to bodily features, but covers all aspects of development. For instance, we expect others to acquire and master language use, so dysfunctionality in these will be perceived as signaling neural or other problems. The same

goes for social behavior that made life in the late Paleolithic possible. For instance, we expect people to acquire a sense of reciprocity and a commitment to cooperation. And if the creation and appreciation of art was prehistorically as widespread as I have claimed, a person who showed no interest in any form of art would be as unappealing as someone who is without intelligence, humor, social grace, care for others, and a navel. The general point is this: any transmissible human form or behavior that was recognized as signifying well-formedness and developmental normalcy would not only become statistically average as it successfully spread through the population; it would become normative in the evaluative sense, whether it first emerged as an adaptation or as a spandrel.

In the case of navels and the other bodily features I have mentioned, the signals are near-universal but provide only cheap signals of fitness. Their occurrence in the usual manner is so prevalent that they have only minor value. This is not to say that they are worthless, however. Departures from the norm may be taken as anomalies. If these departures are comparatively minor, they should be overlooked in favor of the person's intelligence, sensitivity, creativity, and loving nature. This is because personality and social competence should be valued more highly than bodily integrity. But significant deficits on either count are liable to be interpreted as counting against fitness to the extent that they impinge on a person's capacity to contribute to the community or on their appeal as a potential mate.

If art behaviors came to us as ancillary evolutionary by-products, they would not remain merely incidental. Their occurrence in the usual manner would become normative because they provide honest, because costly, signals of fitness. As a result, not only the absence of art behaviors but also the degrees to which they are represented can be informationally significant in assessing someone's fitness.

The cost of our art behaviors can be overlooked, so it is worth reminding ourselves of it. Expertise and knowledge in the arts is hard earned. The relevant talents and skills can be developed and displayed to different degrees and in different areas. In general, we place a high value on creativity and we expect it to be specialized. And we place similar worth on connoisseurship in appreciation. A person who enjoys only commercial mainstream music and makes no discriminatory judgments within the category, or, worse, enjoys no music at all, might cultivate an expert's interest elsewhere, say in post-Impressionist painting.

As I argued in Chapter 4, this emphasis on expertise and connoisseurship should not be equated with aesthetic elitism. It applies across the full range of the arts. Some music aficionados distinguish many different types of techno; and every pop fanatic I have ever met has claimed to have a special interest in a kind of music with specialist appeal and could point to crucial differences between their favored variety of pop and others, these being differences that my ears were initially inclined to miss. Expertise, both on the part of creator and appreciator, rarely depends on raw talent alone. It comes hard won, being developed and refined through practice, experience, exposure, and study.

Here is the point: even if the possession of a normal navel is cheap and is therefore not a positive sign of fitness, the same does not apply to the arts. These allow many and costly

ways to achieve creativity and subtle proficiency in appreciation, which can therefore act as reliable, positive signs of fitness. Moreover, though interest in the arts broadly construed might be universal, individuals specialize where their talents, interests, and knowledge lie, and this differentiates us in complex ways. A person can afford to become a narrow specialist at great personal cost in energy, cognitive investment, and expense provided enough others are like-minded, and what counts as "enough" might be only a small portion of a large population. Relevant art behaviors can serve as reliable signifiers of many kinds or aspects of fitness, then, though there may be high variability and competition between the types and expressions of art expertise that are possible.

A possible objection to my view that form becomes norm detects an unacceptable kind of Social Darwinism as implied here. It looks as if some standard could become evolutionarily normative if it were imposed sufficiently widely. This seems to open the door to the possibility that an evolutionary sanction might be claimed, say, for racial and sexual discrimination, homophobia, and enslavement of ethnic minorities.

Admittedly, the position I have defended holds that what become normative are only those transmissible human forms or behaviors that are recognized as signifying *well-formedness* and *developmental normalcy*, but now the worry can be articulated as one about how vulnerable and corruptible are these notions. Most societies tolerate many individual differences as normal—differences in hair and eye color, hair distribution or curliness or straightness, skin pigmentation, height, and intelligence. But suppose the government of a populous society enforced a decree against left-handedness to the point where its citizens regarded left-handedness as an abnormality. Rather than accepting that their belief changes the standard for normalcy in their own society, should we not regard their belief as mistaken?

A first reply to this concern notes that at least some of the aesthetic and other preferences under discussion are ones that shaped the lives of our distant ancestors. They are an aspect of the human nature we inherited from our forebears. As such they will not easily be changed by government edicts, though such edicts might succeed in suppressing or distorting their expression. Here we might draw an analogy with humans' selective breeding of nonhuman animals. We breed them for traits we choose, sometimes to the detriment of the animals' normal functioning, but this external control does not necessarily change their underlying nature or the preferences that are indigenous to their species. For instance, Labradors are not sexually attracted solely to other Labradors, but rather to dogs of all breeds. In the human case, we know that locally arbitrary conditions can conspire with human preferences that go on to affect what counts as statistically normal at a given place and time with respect to such factors as neck length, height, weight, tooth whiteness, and the like. But as was recorded in Chapter 4, many aesthetic features, human forms, and themes of social life are universal and cross-culturally appreciable. In general, the basic character of the preferences we are discussing runs deep.

Moreover, it is worth recalling that, even if human nature includes a common core, it is also a crucial aspect of human nature that individuals differ. As described in

Chapter 7, we are drawn to what is unusual as well as to what is average. This works to preserve diversity. In fact, evolution is driven by individual difference. There is not uniformity, but a varied distribution of traits across the species' population and an equally varied distribution of preferences for particular traits. The point here is that developmental normalcy does not and could not correspond to developmental sameness.

Although I have suggested that the creation and appreciation of art is universal, I have also indicated the variety of ways in which artistic creation and appreciation can find expression. Not only are there differences in the art practices of distinct cultures; there is as well a significant diversity of art practices within each culture. And for any given art practice, there is likely to be a spread of levels that accommodates many degrees of competence among the participants. All this means that there are many ways in which individuals can seek the artistic development of their distinctive talents as creators or appreciators. Nothing in the form-becomes-norm idea requires or predicts uniformity or regimentation when it comes to a social practice like art, with its long historical development, advanced sophistication, and scope for virtuosic originality. Indeed, it is precisely the multiplicity of art's possibilities that makes it such an informationally nuanced signal of fitness.

The factors that dictate our preferences can develop and alter over time, of course, and this may shift what counts as well-formedness and developmental normalcy. To return to dogs, their association with humans has altered their previously wolfish nature, but this is not a result that could have been achieved by a regime of training alone. It also required the prior evolution of canine neural structures that might make such training effective. I allow that humans are highly unusual in the cognitive and social plasticity of their desires and norms, which is relevant to their capacity to adjust to an extraordinary range of environments and circumstances. But I do not share the view that all our values and predispositions are or could be the product of arbitrary cultural conditioning. We can hold that our evolved biology sets constraints on what we may become, without also subscribing to the kind of crude theories that mischievously appealed to biological determinism in the misinformed attempt to defend inequitable social hierarchies and the status quo.

10

Art as a Technology

In this chapter, we will consider the possibility that art is a technology—that is, an invention of culture. Of course, culture is not independent of biology. There are choirs only because people can sing, and they can sing only because they have biologically evolved body parts adapted to vocal production and control, minds adapted to coordinated action, and so forth. But that granted, the idea featured here is that art relies on biology only in a rather general and indirect fashion and without the evolution of art-specific capacities.

Technologies versus spandrels

If most human behaviors depend at some point on our evolved cognitive, perceptual, affective, and motor systems, should those behaviors be viewed as spandrels? Some theorists would find that idea congenial. The evolution theorist Stephen Jay Gould suggested that, with only 5,000 years of history behind them, both writing and reading are spandrels. Indeed, he regarded language, human culture, and technology generally as by-products of the oversized human brain that evolved to address now unknown problems faced by our ancestors.

I think that this use of the notion of a biological by-product or spandrel is too profligate. The connection between the behaviors in question and the evolved capacities on which they depend is too stretched for spandrel-talk to have explanatory power. To regard all of culture as a spandrel generated by an ancient, general adaptation—the acquisition of language, for instance—empties the term of significance. We should reserve the term "spandrel" for non-adaptive, ancillary behaviors closely connected to the adaptations that bring them about. In other words, it seems reasonable to view some behaviors neither as adaptations nor as spandrels. They are better described as technologies. Technologies are *enabled* by, rather than *produced* by, our biological natures. They are learned via culture and are achieved by us, rather than being genetically transmitted.

Gould is not alone in regarding most human culture as resting on broad-based cognitive resources provided by evolution. Michael Tomasello, a developmental psychologist, describes a limited suite of cognitive skills—recognition of other people as intentional beings, imitation, and teaching—as providing the biological scaffolding that made cumulative cultural change possible in humans. Once underway, culture was self-driven, as it were. Similarly, Steven Mithen, an archaeologist, argues that modern

human behavior is the consequence of the development of general intelligence and that this emerged as a result of a breaking down of boundaries between isolated mental domains specializing in natural history, social relations, technology, and language. The subtitle of his 1996 book—*A Search for the Origins of Art, Religion, and Science*—makes clear that he traces the origins of art, religion, and science—that is, the origins of culture generally—to this change. In all these cases, I suggest that it is appropriate to regard the general claim about culture and the arts as one identifying them not as spandrels but as technologies.

Culture as technology versus gene-culture coevolution

As I noted in Chapter 3, the thesis of gene-culture coevolution opposes the ideas that culture runs independently of evolution and that human evolution came to a halt long ago. Environmental factors, including aspects of culture, can affect how genes are expressed. But more than this, feedback loops allow culture to alter our evolved biology. For example, the move from hunting and gathering to herding was followed by increased lactose tolerance. Strong advocates of the gene-culture coevolution hypothesis, for example the environmental scientist Peter Richerson and the anthropologist Robert Boyd, argue that the relationship between biology and culture is symbiotic. They maintain that aspects of our sociality have selectively altered our fitness and affected our biology as a species. Their view, which I share, is that evolution is ongoing and not necessarily separable from cultural process and change.

The possibility of gene-culture coevolution should make us wary of regarding culture generally, including art, as a technology. And the pervasiveness and importance of art are at least suggestive of its close connection with biological evolution. But the hypothesis that art is a technology cannot be dismissed out of hand and deserves consideration.

Music as a technology

The most sophisticated and extended defense of the idea that an art form is a technology is made for music by the neuroscientist Aniruddh D. Patel. He maintains that music is a cultural invention with no evolutionarily specialized biological foundations. It is what he calls a *transformational technology*. It is transformational to the extent that it can have lasting effects on the brains and minds of those who are exposed to it.

Patel reviews accounts of music as an adaptation and finds them wanting. He offers two main counter-arguments. First, language is an adaptation and there are key respects in which the acquisition of music is not analogous to that of language. In particular, music behaviors emerge more slowly and less robustly as part of normal human development than do linguistic behaviors. Second, there is no evidence of genes giving rise to music-specific brain networks. For instance, two core components of music cognition—tonality processing and synchrony to a musical beat—co-opt neural structures that primarily serve linguistic and complex vocal learning functions.

Patel also criticizes theories of music that view it as an evolutionary by-product to the extent that they imply that music is a free rider or frill with no value from a biological point of view. It can have significant value to many individuals without contributing to heritable fitness and species-level change. He notes that regular engagement with music can affect nonmusical brain functions in ways that produce enduring beneficial consequences with respect to language processing, language disorders, and recovery from stroke. These are examples of positive results of our involvement with music but are not the cause of that involvement. According to Patel, we are motivated to pursue music and value it for its aesthetic rewards, emotional power, enhancement of ritual, mnemonic efficacy, and its role in identity formation. These widely recognized benefits together account for music's universality and ancient origins.

Patel develops an analogy between music and fire, which is also a transformational technology. The ability to control fire is very likely to be a trait that does not rely on evolutionarily specialized "fire making" cognitive mechanisms in the brain. Rather, the ability to control fire is almost certainly an invention that spread culturally and became universal because of its utility for humans.

> The notion of music as a transformational technology helps us to explain why music is universal in human culture. Music is universal because what it does for humans is universally valued. Music is like the making and control of fire in this respect. The control of fire is universal in human culture because it transforms our lives in ways we value deeply, for example, allowing us to cook food, keep warm, and see in dark places. Once a culture learns fire making, there is no going back, *even though we might be able to live without this ability*. Similarly, music is universal because it transforms our lives in ways we value deeply, for example, in terms of emotional and aesthetic experience and identity formation.

On this view, the cognitive flexibility that leads us to invent, elaborate, and develop what comes our way—to make fire or music for instance—is an adaptation, but the results of those acts of invention, development, and elaboration are not thereby merely by-products or spandrels. They are designed applications, not adventitious by-products. We put the relevant capacities to work with the intention of bringing about desired outcomes; and, when we are successful, those outcomes are achieved, not accidentally thrown up. Moreover, such technologies are transmitted via teaching, not via genetic inheritance, though our evolved natures contribute some of the dispositions and capacities on which this process of teaching relies. So it is that reading and music are passed to children.

Although Patel does not broaden his view to other art forms, it is possible that this could be done. We might speculate that art had its genesis in our inclination to create, design, and elaborate whatever comes to hand; and that this also explains why it continues to renew and transform itself. It is an expression of our biological nature, certainly, but it is not thereby either an adaptation or a spandrel. It expresses the aspect of our nature that leads us to be creative inventors and appreciative users of technology.

Patel's argument reviewed

I accept Patel's claims about the value of music and his account of why we are attracted to it, but I question the success of his arguments. I doubt that the differences between music and language demonstrate that music is less likely to be an adaptation. I am unconvinced that the transmission of musical knowledge and skill is purely cultural. And I think that the analogy between fire and music is overdrawn. I begin by attempting to show that music behaviors do not qualify as evolutionary specializations in their own right.

The capacity of humans to acquire oral language is an adaptation in Patel's view. He identifies ten human capacities for language acquisition that provide strong evidence that there has been natural selection for the transmission of oral language.

- Spontaneous babbling (even by deaf babies) shows that infant speech is not simply an imitation of adult speech.
- Humans' lowered larynx brings the risk of choking but was necessary for speech.
- Humans are unique among primates in their capacity for vocal learning and imitation. Infants have the capacity to learn any language but soon favor their native tongue.
- There is a critical, early period for language acquisition.
- Deaf signing children acquire grammar in parallel with hearing children.
- While some children get more input in learning a language than others, all acquire it.
- Successive generations of users increase grammatical complexity, for example, as in Creole.
- A single gene has been identified as exercising strong influence on speech and language.
- And it is highly likely that humans without language abilities would be at a severe disadvantage when it comes to survival and reproduction.

Patel presents the comparison with music as revealing an absence of evidence that there are adaptations for music acquisition. Babbling, vocal learning, and the anatomy of the vocal tract could all reflect adaptations for an acoustic communication system that originally supported both language and vocal music, but in other respects music does not measure up well. Music learning develops rather slowly. For example, at 5 years of age children are not as sensitive to musical keys as are adults. Also, it is not clear that there is a critical period for music acquisition, because some good musicians first learn to play or compose in their teens. Not everyone is able to acquire musical skills, and there is no evidence that nonmusical people are less successful reproducers.

Moreover, Patel continues, the case for music-specific innate capacities is weak. Studies treating newborns as musical innocents should be regarded as controversial because fetuses may already have had significant exposure to music. Also, their "musical" responses can be explained as related to speech or general auditory processing. Indeed, many so-called "musical" recognition abilities might be aspects of auditory processing evolved to help us negotiate the general soundscape, rather than being particular to

music. Meanwhile, there is no evidence for a "music" gene. Tone deafness runs in families, but the deficit is not music-specific. Perfect pitch is heritable, but is not necessary for musical ability. Patel's overall conclusion is negative: based on current evidence, music does not seem to be a biological adaptation.

Unlike the usual approach to the topic of music and evolution, which is piecemeal, narrowly focused, and highly speculative, Patel offers a sustained argument that calls on a considerable spread of data that he subjects to a powerful test: if music behaviors are an evolutionary adaptation, this should be no less apparent than is the fact that oral linguistic behaviors are an adaptation; and the indicators of music's adaptedness should parallel those for language. In terms of its rigor, the argument is impressive. Nevertheless, it must be queried as setting the standard for music being an adaptation at an inappropriately high level.

First response—modularity

The first response to Patel's argument requires a brief introduction. As we have noted, some theorists regard human behavior as highly modular. In other words, they think that behavioral responses to environmental stimuli are triggered and operated automatically, without higher cognitive supervision or insight. Some evolutionary psychologists defend this view, using the metaphor that the human mind operates like a Swiss army knife. Modular functioning need not be underpinned by specific neural circuits, but where such circuits do exist they provide further evidence that the function is adaptive.

Opponents of this view are liable to emphasize the importance of general intelligence, cognitive plasticity, and creativity. They note how human thinking is usually self-aware and conscious, as well as involving multiple levels of intentionality. (That is, thoughts about other people's beliefs, desires, intentions, etc., as these concern yet other people: for example, where *you* worry that *she* thinks that *they* should give more consideration to *his* needs.) Undoubtedly, much of our brain functioning is automated—much of the processing the brain performs is not present to consciousness—so the disagreement is about the degree of modularization and the comparative significance of self-conscious, executive thinking in our overall performance.

It is widely accepted that language acquisition and use is a prime example of a modularized behavior. Children are programmed to soak up their mother language at an astonishing rate, and we are all deeply unconscious of the structural principles that govern our use of language. Patel's test for whether music is an adaptation requires that it be as highly modularized (automated) as language is. This comes out in his insistence that, if it is an adaptation, not only should it emerge unthinkingly as an aspect of normal development in all children; it should also be acquired as robustly as language is, and it should be driven by music-specific neural systems.

Patel does not deny that music calls on some music-specific brain modules, but he thinks that many cognitive mechanisms that appear to be music-specific in fact have deep connections with other nonmusical brain functions, such as those for language.

For instance, he accepts the modularity of beat-based rhythm processing, but argues that this module is intimately involved in complex vocal learning. He also points out that some music-specific neural circuitry might be the result of individual experience and development, rather than reflecting innate brain specialization.

In considering these arguments, it is important to recall how fiercely contested are claims both for and against the existence of genetically programmed music-specific neural networks. Some neuroscientists agree with Patel that these are (largely) absent in music processing. But others disagree and claim that much music processing is neurally specialized and modular. So one premise of Patel's argument is at least debatable.

It is true that music draws on neural circuits that are important for language, and that there are many parallels between the ways the brain processes both language and music. And we noted in Chapter 9 that some theorists see music as a by-product of language. In fact, though, it is possible that music preceded language or that they had a common origin. So, we should not assume that the relevant neural structures evolved for the sake of language and only later were co-opted by music. All in all, it is not obvious that music has a lesser title than language to claim "ownership" of the neural structures that it calls on.

In addition, the earlier discussion of feathers alerts us to the possibility that music could be an adaptation that borrowed circuits originally evolved for more mundane aspects of sound processing. If those neural units have been tweaked or modified so that they can be applied to making or appreciating music, and if those who so behave are thereby fitter in ways they can pass on, then the tweaking or modifying is where the adaptation lies. As I emphasized previously, judging whether we are dealing with an adaptation involves considering the role of the relevant behavior in the creature's ecology. That judging is not foreclosed by learning that the heritable traits responsible for the current behavior first evolved to service different behaviors.

Besides, language acquisition is unusual in its degree of modularity and in its robustness with which it is acquired. And there is no reason to assume that only automated behaviors are adaptive. Finally, not all developmentally robust behaviors or structures are adaptations. There is robust development of the coccyx in humans, but it is a vestige. And not all adaptations are developmentally robust. For instance, they may not manifest in environments other than those in which they are useful.

So Patel's test, which requires music to measure up to language in all these respects if it is to be acknowledged as an adaptation, sets an unreasonable standard. Music behaviors could be adaptive even if they do not meet it. For instance, music behaviors might be adaptive for those who have them, but not be as strongly and universally heritable as the propensity for language is. A possible explanation for the low heritability of high-level music behaviors might be that the realization of talent across the full range of music behaviors requires the correctly sequenced expression of a great many different genes.

Second response—scope and spontaneous emergence

In case it is thought that the low level of genetic heritability for musical talent creates a presumption in favor of Patel's conclusion that music is not an adaptation, I now

review that issue. I suggest that low heritability is true of high-level musical talent but not of low-level music making and appreciation. And I suggest that Patel should (and does) aim his argument at the low level. He often discusses ordinary listeners, for example. (This is the issue of scope that I raised in Chapter 4.) Just as we are not all professionally competent poets, playwrights, or novelists, we are not all professionally competent composers or musicians. But the relevant question concerns whether we can all engage our native music with understanding, as we do our mother tongue. I argue that we can. In other words, when we make the comparison at the appropriate level, Patel exaggerates the extent to which music differs from language.

With language we are all speakers as well as listeners, and we are all able to generate novel utterances. Competent users are equally speakers of and listeners to linguistic utterances. It might be thought that this is not also the case for music. Many music lovers cannot even hum in tune, and not all performers are also composers. So if we are checking whether music is adaptive, we might need to distinguish between various musical behaviors. Patel's approach tends to run all musical behaviors together. Is he wrong to do so? No, I don't think so, because at a relevantly basic level we are all vocalists and we can all invent new musical tunes. It is at the level of basic ability that musical and linguistic capacities should be compared. Once this is allowed, Patel's claim that musical behaviors do not emerge spontaneously as part of normal human development becomes vulnerable.

Patel suggests that musical behaviors are mastered later than linguistic ones: a person's understanding of her culture's musical tonal system is not fully formed until, say, five to 8 years of age, and many famous musicians and composers did not study music until their teens. Yet these observations do not show that acquiring knowledge of music is not part of normal development. The onset of sexual maturity is an obvious example of a part of human development that emerges spontaneously only with age. It could be that music behaviors rely for their appearance on the realization of appropriate facilitating conditions—on the development of cognitive sophistication or the acquisition of emotional sensitivities, for instance. And it is relevant to note that, just as language is unusual with respect to the degree of its modularity, it is also exceptional in the ease and youthfulness with which it is acquired. In this respect, language rather than music is the exception among adaptations. The basics of language are in place at age five or six years, though the vast majority of words in a person's vocabulary are acquired in late childhood and early teens. By contrast, most crucial survival skills are not fully developed until late teens.

And to return to the point just made, when we focus on basic musical skills—at a level according to which it is appropriate to count us all as performers and composers as well as listeners—they do emerge relatively early and prior to full competence in the mastery of musical scales. It seems plausible to count pitch-structured, metrically regular vocalizing as evidence of the acquisition of music behaviors, without also requiring that what is vocalized must have a complex structure exhibiting tonal closure (that is, consistency of key and closing on the most stable tone). Pitch-structured, metrically regular vocalizing emerges earlier than 5 years of age in the child's development. In fact, children begin

to sing songs structured in terms of melodic contour rather than tonality from about eighteen months. Such behaviors appear to be self-motivating and often unprompted, which suggests the environmental triggering of genetic dispositions.

Because infants' discrimination of pitch and timing differences rivals that of people with many years of exposure to music, the psychologist Sandra E. Trehub concludes that the rudiments of music listening are gifts of nature rather than products of culture. Ian Cross, a musicologist, follows Trehub in claiming that children are primed for music as much as for language. So if we consider the first appearance of behaviors that count as musical and as linguistic, where such behaviors are initially primitive compared to what comes later, it is not obvious that the linguistic behaviors are earlier or more spontaneous than the musical ones. Moreover, many people would count the intrinsic appeal of music to babies and very young children as suggestive of its connection with behaviors of evolutionary significance.

It is also relevant to observe that music behaviors develop much more spontaneously than reading and writing. Indeed, the acquisition of music behaviors is unspontaneous only as a matter of degree in the comparison with oral language acquisition, which is rather different from suggesting that such behaviors are purely cultural.

Third response—fire and the positive argument

So far we have been reviewing Patel's argument against adaptationist accounts of music. I have tried to show that it is not successful. The case stands unproved. I reserve until Chapter 11 further discussion of the topic of whether it is plausible to see music as the outcome of evolutionary selection. It is now time to consider Patel's positive argument, which compares music making favorably to fire making: fire is a technology; music is similar in relevant respects to fire; so music is a technology. In what follows I mainly challenge the second clause of this argument.

In evaluating this position, obviously it is necessary to compare music behaviors with fire behaviors. That is not easy to do, however, because the idea of fire behaviors is so vague and slippery. Take fire making. There are many ways of doing it: for instance, by taking something already burning from another fire, using friction to generate sufficient heat to ignite something flammable, focusing the rays of the sun on something flammable, striking sparks from flints, using controlled electrical discharges, and generating heat by means of certain chemical reactions (for example by exposing phosphorous to oxygen, adding pure calcium to water, pouring sulfuric acid onto sugar, decomposing organic matter in confined places). The problem is that these various activities seemingly have in common only that they can produce sufficient heat to ignite flammable material, that is, to bring fire into existence. As actions or behaviors they do not form a coherent class. As a result, our focus falls naturally on the product, fire, rather than on its causes and the behaviors that activate them.

Music behaviors are importantly different from this, I think. They are unified with each other and with the product, music. We hear music as an expression of the bodily actions through which it is sounded. All the actions that go into its production and

reception are directly relevant to the properties we experience the product as possessing. On hearing music, the brain's motor as well as auditory centers are stimulated. Even if we were inclined to agree that fire should be counted as a transformational technology, we could have reservations about characterizing music in such terms, because it is continuous with the processes that cause it, rather than being product-focused.

There is a further reason for querying Patel's parallel between music and fire. He claims that we perpetuate both because we find them valuable. That claim is certainly plausible for fire. The value of fire is not merely that it is pleasant. It promotes survival by allowing us to withstand cold and by drying clothes. With fire we can purify contaminated water. It allows access to caves and it brings the light of day to night, thereby extending the time for social intercourse. It can be used to drive away predators, to stampede game animals, to smoke out game, and to harden weapons. Above all, fire eliminates bacteria from food and makes edible foods that we would not otherwise be able to digest easily.

So profound were the effects of controlling fire on the lives of our ancestors that we should pause to consider the history of fire management. It was our Hominin predecessors who first controlled fire at least 790 ka, as evidenced by ancient hearths. Because of its significance in the lives of our forebears, it changed their evolution. In particular, cooking and thereby softening food significantly increased the nutrition that could be extracted. This led to reduction both in the size of the digestive tract and in the energetic costs of digestion. Indeed, the anthropologist Richard Wrangham conjectures that it was the spare energy that control of fire provided by way of cooked food that permitted the development of the energy-hungry, larger brain that marked the line of descent to which we *Homo sapiens* are heir. In any case, fire is inextricably enmeshed in characteristically human behaviors, not merely an interesting but biologically incidental artifact. Fire making may be a technology, but it is part of gene-culture coevolution because our long-standing dependence on fire has fundamentally altered the human genome.

The claim that music is a source of similarly profound benefits is not so clear-cut. Patel identifies the value of music in the positive effect that it has on our emotions, rituals, memory, and sense of identity. I imagine that he is correct about this, and it is worth noting that both music making and music responding can produce paybacks in these areas. We do not value music merely as a means to these desirable effects, however, and we rarely bear them in mind when we make or seek out music. Rather we are inclined to regard the primary value of music as intrinsic to it, as inherent in the activities of creating and listening to it. In part, this is the common thread that unifies the various music making and music responding behaviors.

Like fire, music warms our world. But note that what we value in music and the consequential benefits that come from its engaging our emotions, aiding memory, enhancing ritual, and providing models for us to identify with are only indirectly, if at all, connected with survival and reproduction. As well, the benefits must be balanced

against the costs. Music behaviors come with significant costs in terms of the time, concentration, and effort needed to raise them to the level even of average competence. There is little doubt that we value music highly, but whereas the advantages for survival that controlling fire brings in its wake are patent and are sufficient to explain why the behavior is universal, the high value we attach to music is much harder to justify in similar terms.

Here is my suggestion: with fire, the behaviors that go into its production are merely causal means to the valued end. The means are various and they do not transmit to fire the qualities for which we value it. Fire behaviors have no underlying unity of structure and no common basis of derivation from any single cluster or cohort of adaptive behaviors. With music, on the other hand, there is an intimate connection between what we value in the product and the kinds of behaviors that generate it, such that music behaviors cannot be regarded merely as dispensable means to the end product. Music behaviors share a deep unity, all being directed either to the human generation of patterned sound in causally comparable ways, or to following and reacting to its patterns. And it is not difficult to trace moderately close connections between music behaviors and perceptual, cognitive, motor, and affective systems that are interdependently related in ways that are adaptive, even if we agree with Patel that music behaviors are not adaptive in themselves. These differences between fire behaviors and music behaviors can reasonably be thought to ground the distinction we were looking for—that is, the distinction between transformational technologies that are product- not process-oriented and behaviors that should better be classed as spandrels or adaptations.

I have agreed with Patel that we should distinguish transformational technologies from adaptations and spandrels and that fire behaviors should count as transformational technologies. I have argued, however, that music behaviors differ from fire behaviors in being mutually integrated and unified, rather than being random but for the output they happen to produce, and in being self-motivating rather than end-driven. In addition, whereas the value of fire lies in the product rather than in its production, with music the value is as much in the process as the product. And whereas there is an obvious connection between fire's promoting our survival and our valuing it, if music promotes our fitness at all this seems incidental to our valuing of it. These considerations cast doubt on the claim that music behaviors are transformational technologies.

11

Arts as Adaptations

We are approaching the final leg of this journey with no one view firmly established as the favorite. The main options are that art is a technology, a spandrel, or an adaptation. I do not find the "art as technology" theory attractive, because it presupposes a clearer division between cultural development and the forces of evolution than I think is plausible. But I have also questioned the "art as by-product" hypothesis and theories arguing that the arts are adaptations with a common evolutionary purpose. One path remains as yet unexplored: particular art forms involve evolutionarily adaptive behaviors that are distinctive to them. That is the topic of this chapter.

The arts in question

When it comes to evaluating claims about the evolutionary status of particular arts, it is likely to be helpful to be able to draw on multiple disciplinary perspectives and relevant empirical studies. In this regard, consider the case of music. There is a considerable recent body of academic writing on the evolutionary origins of music and on its alleged status as an adaptation, spandrel, or technology. And there is a great deal of empirical data, including cross-cultural studies, collected by psychologists, cognitive scientists, and neuroscientists. This suggests the possibility of triangulating the literatures on the evolutionary psychology of music, on psychological studies of music behaviors and their underlying brain architectures, and on the nature of music as described by musicologists, ethnomusicologists, and philosophers of music.

Not that this will necessarily lead to a clearer understanding of the issues and their answers. Disagreements within these various areas of music study might get in the way. As we have seen, evolutionary psychologists dispute over what, if anything, music is an adaptation for and also about music's origins. We have observed that neuroscientists disagree over whether there are music-specific brain circuits and, if there are not, over what this might show about music's being an adaptation. Meanwhile, not only musicologists but also philosophers of music argue over the function of music and over whether the object of musical appreciation is a disembodied sound structure or something that essentially implicates its human production and response. But even if much is contested, the spread of divergent studies and methodologies allows for a degree of mutual calibration and testing that is higher than usual for debates on evolution and the other arts.

There is another reason, I think, for being drawn to the discussion of music. Music involves unlikely, demanding, exotic, and highly exaggerated behaviors, apparently to no direct survival advantage. Yet the passion devoted to it by people of all ages and social stations and its universal popularity in all places and periods seem to hint that it is entwined with our deepest instincts. It charms us. We are in its thrall. So music is paradoxically among the most and least likely products of the evolutionary path taken by our species.

With its tantalizing character, how could we not consider it? We will do so briefly at the close of this chapter. But music has already featured so prominently in Part III that we should seek to focus more on other art forms.

It might be thought that visual art provides a strong candidate, because our appreciation of and response to it have been much analyzed by psychologists and neuroscientists.

The best such work can be revealing of important sources of aesthetic value in paintings. For example, Margaret Livingstone, a neuroscientist, demonstrates that the apparent pulsation of the sun and its seeming hot/cold character in Claude Monet's *Impression Sunrise* (1872) depends on its being painted with the same luminance—the degree of a color's brightness—as the gray background clouds. Because we use an item's luminance in detecting its location, this painted sun is not unambiguously fixed in place against the sky. Whereas the real sun is always very much brighter than the sky. Livingstone also discusses da Vinci's *Mona Lisa*, which is widely held to depict an enigmatic, elusive smile. She demonstrates that critical formal features defining the smile are more apparent in the coarse-information components of the image than in its detail, with the result that the smile disappears when one focuses on it and reappears in the peripheral field.

Despite these helpful cases, I am doubtful in general of the relevance of these psychological studies to our topic, because they mostly relate visual art to our evolved modes of perception rather than considering whether pictorial art is adaptive or otherwise connected to evolution. And to my mind at least, much of what is discussed has only limited value for the person concerned with art, as I now explain.

Although psychologists and cognitive scientists sometimes claim to reveal the nature of art, a common approach is to demonstrate the processing and organizational principles of perception with reference to artistic examples. For instance, parallels are drawn between the two-dimensional depiction of perspective and the way the eye works, or there is discussion of the evocation of principles of pattern processing in our response to pictures. Where the works are not realistic, the analysis concerns the roles of edges, form, and color in vision. Where they are realistic, the works are typically treated as if they are representationally transparent and might have been replaced by photographs or by the actual scenes they depict without alteration to the account. Occasionally, attention is drawn to departures from true perspectivalism if these occur, though not greatly to artistic purpose. The neuroscientist Semir Zeki acknowledges as much when he begins his book *Inner Vision* with: "This is not so much a book about art; it is more a book about the brain."

More relevant to the comprehension of visual art are cases in which artists achieve verisimilitude not by replicating what the eye would normally see, but by doing something different that achieves the same effect under the picture's viewing conditions, which involve much less illumination and contrast than is present when objects are viewed in daylight. For instance, "irradiation" is a painterly effect that accents edges by exaggerating the boundaries they demarcate. And significant facial features are often exaggerated for artistic effect in portraits. More familiar techniques include the use of close parallel lines and hatching in drawings and etchings for shading and shadow, and the use of chiaroscuro—that is, light and shade—across a depicted surface to achieve the appearance of three-dimensionality. Artists have hit upon these effects and use them deliberately, but empirical studies can reveal the causal principles that underlie them. This contributes only a little to our aesthetic appreciation of the artist's achievement, however, when we are already aware of these pictorial techniques.

The underlying bases for some more subtle aesthetic effects have been identified by scientists. They point out how the natural interest of eye-like circles or snake-like squiggles can be used by artists, even in abstract designs, to draw our attention. The difficulty of registering fragmented cubist portraits can appeal to the fact that the brain regions that process faces differ from those that process other kinds of objects. Similarly, strangely colored items—blue grass and green skies, for example—are not treated by the brain in the standard fashion, and this may be responsible for the expressive results that are associated with them. But these tend to be local, specific effects and do not provide a grounding for general aesthetic principles.

For the most part, neuroaesthetics does not make good its claim to move from an account of artworks as perceptual stimuli to an explanation of how artworks function as aesthetic stimuli in a way that reveals the former as the foundation of a biological theory of the latter. The aesthetician Gregory Currie concludes that neuroscientific studies of visual art

> are relatively undiscriminating; they do little to illuminate our aesthetic judgements about particular works, traditions, styles, or genres.

By contrast with music and visual art, literature and drama have not been much studied by psychologists and neuroscientists. For instance, there is comparatively little neuroscientific work on reading—what there is reveals brain locations associated with reading events but not innately specified reading-specific neural circuits. And few scientists have considered whether literary behaviors might be adaptive. Despite this, there is considerable interest, expressed mainly by literature professors, in the possibility that literature and drama are evolutionary adaptations. If they draw on scientific studies in developing their arguments, as some do, they must apply them to the literary case.

The attraction of the idea that literature is an adaptation is easily grasped. Literature's connection with matters of evolutionary significance is palpable. *The Iliad*, the *Mahabharata*, Superman comics, *Beowulf*, *Coronation Street*, Shakespeare's plays, *Swann's Way*, *The Lord of the Rings*, Mills and Boon romances, the *Epic of Gilgamesh*, and *The Sopranos*

deal with loss, love, fear, redemption, friendship, political struggle, ecstasy, remembrance, betrayal, loneliness, pride, retribution, and countless other humanly important events, situations, relationships, and emotions. So, I will focus in this chapter on evaluating arguments offered in defense of what is known as "Literary Darwinism."

Literary Darwinism

Inevitably there has been interest in the themes that are universal in literature. At the end of the nineteenth century, Georges Polti, a French writer, identified 36 plot types. Christopher Booker, a journalist, lists nine. Meanwhile Joseph Carroll, a leader of the movement known as Literary Darwinism, argues that literary themes reflect the kinds of chapter headings found in textbooks of evolutionary psychology: survival, romance, kinship relations and family, individual identity, jealousy, revenge.

Literary Darwinists take the regular appearance of these universal themes as inviting a biological explanation. Gary Westfahl, who is a reviewer of science fiction and a fan of sociobiology, proposes that science fiction, being a newly invented literary genre featuring the nonhuman and unfamiliar, repeatedly drifts into themes and forms similar to other literary genres. He claims that this indicates an "element of genetic predisposition in the ways humans create and respond to literature." But surely that conclusion is too strong. Cultural habit in the form of literary conventions and practices could generate the same predisposition.

It is possible that different cultures share story themes in common but view those stories in culturally relative ways. This was the idea presented by the anthropologist Laura Bohannon, who found that the Tiv of Nigeria responded to the plot of *Hamlet* by holding that Ophelia must have been killed by witchcraft and that Claudius was obliged to marry his brother's widow. But even allowing the point that there are differences in cultural beliefs and values that led the Tiv to interpret some aspects of the story as we would not, this does not show that we do not share with the Tiv much of the same psychology and emotional reactions. They were shocked by Claudius' fratricide, understood Hamlet's hesitation to kill his uncle, sympathized with his desire to avenge his father's murder, and so on.

Literary interpretation as applied evolutionary psychology

By far the most common application of evolutionary theory to literature is in the generation of interpretations of works. Academic critics see whether the predictions of evolutionary psychology about the conflicts and strategies that are a product of our human nature and sexual differences are perspicuous in literary fictions. For instance, they look at jealousy and rivalry in terms of mate selection strategies, and at political struggles as manifestations of male aggression and the drive for status. They consider empathy and sociality with respect both to Theory of Mind—our comprehension of the mental lives of other people—and to the human capacity to review multiple levels of intentionality—as in "she suspects that he knows that their daughter . . . " And,

typically, the behavioral predispositions described by evolutionary psychologists are emulated in the best or most popular and absorbing fictions. Usually only one or a few works are interpreted at a time, but several quantitative studies that code and statistically test large numbers of similar works, such as fairy tales, have been attempted.

It might be objected that how literature illustrates archetypal themes reveals biological, not literary, value. In many ways the interpretative enterprise is not unlike the one I have just criticized in connection with the visual arts: it involves using works of art to illustrate the scientific theory, where it might have used narratives about actual people and events to the same effect. But I think in this case the criticism is too strong. We are interested in and can easily be mistaken about what is fundamental in human psychology and sociality, whereas our visual perceptual systems continue to operate whether or not we understand how they work. And while it is surely true that there are many aspects of literary value that are not addressed when we match evolutionary theory against literary fictions, psychological plausibility is almost always an artistic plus in such works. Such interpretative studies are relevant not only for supporting psychologists' theories but also for demonstrating the insights and sensitivities of literary authors, which is pertinent to measuring their achievements.

Now, a literary theorist could adopt evolutionary theories about human nature as one interpretative strategy among many without thinking that literature is an evolved behavior and without being committed even to the validity of the evolutionary outlook. In fact, though, most of those who offer interpretations of literature that pay heed to insights of evolutionary theory and psychology are committed to the view that we can explain both the origins and current value of the literary arts in such terms and, further, that storytelling is an adaptive behavior. As a result, they offer their readings of literary texts as pointing to the primal source of literature's power, interest, and appreciability. This is not to say that they all agree in their theories. Of necessity, when I review their program I focus on some of the main themes rather than on subtle differences in detail.

Before I launch the discussion of literature as an adaptation, however, I must register some concerns about the project as it is usually pursued. We can readily allow that (some) literature provides the benefits that adaptationists identify as central to its nature and originary function while remaining skeptical of the claim that literary behaviors are adaptations favoring that function. Remember: the foot of *Archaeopteryx* was suitable for perching in trees and thereby afforded the bird advantages over terrestrial species subject to ground predation. But we know that the design of the foot was not an adaptation for perching. So, showing that we can learn about human nature from literature is not the same as showing that literature is an adaptation because it conveys that knowledge.

Unfortunately for their cause, most Literary Darwinists do much better in arguing for literature's informational value than in demonstrating that it is adaptive. They are also careless of the requirements of evolutionary theory in further ways. They hardly ever take seriously the need to establish that the benefits in question outweigh the costs and that the allegedly adaptive characteristics are heritable.

Literary Darwinism's subject matter

The first task is to identify the topic. Three notions are central: *literature*, *narrative*, and *fiction*. None alone adequately captures our subject matter. Each includes something irrelevant and excludes something that should be included.

If we understand by *literature* written works that display a higher than average writerly quality or stylishness, there are at least two respects in which literature is too exclusive to identify our topic. Most Literary Darwinists allow that storytelling was adaptive within oral traditions that long preceded the invention of writing. Also, as I observed in Chapter 3, to the extent that we ought to be concerned with humble forms of art—what I earlier referred to as small "a" art—our subject will include many works that are not especially marked by their quality or stylishness. In another respect, literature is too broad a category. It encompasses non-narrative forms of writing, such as essays and tracts, that are not (or not yet) considered by Literary Darwinists.

Narrative is also a broad notion. Narratives are stories or histories that describe the temporal succession of events, actions, situations, thoughts, and the like as structured or governed by intentions or causal regularities. Narratives are not lists of items or facts but explain or intimate the interconnectedness of the elements on which they focus. Narratives can be factive or fictive. The vast majority of narratives—mundane accounts of how things are in the world—are not discussed or analyzed by Literary Darwinists. Moreover, if lyric poems do not count as narratives because they tend to characterize a situation from some point of view rather than relating a series of events, then the notion of narrative is too narrow as well as too broad.

Fictions deliberately describe or create worlds that differ from the actual one and, where they are for an audience, that audience is supposed to be aware of this. (Attempts to deceive an audience about what is true in the actual world may involve a similar kind of storytelling, of course, but I here treat deliberate untruths as distinct from fictions.) Some fictions do not concern Literary Darwinists, however—for example, the vignettes I use as prompts in exam questions. And some apparent non-fictions are of interest because we treat them as if they are fictions. Sometimes we cannot make sense of a story except by viewing it as a fiction, even though it is told as fact. The creation myths and religious stories of many societies fit into this category. And in other cases, we are indifferent to whether a narrative is true because its point is allegorical or purely illustrative, as parables and sagas often are, or for some other reason. Even if the poet tried truly to describe his love, it is not the factual accuracy of the poem that is of interest.

Probably the largest and most central subset of the stories that are analyzed by Literary Darwinists fall under the heading of narrative fictions. For convenience, that is how I will refer to the subject matter of Literary Darwinism, but the topic should be understood as qualified and gerrymandered in the ways I have just indicated. I will now respond to skeptical suggestions purporting to undercut the possibility of separating factual from fictional narratives and thereby establish that narrative fictions can be distinguished from a wider, more inclusive notion of narrative.

Narrative or narrative fiction?

Some authors are plainly interested in the broader topic of narrative. It is the broad topic that must be intended when it is said that all explanations are at bottom narrative, or that narrative is the fundamental instrument of thought and indispensable to cognition generally, or that narrative is an adaptation that has evolved to regulate interpersonal relations and relations between society and its environment, or that narrative evolved to tell humans who we are and how we are distinct from other animals, or when it is said that the self is a concatenation of narratives, that narrative brings the child into culture, that it safeguards traditional values, and that it is fundamental to our thinking.

The centrality of narrative to our ways of making sense of the world and our place in it is undeniable and pervasive. Every person constructs a story about who he or she is, emphasizing this, downplaying that. Everyone who seeks connections between the past, present, and future provides an historical story to tie them together. Religion, science, psychology, and all else are founded on narratives about the world, how it came to be, how it is, how we relate to it. These are reasons for seeing the propensity to narrative as foundational to our human natures and probably as adaptive. But so drenched with narrative is our existence that it is unlikely that we rely on narrative fiction to teach us how to shape stories about our world. Indeed, it is reasonable to suppose that the reverse is the case, that it is our familiarity and skill with storytelling that prepares the ground for our interest in narrative fiction.

In other words, if narrative fiction is distinctively adaptive, it is not its *narrativity* but rather its *fictionality* that should be central to its being so. Accordingly, most of the authors who will concern us try to justify the evolutionary relevance of what happens in academic departments of English, not History. They target the topic of narrative fiction, which might be recorded in oral or written form and presented as prose, poetry, or drama.

The distinction between discourse presented as factive and as fictive is not always well observed, however. It is understandable why this is so. The creation myths and religions of most societies will strike outsiders as fictions, even if insiders take them for fact. And the production of narrative, even where it concerns how the world is in fact, who we actually are, or what really happened, is creative, imaginative, and constructive. Fictional storytelling is an extension of non-fictional ways of describing and communicating, not a separate capacity. In addition, fictions usually include descriptions of many factual matters. On these grounds, Paul Hernadi, a professor of English, sees no reason for postulating a rigid separation between nonliterary and literary experience in the Stone Age mind.

Nevertheless, there commonly are crucial differences in our approaches to narratives represented respectively as about what is real and what is imaginary. Try telling an historian that his elucidation of the causes of the First World War is a fiction or complaining that no birth certificate is registered for Sherlock Holmes! Contra Hernadi, I bet the Stone Age mind had a very robust interest in separating fact from fiction

or conjecture. Those who could not do so would have found survival much more difficult than those who respected the difference between, on the one hand, knowledge and, on the other, possibility, supposition, and fantasy. Similarly, our primordial ancestors would have been keen to detect lying and deception. Successful social regulation and self-protection rely on the skill. Though we may be indifferent sometimes to the truth of a story told as fact, typically we are not.

I allow that we need narrative to shape what we believe to be our individual and cultural identities and histories, to communicate and preserve our personal and group values and traditions. Similarly, our private reveries take the form of narrative, as do in a more fractured way many dreams and hallucinations. But narratives of all these sorts should be distinguished from those of the literary arts, even allowing a broad construal of those arts. So, if we are to evaluate the argument that narrative fiction is an adaptation, we need a narrower and more careful focus than one that targets narrative in wider contexts.

When was literature adaptive?

Among those who hold that narrative fiction is an adaptation, it is important to consider when literature was supposed to be adaptive. Hernadi thinks that storytelling was an adaptive behavior for our ancestors, but that, like the desire for sweet food we have inherited from them, we might be glutted to no evolutionary purpose now by fiction's universal propagation and our addiction to it. At the other end of the spectrum is the view that storytelling is adaptive in modern times as it was not for our ancestors. The common suggestion here is that it compensates for dissonances between our modern life and the ancestral environment for which we are adapted. But the standard assumption is that fictional narrating was adaptive for our prehistoric predecessors and that it remains so for us. Joseph Carroll here is exemplary:

> When I speak of the adaptive functions of literature, I mean to signify the adaptive functions of the oral antecedents of written stories, poems, and plays. The same arguments that apply to these oral forms will be understood as extending also to their counterparts in written language.

In what follows I concentrate on views accepting that literary behaviors have a long history of evolutionary relevance and remain fitness-enhancing. Though it is widely argued that narrative fiction, taken broadly, is an adaptation, as we shall see there is considerable disagreement about what it is alleged to be an adaptation for.

Literature, mate attraction, and social standing

The first suggestion is the now familiar one that literature is a prop for seduction and mate attraction. Both Geoffrey Miller and Denis Dutton note that a large vocabulary is a reliable sign of intelligence and that the skillful use of language offers many opportunities for displaying wit, erudition, originality, and playfulness. John Constable, an English literature academic, offers a more restricted version of the thesis: that verse form is so difficult to bring off that its mastery and use are what is attractive.

The problems with this general approach were rehearsed in Chapter 8, so I will deal swiftly with them here. On this account, what appears to be adaptive (or sexually attractive) is high intelligence rather than verbal eloquence as such. And in any case, the focus should be on storytelling and what is distinctive to it, rather than on general aptitude in the use of language. Meanwhile, much fictional narrating takes place under conditions in which mate selection is not at issue—for example, between a mother and her infants or between children. No doubt storytelling can be appropriated for sexual display, but this is unlikely to be its original or primary purpose. And even if versifying is more difficult than ordinary storytelling, focusing there does not make the case more convincing.

A related idea—that wordsmiths attain social rather than sexual status through their art—is predictably prone to similar objections. Michelle Scalise Sugiyama, an evolutionary psychologist interested in narrative among hunter-gatherers, argues that the story's presenter gets to set the agenda and further his own interests, thereby augmenting his standing in the community. But even if this is so, it is not obvious that this person will have a comparatively higher fitness in the group than its best hunter, cook, dancer, or comic.

As we saw in Chapter 8, Brian Boyd also regards art behaviors as adaptive for the way they attract attention to the artist. He applies his account specifically to narrative fiction. He notes that gossip can be misleading and boring, whereas fiction is win–win for storyteller and listener because

> skilled storytellers secure our attention by appealing to our cognitive craving to comprehend the actions and intentions of others, while serving their own aims both through the attention they garner and through appealing to interests that we either share or can be made to think we share with them.

And he notes that adoption of the fictive stance allows the artist to enhance the interest of the narrative by mixing elements of the everyday and familiar with what is fantastic or merely possible.

Such arguments are not sufficient to make the case that storytelling is adaptive, however. While a gifted few fiction authors can make riches from their trade, there is no evidence of which I am aware that the most skilled produce comparatively more descendants than others. And if they did, it would be more appropriate to identify the adaptation as residing in the person's comparatively enhanced power and status, with the creation and presentation of fiction being only one of many possible ways of achieving these.

The social benefits of literature

A widespread view locates the benefits of literature as accruing to the group rather than the individual. John D. Niles, a professor of English, maintains that oral narrative serves important functions of education and acculturation:

> It tends to be one of the important means by which children absorb the values of adult society and learn to pattern their behavior according to accepted norms. For adults, it confirms the nexus

of understandings that constitute their knowledge of the past and of the world around them, their social structure, and their moral action.

While the narratives that serve these functions could be fictional, many presumably are not. But some writers explicitly discuss how fictions can accomplish such results. Stories serve to define and establish moral and social boundaries, thereby preparing their audience for appropriate roles and social actions. And their fictionality allows them to be more effective in dramatizing charismatic, altruistic heroes and in satirizing selfish, evil villains. Moreover, it has been argued that, without art, the inevitable tragedies of existence would destabilize society. The philosopher Noël Carroll sums up:

> nothing transmits cultural values better than art, for inasmuch as art may engage feeling, emotion, perception, imagination, and cognition all at once, it encodes, so to say, cultural information redundantly across a number of faculties, thereby embedding it more deeply in memory and making it more readily available for retrieval than otherwise it would be.

Must the holders of the view that literature's evolutionary significance lies in group benefits be committed to embracing the reality of multilevel selection theory? That is, must they accept that evolution operates on group differences, not only on differences between individuals, to favor some groups over others? Multilevel selection theory as applied to literature in this way requires two things. First, the idea would be that literature-endowed groups survived and expanded more successfully than literature-impoverished groups. Second, it would have to be the case that the relevant inter-group pressures were more significant or powerful than selective forces operating via intra-group competition between each group's individual members.

Alternatively, it would be possible to stick with individuals as the units of evolutionary selection provided it could be argued that, in benefitting groups, the presentation and appreciation of fictional literature do not benefit all group members equally. The claim would be that differences at the individual level favor more artistic individuals, even as the group as a whole benefits.

Hernadi takes the second option of showing how group benefits can be reconciled with taking individuals to be the evolutionary units of selection. He proposes that, through literature, the group benefits in increased altruism and that this can be explained by reference to kin selection—helping those who are related to us and thereby furthering genes we share in common—without requiring a commitment to group selection. Ellen Dissanyake is another who talks of group benefits while maintaining that selection operates on individuals only.

Other theorists adopt the first course by explicitly invoking the theory of multilevel selection in support of their positions. That is, they think that in this case competition between groups and their comparative survival is governed by evolutionary principles. In doing so, they emphasize benefits that literature brings to the group, but they do not usually attempt to demonstrate that the first and second conditions for group selection (that I just identified) apply. For instance, they do not argue that competition between

groups is more significant in settling how many descendants people have than competition between each group's members.

Most theorists who appeal to group benefits in claiming that literary behaviors are adaptive remain silent on both counts: on whether they embrace group selection and understand what that commits them to, or if not, on how to reconcile stories about general group benefits with a framework that sees individuals (or their genes) as the units of evolutionary selection. This undermines the convincingness of their appeals to Darwinian theory.

Now, I do not doubt that much storytelling has many of the social benefits claimed for it, and it is plausible to suggest that fictions understood as such can achieve these benefits in a more compelling fashion than other narrative forms by making the crucial issues more lively and prominent. But I think that fictions can also produce group detriments. They can disseminate inappropriate or transgressive values and points of view as easily as they spread morally sensitive sentiments. And they can entrench damaging standpoints, such as racist and sexist attitudes. Moreover, some forms of fiction, such as social satire, are often aggressive in how they function. It is not obvious that the positive group effects inevitably outweigh the negative ones.

It should be noted, in addition, that literature can become an escape from society rather than the point of entry. More generally, art looks to some commentators to be more about competition between individuals for status or sexual attention than about conserving the group and its way of life. With these reservations in mind, the claim that narrative fiction is an adaptation selected for the production of group benefits should be seen to be shaky.

Fiction as instructive thought experiment

The most widely represented argument for the position that the creation and consumption of narrative fiction is an adaptive behavior notes that fictions provide worlds that can be imaginatively explored without generating real-world risks and consequences. Though these fictional worlds differ more or less from the actual world, our encounters with them furnish information or skills that have important real-world applications with genuine survival value. The idea is that, by exploring fictional scenarios and narratives many aspects of which are or could become true, literature cultivates the skills and enriches the knowledge we need to plot our way successfully through the world. By engaging with fictions we are projected into the minds and shoes of people with lives, situations, beliefs, feelings, and experiences quite different from our own. We learn in concrete detail what it is like to have one's uncle murder one's father and marry one's mother, to be stopped by an old sailor who tells of the consequences that followed from his killing an albatross at sea, or to travel to different lands populated variously by midgets, giants, unpractical devotees of music and mathematics, immortals, and civilized horses.

Denis Dutton summarizes the broad-brush view:

The features of a stable human nature revolve around human relationships of every variety: social coalitions of kinship or tribal affinity; issues of status; reciprocal exchange; the complexities of sex and child-rearing; struggles over resources; benevolence and hostility; friendship and nepotism; conformity and independence; moral obligations, altruism, and selfishness; and so on . . . These issues constitute the major themes and subjects of literature and its oral antecedents. Stories are universally constituted in this way because of the role storytelling can play in helping individuals and groups develop and deepen their own grasp of human social and emotional experience.

Brian Boyd puts it this way:

Fiction . . . preselects information of relevance, prefocuses attention on what is strategically important, and thereby simplifies the cognitive task of comprehension. At the same time it keeps strategic information flowing at a much more rapid pace than normal in real life, and allows a comparatively disengaged attitude to the events unfolding. . . . Fiction aids our rapid understanding of real-life social situations, activating and maintaining this capacity at high intensity and low cost.

Critics of Literary Darwinism object to the way it reduces literature to plot lines. Jonathan Kramnick, an English professor, satirizes Dutton's ideas in these terms:

The disposition to tell stories is an adaptation because it helped us survive and was passed on with reproduction. The stories we tell are (oddly) about this process of survival and the passing on of things like stories. We need not have any idea how any design specific to literary form mediated this trait. Form turns to plot and plot to theme.

Eugene Goodheart, another literature academic, similarly regards the search for universal themes in literature as reductionist. While Joseph Carroll is a critic of Goodheart, he agrees that those who merely point to Darwinian themes betray a naïve and vulgar application of Darwinist thought to the appreciation of literature.

These complaints have some bite, but they may underestimate the extent to which specific details of individual works become the focus of interest for the light they shed on the themes they bring so vividly to life. In other words, it is not their themes but the specific ways in which these are handled and elaborated that are the primary source of literary value.

Many Literary Darwinists subscribe to the general idea that literature illustrates archetypal situations but then emphasize different aspects of that idea. For instance, it is said that fiction provides mental maps that help guide our emotional lives, and that, by filtering what is tangential, it allows us to see deep into the structure of our nature. It provides models for the resolution of conflicts between human goals, it refines our ethical sense of empathy and sympathy, and it experiments with our Theory of Mind capacities. More specifically, some authors argue that our experience of fiction trains us in the detection of deception, fantasy, and pretense.

As I read it there are two aspects to this kind of position. The first is that fiction provides us with useful information. Given our highly social nature, much of this information concerns social life and human psychology. When we learn about the interests, desires, beliefs, attitudes, and points of view of people who are not like us, we

are liable to become better at understanding and empathizing with similar people in the real world. Second, simply by rehearsing the relevant mind-reading skills, attitudes, and feelings, we might become more adept at applying them.

As a first step to evaluating this position we should consider whether our experience of fiction delivers the kind of information or skills that can be transferred profitably to our real-world behavior. There is an obvious reason for doubting this in the first instance. What we learn about is the world of the fiction. Its world differs from the real world and there are non-negligible dangers in extrapolating from the one to the other. In the fictional world, people in barroom brawls might be apparently uninjured despite having chairs broken over their heads and being thrown through windows. And even when we learn about ourselves from our reaction to fictions, what we learn concerns how we relate to their fictional worlds, not the actual one. Still, it would be a mistake to over-exaggerate these concerns. Many authors of fictions make clear their intention to educate their readers about reality, and, though care is needed, we can often advance our understanding of the real world through our appreciative comprehension of the world of the fiction.

Nevertheless, having allowed that fictions can provide genuine knowledge of matters beyond their boundaries, it is also relevant to concede that they can miseducate us. And there is the additional concern that what we learn are platitudes—that pride and prejudice damage our intimate relationships, that punishment follows crime, that things are likely to go badly if you inadvertently kill your father and marry your mother. In the context of the fiction all the rich details and subtle nuances count, but when we export what we have acquired to the actual world where the details and nuances are not the same, we may be left with truisms. Finally, there is the issue of whether a focus on how literature is instructive can account adequately for the pleasure we take in it.

A different objection maintains that we acquire Theory of Mind skills at such an early age that the appreciation of fiction cannot play a significant role in their development. Indeed, it can be argued that the acquisition of Theory of Mind at about the age of four years and the capacity to think in terms of what is not the case—to think counterfactually—are both prerequisites for recognizing and understanding fictions as such. Besides, tracking the mental and emotional lives of fictional characters often does not require us to exercise Theory of Mind skills because authors, dramatists, and moviemakers frequently allow us direct access to their characters' thoughts via omniscient narrators, soliloquies, voice-overs, or first-person interior monologues.

Yet allowing all this, it seems possible that we become better and more sensitive at reading the minds of real people who are unlike us as a result of the psychological insights we take from fictions. There are many ways in which an appreciation of narrative fiction could improve us and this is one of them. That said, we are as far as ever from demonstrating that narrative fiction was evolutionarily selected for this purpose.

An equivalent objection—that we have acquired the relevant skills too early to have got them from literature—can be raised to the suggestion that appreciation of fiction

promotes both the detection of deception and its more effective adoption. After all, deception and what is called "Machiavellian intelligence" are recorded in apes and other non-narrating animals. And preliterate children quickly learn the art of lying and are aware that others may lie to them. Did it take fictive tales of adultery to first awaken in men a prospective concern with the faithfulness of their spouses? Did it take made-up stories of past loss to first fire feelings of guilt, sadness, or regret? I doubt it. The detection of deception and cheating is certainly important to how we monitor our relationships, and cultivation of the relevant deceptive skills might also help us to manage them. But it is not plausible that literature supplies these skills as against drawing on ones already developed.

As well as the concern just expressed, we might doubt that fiction provides sufficient novel information to hone the competence in question. Am I likely to become better at understanding how my boss's mind works by reading Joseph Heller's *Something Happened* or viewing the TV show *The Office* as opposed to spending more time with her under diverse circumstances? Will watching the movie *The Sting* make me more skilled than I am already at detecting cheats and liars? Again, I doubt it.

It is striking how far the style of the views I have outlined departs from the Darwinian paradigm. These literary adaptationists emphasize how fictional narratives serve as a repository of knowledge about human nature and as a tool for perfecting or elaborating Theory of Mind and similar skills. But neither this kind of knowledge nor the result of practice is genetically transmissible from generation to generation, and this is required in classical Darwinian adaptations. It is precisely because we are *not* born with the relevant knowledge or perfected skill that we benefit from exposure to information and practice. Their arguments often suggest that Literary Darwinists do not appreciate what Darwinism requires.

The theory can easily be recast in appropriate terms, however. The evolutionary account should rather be about genetically rooted dispositions and capacities to acquire such knowledge or to hone the relevant skills. And if narrative fiction is adaptive through its connection with these dispositions, it must not only engage with and stimulate them, it must be causally responsible for them.

But how are such claims to be justified? It is difficult to imagine designing an appropriately rigorous experimental program that could put this hypothesis to the test. We know too little about the role of fictional storytelling in the lives of our distant forebears to make a convincing case with respect to them. And the current practice of literary interpretation provides no such test—literary critics do not use the controls or double blinds found in scientific experiments and there are no readily agreed standards of disconfirmation. Indeed, literary interpretations are often presented as if self-confirming, which is what allows so many disparate schools of criticism to thrive.

These considerations, which are conspicuously ignored in the work of many Literary Darwinists, ought to temper our enthusiasm for adaptationism with respect to fictional literature's capacity to teach about human nature and to make us more skilled at understanding others.

Fictions as developmental machines

Interestingly, the evolutionary psychologists John Tooby and Leda Cosmides adopt an approach that appears to sidestep the question of whether we acquire either useful novel information or mind-reading skills from fictions. They argue that our access to fictions is adaptive because it provides a cheap and efficient way for us to flesh out the modular framework with which evolution provides the mind. In particular, exposure to fictions provides organizational development of cognitive reasoning modules that deal with hypothetical situations.

> We think that fiction consists of representations in a special format, *the narrative*, that are attended to, valued, preserved, and transmitted because the mind detects that such bundles of representations have a powerfully organizing effect on our neurocognitive adaptations, even though the representations are not literally true . . . [Because they deal with fictions known as such], activities that organize an adaptation can be liberated from the constraints of having to encounter and practice the actual task, which may be very limited, dangerous, or may simply not contain the informative feedback or revelatory data necessary by the time the organism needs the adaptation to be functioning effectively.

Quite apart from previously expressed concerns about the tendency for these evolutionary psychologists to think that the mind is massively modularized—that mostly it triggers automated behavioral routines—I do not understand how this "fleshing out" amounts to *organizing* the module as opposed to *exercising* it through practice and providing it with content to work on. In other words, I suspect this position is not in the end different from the one just rejected. The proposed difference depends on the idea that this exercise "calibrates," "tunes up," or "fleshes out" the operation of the module during its development, but how are we supposed to cash out the content of these metaphors? In addition, the emphasis placed by Tooby and Cosmides on the developmental aspect of the training does not explain the ongoing fascination that fiction holds for adults.

Imaginative thinking and pretense

Earlier I suggested that narrative so saturates our world that it could not be an adaptation distinctive to literature as such. That is why, in trying to locate the adaptation, we attended to the *fictionality* of narrative fiction. But a similar objection can be raised with regard to fictionality itself. So fundamental are fictive ways of thinking outside the literary context that it is reasonable to view narrative fiction as an offshoot of that practice, rather than as its source.

At a very young age, children adopt games of pretense and make believe. They make pies from mud, pour non-existent tea from toy kettles, and exchange imaginary goods for imaginary money. In other words, they are fictioneers. Though they are not yet able to reason in abstract ways, they understand the rules of their games and the implications of those rules for what happens in their game-worlds. For example, if tilting the toy kettle over a cup counts as filling the cup with tea, they understand that if the cup is accidentally knocked over before its tea is drunk that tea is spilled on the

ground. So, the games they play reveal their capacity to apply make-believe over a range of scenarios, not only those fictionally enacted in the game but also others that the game could throw up, including unplanned ones and ones that may never occur. That is, they can think counterfactually.

Fantasy, pretense, game-playing, and daydreaming remain with us as adults, of course, but it is not only in these situations that we adopt fictional modes of thinking. We use practical reasoning to avoid blundering blindly through the universe. When we do, we constantly and knowingly deal with what is not the case. In considering the future we make suppositions and consider what would follow from them. "If inflation stays at the present rate, how will the markets react?" This involves imaginatively entertaining the reality of non-actual events. And in learning from the past we consider not only what did happen but also what might have happened instead. "Would more or fewer people have died before the end of the war had the atomic bombs not been dropped on Japan in 1945?" That is, we consider counterfactual situations, ones we know never to have obtained. As it happens, remembering the past, thinking about the future, and conceiving the viewpoint of others all draw on episodic memory and activate the same neural circuits.

So extensive and crucial is our use of fictional thinking from 2 years of age and up that it seems unlikely that we depend on narrative fiction to alert us to the uses and possibilities of thinking about what is not the case. As children we pretended that our pets were lions and tigers, that they could speak, and that they too could see our imaginary companions. As adults we planned the hunt, speculating where the animals would be found and wondering how we would cope if they caught wind of us. We considered if our relative would have survived had he noticed the lion footprints or we speculated on what that tragically dead child might have grown up to be like. It seems unlikely that such thoughts would have preoccupied us only after fireside tale telling made the possibilities of fiction evident. Rather, it is reasonable to suppose that the reverse is the case—our familiarity and skill with make-believe modes of thinking about the actual world prepare the ground for our interest in fictional literature. So I agree with this from Jonathan Kramnick:

> Natural selection did not need literature to represent "possible but non-existent states of affairs," for example. It only needed the mind's ability to form sentences in the conditional tense.

The role of fiction in hypothetical and counterfactual practical reasoning is not acknowledged by most of the authors who regard literary fictions as essential in perfecting our capacity to project into and understand the minds of other people. John Tooby and Leda Cosmides are exceptional in giving it its due. This may be why they claim that the value of literary fictions is organizational, rather than residing in knowledge or skills that we export to the real world.

What response is available to the objection that we do not need fictional narratives to teach us how to think hypothetically and counterfactually? In what respects do narrative fictions extend our thinking and response beyond what practical reasoning in

real-world situations delivers? Well, we have the input and experience of a range of authors to call on, rather than relying mainly on our own thought. And as I have allowed, they supply information about their own and their fictional characters' first-person points of view, which is often denied to us in ordinary direct experience of others. But, and here is the sticking point, do narrative fictions provide valuable information that we could not glean from autobiographies, biographies, histories, and the researches of the social sciences? It is far from clear that they do.

Admittedly, the worlds of narrative fictions are licensed to depart further from the actual one than are factive narratives presented and intended as such. But as I have already observed, this can make it harder, not easier, to extrapolate information that is usefully rich to the real world. It is not clear, therefore, that involvement with literary fiction provides comparative advantage in fitness over someone who relies only on these other, factive sources of information. Once again it looks as if what is adaptive is narrativity, not fictionality as such.

One person who has argued that literary fictions provide a form of moral knowledge that cannot be communicated or acquired in any other way is the philosopher Martha Nussbaum, though I hasten to add that she has no interest in connecting literature to evolution. Writing of Henry James' *The Golden Bowl*, she asks:

> Why, as people with an interest in understanding and self-understanding, couldn't we derive everything we require from a text that stated and argued for these conclusions about human beings plainly and simply, without the complications of character and conversation, without the stylistic and structural complexities of the literary – not to mention the particular obliquities, ambiguities, and parentheses of this particular literary text?

She continues:

> The claims of this text concerning value and imperfection are views whose plausibility and importance are difficult to assess without the sustained exploration of particular lives that a text such as this one makes possible.

And she goes on to explain the author's skill and insight in presenting and structuring the story's detail, the role of James' intra-textual editorial comments in directing the reader, and the necessity that the reader follows the text in its complete detail if he is to engage fully with its moral vision and attain a proper understanding of this.

Nussbaum's approach involves a close and reflective reading of particular literary texts. Although the qualities that turn novels into works of moral philosophy are found across a spread of works, plainly she thinks that, overall, only a tiny minority of works and authors can achieve this transformation, as Henry James does. (Where I earlier highlighted fiction over narrative and literature, she swings the emphasis more to literature.) Nussbaum does not offer a defense of the specialness of narrative fiction in general. But she does demonstrate the kind of thing that might be involved in arguing that novelistic fictions have distinctively special resources for communicating important (moral) facts and for refining our discernment of the subtle complexities that

are crucial to making appropriately sensitive moral judgments when faced with the messy contingency of reality.

The special case of the novel

If we accept Nussbaum's argument—and not everyone does—it implies that only works as complexly structured and detailed as novels can be a source of morally significant information that factive narratives cannot so readily convey. It is also important to her view that novels can be pored over and thought about in the process of following them. This focus on the novel, as against other forms of fictional narrative, raises a point that is not usually addressed in the discussion of literature and evolution, though many who write on the topic plainly have novels as their primary focus. While oratorical, dramatic, and poetic oral traditions no doubt are very ancient, writing and reading are inventions of comparatively recent times and neither became widespread until much more recently. The novel has existed as an art form only slightly more than 400 years. Miguel de Cervantes' *Don Quixote* dates to 1605 and 1615, and is often identified as the first novel (though it had many non-Western precedents). This fact invites us to consider whether written literature, and especially the novel, should be distinguished in its achievements and effects from oral culture. It is reasonable to think that the development of the novel has enabled literary forms and topics not possible in oral culture. Unlike oral stories, written ones can be consumed at the reader's pace, they allow for back-tracking, and they can invite passage by passage reflection.

Suppose this is indeed the case, what does it prove? It might demonstrate the extent to which the novel has transcended the origins and adaptive function (if it had one) of prehistoric narrative fictions. But there is a more intriguing possibility that, if it could be established, would put Literary Darwinism on a firmer footing. It might be that the novel has taken on a new and special evolutionary significance in virtue of those qualities that distinguish it from earlier types of fictional narrative.

Counting against the plausibility of this last suggestion is the slow timescale on which evolution operates. With this in mind, Michael Austin, an English professor, writes:

> imaginative literature in any form that we would recognize—and many that we would not—emerged too recently in history to have been specific adaptations for their current purposes.

Yet, comparatively accelerated evolutionary change is possible when the environment is unstable, as has been true of the cultural environment of humans over recent centuries. And as I indicated at the close of Chapter 8, it would be interesting to see exploration in Darwinian terms of the special character of the written novel. Nevertheless, the hope of bringing the written novel, as a distinctive literary form, within the ambit of evolutionary accounts of human behavior must be slight and no one has yet attempted that task.

The value of literature

There are a number of adaptations within the immediate vicinity of fictional narrative: our propensity to narrativize the world, our capacity to think in terms of what is not

actual and what is merely possible, and our ability to understand others by projecting into their mental and emotional lives. We implement these capacities across a range of contexts with real-world payouts. But our production and engagement with narrative fiction are more likely a consequence of than a fundamental contributor to these adaptive behaviors. And while it is plausible to make the case that our engagement with narrative literature produces many kinds of benefit, the further arguments offered as demonstrating that narrative fiction is an evolutionary adaptation are disappointingly slight. The value of literature is not in doubt, however. We can learn from it. And although I have not stressed the obvious point, it provided pleasure and amusement as well. But these facts are bound to be acknowledged by almost everyone. And most who do admit them feel no compulsion to postulate a connection to evolution on that basis.

Music as an adaptation

We now turn briefly to adaptationist accounts of music.

Music and sexual selection

Darwin is the most famous promulgator of the idea that music is used by man to outcompete rivals and to attract mates by appealing to their aesthetic sense. He wrote:

> When we treat of sexual selection we shall see that primeval man, or rather some early progenitor of man, probably first used his voice in producing true musical cadences, that is in singing, as do some of the gibbon-apes at the present day; and we may conclude from a widely-spread analogy, that this power would have been especially exerted during the courtship of the sexes,–would have expressed various emotions, such as love, jealousy, triumph,–and would have served as a challenge to rivals.

And again:

> All these facts with respect to music and impassioned speech become intelligible to a certain extent, if we may assume that musical tones and rhythm were used by our half-human ancestors, during the season of courtship, when animals of all kinds are excited not only by love, but by the strong passions of jealousy, rivalry, and triumph.

As we have seen, the position remains popular, being advocated by Geoffrey Miller and others. Their idea is that excellence in musical behaviors displays intelligence, creativity, emotional sensitivity, and the capacity to "waste" time without loss of comparative fitness. Music honeys the performer's words and emboldens their dancing. It displays their physical attributes and health. Meanwhile, if the devotee finds his music catchy, he is always present to her as his melodies and words run repeatedly in her head. In support of this thesis, Miller notes that music comes to the fore in adolescence, plays a prominent role in courtship, and that more pop music artists are male. He draws attention to the apparently prodigious copulatory success of musicians such as Mick Jagger, Jimi Hendrix, John Lennon, and Jerry Garcia.

We have already considered powerful objections to Miller's theory in Chapter 8 and I won't elaborate them again here. But we should note that music is no less prominent in ritual, private entertainment, and other spheres of life than in courtship. Women are highly musical and it is they, more than men, who sing to their children. In addition, musicality develops in children long before sexuality. And much music making is cooperative and involves the group, rather than being competitive and featuring the individual. Miller responds that music is done *in* groups but not *for* groups, but that is surely not always the case. In the music repertoires of small-scale cultures, romantic and courtship songs make up only a small part.

There are several points to make about the sexual attractiveness and fertility of musicians. Until the early nineteenth century most music was made in the home by amateurs, and by women as much as men. Even the best composers and musicians were servants in the employ of the nobility or church. They were regarded as craftsmen rather than as charismatic sex stars. Some, such as J. S. Bach, fathered large families. But if anyone could attract sexual favors via music, it is more likely to be those with the wealth and prestige to commission and pay for the production of such exotic and costly items as operas and symphonies, not composers and performers.

It was only with the rise of a middle class and the public demand for high-end art that music making became a profession. No doubt histories are right to suggest that some virtuoso composer-performers, such as Nicolai Paganini and Franz Liszt in the nineteenth century, attracted more than their fair share of female admirers. But there is no evidence of which I am aware to suggest that musicians then were more attractive to females than other skilled artists or other socially prominent males. In fact, the reverse: as mentioned in Chapter 8, a study of European male composers showed that they produced significantly fewer children than the general European population. Even well into the twentieth century, only a small minority of composers and musicians could make a wealthy career. So, if music is an adaptation that exploits its attractiveness to potential partners, this is an outcome of only the past few centuries.

The biomusicologist Steven Brown summarizes the case against Miller's account of music in terms that echo objections to Miller encountered in Chapter 8:

> Sexual display is but one area where music-making–often in combination with dance–has found an important role in human cultures. However, it is difficult to see courtship as the *raison d'être* of music. Once music evolved, it was cooptable in the form of sexual displays, even highly competitive ones, but I doubt that this was the initial driving force for the evolution of music's melodic and rhythmic systems.

Ian Cross's theory

The most fully developed explanation of music as an evolved adaptation has been put forward by the musicologist Ian Cross. He makes much of the fact that the meaning music conveys is often various and ambiguous. He writes of music's "polysemic nature" and "transposable aboutness" by way of indicating its lack of a fixed semantic

meaning. Another favorite slogan is "floating intentionality," used to indicate that music simultaneously can be self-referential—presumably by exemplifying its properties or by drawing attention to internal structures and relationships—and can also be interpreted as referring to the world beyond its boundaries. Though music is a mode of communication, he maintains, it does not inform as language does.

Cross adopts from evolutionary psychology the view that the mind is comprised of modules that issue in specialized, automated behavioral responses to environmental triggers. These modules are initially independent of each other, but the previously mentioned special characteristics of music allow it to open channels of communication between them.

> Music's floating intentionality might have been a factor in the emergence of domain-general competence by virtue of the capacity of musical behaviors simultaneously to be embedded in, and to signify differently within, different domains of human mental life. Music is conceived of here as underpinning a capacity to integrate information across different cognitive domains by offering a means of bridging the gap between these domains by virtue of its semantic openness and its ability to be integrated with other activities.

As a result, music plays a crucial role in cognitive development.

In addition, music produces many positive group benefits according to Cross. Music coordinates and "transposably intentionalizes"—I am not sure what is meant by this—time in sound and action. It synchronizes our bodies and aligns our thoughts. It thereby rehearses management of social interactions and promotes flexibility in social behavior. It reinforces group beliefs. Because individuals are free to develop their own interpretations of its significance, however, music's "polyvalent meanings" also facilitate peaceful interactions that in nonmusical contexts might result in conflict. Finally, music provides the source of the human capacity for metaphor by inviting us to juxtapose thoughts from different domains.

Yet more than this, Cross maintains, music may have enabled the emergence of human culture.

> Music, as a communicative behaviour, fulfils a generic function in affording us space to rehearse and to sustain our social flexibility, permitting the expression of, and most likely having contributed to the conditions allowing the evolutionary emergence of, the human capacity for culture.

Moreover, music shapes social behavior in a positive direction.

> Without musicality the flexibility in managing social relations that characterises modern humans and that constitutes the matrix within which abstract conceptions such as social justice can take form is less likely to have arisen.

In short:

> Music seems to have at least two generic functionalities, in underwriting social flexibility and in facilitating intellectual flexibility. These two generic functions of musicality would seem to me to be likely preconditions for the emergence of abstract concepts that frame and give meaning to

human interaction, such as that of social justice, that aspect of morality which is concerned with the achievement of equity in human relations.

Critical discussion of Cross's theory

Who would have thought that the absence of specific meaning in music would have such far-reaching beneficial consequences! And, indeed, there is reason to be wary of the account of musical meaning that is on offer here. In general, musical repetition and the unfolding of musical structure and pattern should *not* be equated with self-reference. We note the formal order of similar windows in a house without usually taking this to imply that the windows refer to each other. The repetition of musical ideas in a piece is analogous.

Also, the fact that people sometimes find meaning in music does not show that it thereby refers to the world. It is revealing in this context that Cross cites the philosopher Susanne K. Langer with approval. She argued that music is an important bearer of linguistically inexpressible but humanly significant meaning. Cross similarly conveys the impression that, in denying a specific, language-like semantics to music, nevertheless it has its own manner of communicating ineffable meaning.

This view faces many objections but I do not review them here because there is a simpler, decisive response to the claim about music's lack of semantic meaning. The most popular and common form of music surely is song. And it is widely assumed that music originated in song—or at least that song became foundational for music by the time language had evolved. And even if music preceded language, it almost certainly accompanied dances that were invested with ritual significance or with narrative meaning. Though vocal music can be wordless, song generally marries music to words: "Stand by your man" and "All you need is love," "Londonderry air" and "Scarborough fair," "Light my fire" and "Smoke gets in your eyes." Traditionally, music never had the transposable aboutness and floating intentionality that Cross praises, because either it came with words with a quite specific semantic content or it accompanied dances with ritual meaning and representational significance. In the West, purely instrumental "abstract" music is a development of recent centuries. No theory discussing music's origins, primary functions, and most frequent uses should take it as the default case.

If most music lacks the special mode of meaning that Cross makes central to his theory, his account of how music supposedly yields cognitive and social benefits is already in serious trouble. And there are further grounds for interrogating the stories he tells about these matters.

Cross's explanation of the cognitive benefits of music—that its lack of definite meaning allows it to engineer bridges between domain-specific parts of the mind—is hostage to the view that the brain is heavily modularized. This supposition has been challenged not only by philosophers of biology but also by recent evolutionary psychologists. And where is the evidence in favor of the bridging thesis? Of course, training and intensive exposure to music alter neural structures, but that is only to be expected—extensive training in any number of mental or physical disciplines has the

same kind of result. Cross cites a study showing that music lessons lead to a small increase in IQ. But there could be many explanations for this gain. And to make the connection with domain-crossing cognitive flexibility that Cross relies on, it would be necessary to share Cross's commitment to two controversial theses: that the individual's development repeats the evolutionary trajectory of the species' development; and that the emergence of general intelligence in the species as a whole is a consequence of the breaking down of barriers between mental modules.

Of course, other theorists have suggested that music aids cognitive development in other ways—for example, by preparing infants for the acquisition of language and social interaction. It is difficult to know how to evaluate such claims. In general, individuals with congenital musical defects show otherwise normal mental and social development.

Turning now to the alleged social benefits of music, Cross's more extreme claims—that music paved the way for culture generally and that it facilitated the emergence of the sense of social justice—strike me as extravagantly speculative. Where is the evidence to show, for instance, that musicians and composers are more socially responsible and sensitive to others' rights than less musical people, or that judges and human rights activists are more musical than other folk?

Nevertheless, as we saw in the discussion of music's origins in Chapter 8, many theorists identify social benefits produced by music: it bonds and coordinates, promotes conflict resolution, and mimics mutual grooming by triggering the release of endorphins. Most of these authors go on to represent music behaviors as naturally selected for the sake of social benefits. Yet in claiming evolutionary significance for group benefits garnered from music, they do not explicitly embrace multilevel selection theory in order to argue that natural selection operates on groups as well as individuals. Nor, alternatively, do they explain how these benefits differentially affect the fitness of individuals within the group. To make the connection with evolution, they should do one or the other.

The hypothesis that music is an adaptation for the promotion of sociality is sometimes supported by reference to two forms of developmental disorder. Sufferers of Williams syndrome, which combines intellectual impairment with high sociality, often are strongly drawn to music; whereas Aspergers-like autism, which impairs sociality, goes with indifference to music's expressiveness. The neuroscientist Ani Patel challenges this last claim, however. Autistic people are sensitive to music's expressiveness and some individuals have achieved a high level of musicality. He concludes:

> there are at present no data to suggest that singing is needed for normal social or emotional development.

We can also question whether music produces the social benefits that have been claimed. Even if group singing triggers the release of endorphins, does that mean it functions to replace the hands-on grooming of our primate cousins? Doesn't music divide the group and the generations as often as it unifies them? While some music can be used to pacify, can't other music be used to ramp up anger and violence? And even if

music does produce the social benefits claimed for it, it remains to demonstrate that it was *selected* for that function. Mathematics and reading are also sources of similarly widespread benefits, although, as mentioned earlier, neither is an evolutionarily selected adaptation. Besides, ethnomusicologists have recorded so many functions to which music has been put that it is difficult to see where we would begin to distinguish what music can be used for from what, if anything, it was selected by evolution for.

A different, more rigorous approach to the connection between music behaviors and evolution is recommended by the neuroscientists Josh McDermott and Marc Hauser. They reason that perceptual capacities that are developmentally fixed, unique, and specific to music are strong candidates for adaptations for music. So, rather than trying to analyze the evolutionary origins of music by considering which among its many possible functions is central, they focus on music perception and on the neural systems that underlie this. The many studies they review tested music perception across cultures and in children, nonhuman animals, and people with brain damage with respect to melody, pitch, tonality, consonance and dissonance, expressiveness, and other musical parameters. They conclude that the data are suggestive but do not decisively point to innate, unique, music-specific capacities. Some effects might be the result of learning, even in the womb, and others might indicate perceptual capacities shared with other species or ones evolved for language rather than music perception.

Two other neuroscientists, Timothy Justus and Jeffrey J. Hutsler, conducted a similar, equally extensive literature review and arrived at the same conclusion. Here is their summary:

> In our view, given the current state of knowledge about music cognition, there is no compelling reason to argue categorically that music is a cognitive domain that has been shaped directly by natural selection. Such a conclusion is still consistent with the belief that music is a universal and cherished part of being human, as many of humanity's most important achievements share similar evolutionary pasts. It is also consistent with the idea that music is a product of human biology, as all cultural knowledge is represented and processed in a network of brains.

It is important to note that the verdict is not negative; rather it is "unproved," given the current data. What are the prospects for resolving the present uncertainties via further experiment? McDermott and Hauser seem to be optimistic that an experimental program could settle the matter. And Justus and Hutsler point to new leads that cognitive neuroscience might pursue. Not everyone shares this optimism, however. The paucity of the Hominin fossil record might mean that we can never obtain the data that would tell us about music's origin and earliest evolutionary function. And given the significant overlap in neural areas employed by language and music, a further problem concerns our ignorance of the relation between the origins of language and of music. As noted earlier, whereas some people see music as consequent on language, others see it as a precursor of language or hold that music and language arose from a joint vocal source.

As I said, these studies set a higher standard than evolutionary psychologists usually apply to themselves. But that standard might be inappropriately high if it privileges the

search for music-specific brain networks above all else. Music behaviors could be adaptive without being served by music-specific brain circuits, according to Björn Merker, a biomusicologist.

> The consistency and specificity across cultures of the peculiar human propensity to sing and dance raises a strong presumption that it rests on a biological foundation . . . It is by no means evident why such a propensity, even as a full-fledged adaptation, should be expected to engender specializations of the auditory system and its cognitive superstructure. On the contrary, one would expect it to rely upon, exploit, and even adapt its structural forms to the capacities of our sophisticated sense of hearing evolved over a hundred million years.

How frustrating! The arguments of musicologists and psychologists urging that music is an adaptation are at best incomplete and unsatisfying. Meanwhile, at this time, brain science cannot clarify the issue. I understand very well the desire to identify music as an adaptation. It is a distinctively human practice, highly valued and found everywhere and at all times. It seems to be peculiarly central to our humanity as such. But taking it as an adaptation involves a leap of faith.

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Conclusion

Let us take stock and see what we can draw from Part III's discussions of the various possible relations between art and evolution.

In Chapter 10, we explored the view that art is a technology, a cultural product resting on evolved capacities of a general kind that lead us to be creators, transmitters, preservers, and incremental improvers of the valuable achievements of our predecessors. I suggested that this approach most naturally aligns with one that sees almost all culture as a self-elaborating superstructure erected on a broad, ancient evolutionary base. But that picture, which presupposes the isolation of cultural change from biological evolution, is problematic. There are good reasons to suppose that genetic evolution and cultural evolution are often connected. And this undermines the idea that nature and nurture can be treated as separate. In any case, there is reason to think that evolution operates not only on general conditions and aptitudes but also in a fashion that is subtly responsive to specifically local or to changing conditions, in which case the connection between art and evolution could be closer and more direct than the technology model presupposes.

Of course, this is not to deny the importance of culture in the way it shapes the direction the arts take. But consider these analogies. Writing can be done by carving, engraving, or etching a hard surface, by marking an absorbent surface with ink using a nib or brush, by typing on a keyboard, or by touching an electronically sensitized glass screen. Cooking can involve applying flames to a foodstuff, boiling it in water, baking it, immersing it in astringent liquids such as lime juice, or placing it in a microwave. What methods are available to a person for writing or cooking plainly depends on that person's cultural location, among other things. But the underlying purposes and outcomes can be seen to be the same, despite differences at the local, cultural level. So it is also with art behaviors, I claim. They can take many different, culturally inflected forms and call on local genres, conventions, and traditions. But though cultures may enact them differently, we recognize all people as making music, performing dramas, painting depictions, and so forth, as was discussed in Chapter 4.

In Chapter 9, I considered the idea that art is a by-product of adaptations with non-art agendas. I argued against attempts to characterize music in such terms and questioned the failure of theorists to agree on the adaptation to which music stands as a by-product, or how music derives from it.

So, is art an adaptation? In Chapter 8, I doubted the success of theories treating all the arts as sharing an adaptive function. Either these simplify and abstract too far in finding

functions that the arts might share. Or they imply that the adaptation lies beyond art—for instance, in imaginative creativity—and that the arts, along with many other things, merely provide routes for its implementation. I suspect that, if any of the arts are adaptations, they will be so in their own specific fashion. This is not merely because they involve different media but, rather, because they achieve their purposes in very different ways and seem to be suited to very different functions. Yet in Chapter 11, when I considered various theories locating the adaptive importance of narrative fiction and of music in their individual characteristics, the results were unconvincing.

If *technology*, *spandrel* and *adaptation* exhaust the logical space of possibilities, as I believe they do, it looks as if something has gone wrong. I have raised doubts equally against all three! Have I set the expected standard too high? I do not think so. It is not unreasonable to adopt a skeptical stance when a host of conflicting hypotheses are advanced to explain this or that art behavior, especially where the supporting arguments are far short of compelling.

The fact is that some of the people from the humanities who take up these issues have political agendas and only a loose grasp of what the science requires. If they refer to the scientific literature, they sometimes seem to cherry-pick sources that support the conclusion they have already drawn. And for their part, the scientists are sometimes naïve in their understanding of aesthetic theory and of what art appreciation typically involves. They regularly over-interpret the significance of aesthetic- or art-directed empirical studies. Though he cites only one source (from 1974) on philosophical aesthetics, the evolutionary psychologist Randy Thornhill writes patronizingly:

> Philosophical aesthetics yields a list of unresolved issues that aestheticians through the ages have attempted to treat. Darwinian aesthetics accounts for the central place of these issues in the minds of aestheticians and helps resolve them.

He then makes the error I identified previously of equating any unreflective preference with an aesthetic judgment and goes on to maintain that "all mobile animals from amoebae to primates are environmental aestheticians."

I should stress that I have not chosen the weakest theories to discuss. Rather, I focused on the ones that are widely acknowledged or that I find most plausible. But the point is this: even where bias and narrow-sightedness are carefully avoided, it is invariably difficult to ascertain what was true in prehistory. The requisite evidence is extremely hard to come by and difficult to interpret. Any theory is bound to be vulnerable to the charge that its conclusion is not incontrovertibly established. So, the upshot of my counter-arguments and questionings is to leave the discussed theories unproved rather than falsified, though in the process I hope to have indicated why some of the unproved theories might be stronger candidates than others.

Many of the doubts and concerns I have expressed could be put aside if the appropriate empirical evidence is unearthed. For example, we might be able to settle some disagreements about music's evolutionary status if we could ascertain when language evolved and how its evolution stands with respect to the evolution of music behaviors. And who

knows what innate, task-specific neural networks will be identified by neuroscientists in the future? Can we expect our uncertainties about art's evolutionary standing to be answered in the course of time? I don't know. It certainly is possible that we may never settle the debate about art's origins. And even if we could discover art's origins, this might not help us resolve issues about its present evolutionary status, if it has any.

When I review the theories and the evidence, I am doubtful that the arts, either together or singly, are selected to serve an adaptive function. If I had to bet, I would say that the adaptations that give rise to art behaviors are intelligence, imagination, humor, sociality, emotionality, inventiveness, curiosity. Though art is mediated by culture, it gives direct and immediate expression to these traits and dispositions, so I would identify it as a by-product rather than as a technology. Art gives vivid and powerful expression to these qualities, which are central to our human nature and indicate our humanity.

Art behaviors as signals of fitness

I want to return to an idea defended in Chapter 9. I tried to show that, even if the arts, taken as group, came to us as a spandrel, they would not remain incidental. Because art behaviors are a universal aptitude, but are, nevertheless, extremely costly to sustain, they signal fitness. As I have explained, saying that art is universal amounts to claiming that very nearly everyone has a modest level of expertise in some arts as a creator or performer, a high knowledge and appreciation of some other arts, and average competence across a spread of yet more. Being merely average with regard to art behaviors is very costly indeed. It calls for attaining a high level of knowledge or skill in one or another art arena. It demands investment of time, attention, training, resources, and energy. Not every quality or trait that is near-universal comes cheap.

Just as there are a few unfortunate people with deficits that affect their capacity to acquire full-blown language, to interact socially, and so on, so there might be people whose artistic abilities are unusually limited. On the one hand, this is more likely to occur with respect to artistic abilities than for very robust systems, such as those for language, because a far-flung spread of diverse genes is likely to be involved in perfecting artistic skills. But on the other hand, a person who is naturally deficient in music might be good at painting; and someone who has trouble following dramatic action might be a skillful dancer.

It is not only those who are markedly poor in art behaviors that send a meaningful signal. Some people will do much better than the average in terms of their level of expertise or of the spread of arts in which they perform well. A few others will do noticeably worse. We will regard the former group as signaling high fitness, supposing that art attainment correlates well with other signs of fitness such as intelligence, imagination, and sensitivity. And we will regard the latter group as comparatively less fit on account of their comparative ineptitude, taking this to correlate with underlying genetic shortfalls or with the damaging effects of environmental impingements.

Moreover, the arts offer many different, diverse opportunities and invite specialization. Calling the relevant behaviors *universal* tends to mask the extent to which they are informationally complex and nuanced. Not only do they signal fitness, they signal many kinds, shades, and degrees of fitness. In this regard, consider the drives that centrally shape the kind of lives humans lead: to reproduce, to belong to the group, to discover meaning in the world and our lives, to be resourceful, to be creative, to achieve what matters to us, to be acknowledged and valued for who we are and what we have done. These drives can find expression in countless non-art behaviors and there are many ways their connection with our biological fitness can be signaled. But the arts are extremely varied and rich in their potential to channel, exercise, and exhibit these energies. Art behaviors are intensely subtle and interesting indicators of our individual differences as well as our shared commonalities. As such, they are markers of extreme importance.

Are not powerful signals of high fitness likely to take on the role of adaptations? In the case of the peacock's tail, this is indeed what happens. But that is because, for this species, one key signal leads directly to reproductive success or failure. For humans the situation is very different. Many factors are relevant to assessing our biological fitness and there are myriad ways of signaling each of the relevant factors. Art behaviors provide powerful indicators of our various qualities, skills, values, and the rest, but so also do many non-art behaviors. We can acknowledge the relevance of art behaviors as complex indicators of fitness without having to demonstrate that they serve as adaptations rather than as by-products of non-art adaptations.

The arts and human nature

What can we take away from the discussion in Part III? Are art behaviors important aspects of our biologically rooted human nature? Is art connected to evolution? I think the answer to both questions is *yes*. If art is not a purely cultural technology then it should be either an adaptation or a spandrel. Both of these are the products of evolution. And as multifaceted markers of fitness, the arts cannot be incidental to our biological agendas. There should be no question that art behaviors, or the propensities to learn them, are part of human nature, and not in the trivial sense in which whatever we do gives expression to our species' character. So Ellen Dissanayake is right to stress that art is *universal*, *ancient*, and *intrinsically pleasurable*, and right also to suggest that this strongly indicates that art *connects to evolution*. These terms need to be qualified and elaborated, though.

Keeping in mind that "art" here refers to appropriate folk, domestic, decorative, and popular entertainment practices, as well as to high art contexts, art is *universal* in the sense that most normal people are art creators or performers, at least at a modest level, in a subset of their culture's art forms. And as art appreciators, they have detailed knowledge of at least some of their culture's sub-genres and passing competence in many more.

Since all historically documented cultures have practices we would normally acknowledge as artistic, even if they do not always separate these practices from

practical concerns and wider social systems, it seems fair to infer that art is *ancient* and existed prehistorically. We cannot be precise, of course, but so many theorists refer to Upper Paleolithic art without the qualification of scare quotes that we might reasonably suppose that some forms of art go back more than 30,000 years. Perhaps we should be more careful than to make this assumption, given how little we know of the use made of such paintings and carvings. But as I pointed out, if we came across similar depictions in a cave used by an isolated group only a few thousand years ago, we would be very unlikely to withhold the term "art," even were we to be similarly ignorant of the functions to which their depictions were put.

Art is *intrinsically pleasurable* in the sense that its making and consideration are frequently self-motivating. We may do these things with no other end in view. This is not to deny, however, that art can be and in some contexts perhaps always is harnessed to some practical function. When art is made to have functions beyond that of being contemplated for its own sake, this typically does not rule out its contemplation or, where relevant, reflection on how its aesthetic and artistic properties contribute to its satisfying its practical function.

It is necessary to note that the enjoyment we get from art often has a cognitive dimension, rather than being a visceral thrill, because this is crucial to explaining the attraction of artistic tragedies, horrors, and other negatively charged works dealing with the darker or more bizarre and disgusting aspects of existence. With this in mind, it might be better to say that we find art intrinsically *rewarding* rather than intrinsically *pleasurable*, because pleasure is too readily equated with sensations that feel good.

And finally, it is important to observe that the claim that art is a source of pleasure is one about art in some generic sense, not about all individual art behaviors or works of art. It can be extremely difficult to make very good works of art, so many are likely to be disappointing to some extent. In any case, there is no reason why all art should aim to be very good where what is average might suffice for a given time or setting. The claim about art being rewarding is to be understood as one about the point of much art—that it aims to reward an interest taken in it as art, whatever further interests it might serve—rather than about the success of individual works in meeting that point, or even about the subservience of all art to that typically primary purpose.

Dissanayake takes the facts that art is *universal*, *ancient*, and *intrinsically pleasurable* together as pointing to the fact that art *connects to evolution*. More particularly, she thinks they show that art is adaptive. That is, she infers the strongest possible connection between art and evolution. But we can accept that art behaviors are deeply rooted in human nature and depend ultimately on evolution while adopting weaker views: for example, that art is a spandrel that survives because it does not limit or undermine the comparative fitness of those who display it. Only the view that art is a life-enhancing technology distances it from evolution.

What our obsession with the arts makes clear is that we are a species that craves stimulation, challenge, and entertainment. I think both Geoffrey Miller and Ellen Dissanayake are right to this extent: by making and appreciating art, we envelop

ourselves in an environment of heightened interest and emotion. Miller's view limits the relevance of this to mate attraction. Instead, I would argue, as I did with respect to human beauty in Chapter 7, that art behaviors are more generally about self-definition, self-expression, and sociality. Meanwhile, by focusing on the humble, pre-symbolic beginnings of art, Dissanayake underrates the level of informational richness which art behaviors are capable of conveying. In my view, the importance of art is more pervasive than either of these theories can account for. It is more foundational in generating our sense of ourselves, both as individuals and as members of communities. In this connection, Ani Patel is correct to object to views characterizing the arts as incidental frills and to emphasize, instead, the extent to which the arts transform and add meaning to our lives. But I do not share his view that the arts are so distanced by culture from the adaptations they draw on that they qualify as technologies.

It is fascinating to identify those suites of behavior that are mastered by nearly every person despite the extremely high cost this imposes. Such behaviors are the touchstones of our humanity. They identify what is important to us as a species. They indicate what has directed our pathway and contributed to our success. Such behaviors are both puzzling and magnificent: puzzling because their inordinate cost seems to go beyond what is necessary for survival, and magnificent because we take on their burden with such cheerful eagerness. They include our commitment to ritualized competition and to spirituality and religion. Among them, art behaviors are central. We are driven to be artists and art appreciators, as is testified by the place accorded to art in every society and epoch. Were we not so impelled, we would be less than fully human.

Endnotes

Part I. Key Concepts

Introduction

p. 1 Excalibur: found Sima de los Huesos (Bones Pit), the Atapuerca mountains, Spain in 1998.

1–2 percent of axes: Corbey et al. 2004.

Currie quote: 2009:1; see also Currie 2004, 2011.

p. 2 Hand axes as aesthetic artifacts (or as art): S. L. Washburn 1970, Brothwell 1976, Geist 1978, Hadingham 1979, Dissanayake 1980, 1988, Oakley 1981, Pfeiffer 1982:83–4, 1985:117, Sandars 1985, Lumsden 1991, Mithen 1996, 2003, 2005, Kohn and Mithen 1999, G. Miller 2000a, Solso 2003, Corbey et al. 2004, Zaidel 2005, R. Berleant 2007, B. Boyd 2007a, 2009a, Lumley 2009, C. Renfrew 2009.

Homo heidelbergensis: this species is sometimes assimilated to *Homo erectus* or *Homo rhodesiensis*.

First makers of stone tools: most likely to have been *Australopithecus garhi*: Semaw 2000, Gräslund 2005.

Oldest stone tools: Semaw et al. 1997, Deacon 1998, Klein 2000, 2009, Semaw 2000, Gosden 2003, Sterelny 2003, 2012, S. Carroll 2005, Gräslund 2005, Richerson and Boyd 2005, Stout et al. 2005, Gamble 2007, Clack 2009, Lumley 2009, Jeffares 2010.

Hand axes: the date of 1.65 ma is from Klein 2000. Sterelny 2003, Lumley 2009. Asfaw et al. 1992 give 1.4 ma; Jeffares 2010 and Sterelny 2012 give 1.8 ma. Some prefer a more conservative figure of 500 ka for the first hand axes: R. Berleant 2007, Gamble 2007. Composite tools—stone heads hafted to wood, for example—date from 250 ka: Klein 2000.

Ochre: the date of 300 ka is from Hadingham 1979, Oakley 1981, Watts 1999, Coe 2002, Davidson 2003, Barham 2004. G. Miller 2000a gives 100 ka; Mellars 2005 suggests at least 150 ka; Dissanayake 1988 nominates 500 ka. M. Clark 2002:173 identifies this use as revealing an aesthetic sense. Power 2004 suggests that, between 500–100 ka, ochre was extensively used by female Hominins as personal decoration in ritual contexts and she notes in Power 1999 the extensive use of henna and red camwood, as well as ochre, as a bodily decoration by modern era African tribes.

Skepticism about aesthetic use of ochre: Mithen 1999, Corbey et al. 2004, Sterelny 2008, 2012.

Ochre as preservative: Sollas 1915:221, Keeley 1980. For evidence against, see Watts 1999.

Ochre as medicine: Velo 1984, Klein 2009.

Ochre as sunblock and insect repellant: Sollas 1915:223, Keeley 1980.

Ochre used in glue: Ambrose 1998, Klein 2009, De Smedt and De Cruz 2011.

Ochre as polish: R. White 1993, Klein 2009.

Ochre as a menstruation mask: Knight et al. 1995, Power 1999, 2004, Clack 2009.

Ochre as decoration: Mellars 1996, Watts 1999, Power 2004, McBrearty and Stringer 2007.

Ornaments: the date of 40 ka is from R. White 1993, Mithen 1996:156, 173–5, Sterelny 2008, 2012. R. White 1989a puts the date at 35 ka. For disagreement, see Pfeiffer 1982:204.

Earlier examples of ornaments: Marshack 1990, 1991, Henshilwood et al. 2004, Conard 2005, Henshilwood 2005, Mellars 2005, Vanhaeren 2005, Vanhaeren et al. 2006, McBrearty and

Stringer 2007, Barton et al. 2009, Currie 2009, Mayer et al. 2009. Other examples of perforated shells are at Qafzeh cave, Israel, dated to 92 ka; at Taforalt cave, Morocco, dated to 82 ka; and at Blombos cave, South Africa, dated to 77 ka.

Sea shells: R. White 1993:342–3 cites Y. Taborin to the effect that only a few taxa of shells were favored; they were removed a long way from their sources, and they were worked with an aesthetic view of the final product of which they would be part.

Eggshells: De Smedt and De Cruz 2011 identify as among the oldest artworks 270 engraved ostrich eggshell fragments from Diepkloof Rock Shelter, South Africa, dated to 65–55 ka.

Teeth: only some teeth of only a limited number of mammals were used. Fox canines, red deer and reindeer vestigial canines, and horse and bovid incisors predominate: R. White 1993:343, 2003. Common or large-scale items, such as mammoth ivory, were sometimes carved to resemble scarcer or less easily obtained items, such as red deer canines: R. White 1989b. The humans of 40 ka reserved the difficult-to-work ivory for beads and sculptures: R. White 2004, De Smedt and De Cruz 2011.

Stones: R. White 1992, 1993 lists belemnite, pyrite, hematite, chlorite, calcite, lignite, serpentinite (steatites) as well as jet.

p. 3 Sungir graves: the figure of 250 fox teeth is from Mithen 1996:175, Klein 2009:694. R. White 1993:338 gives a total of 200 fox canines with 150 on the belt. Either way, at four canines per fox this represents a lot of foxes! For more on the Sungir grave: Hadingham 1979:75–7, Pfeiffer 1982:65–7, R. White 2003:141–5. The date of 28 ka is from Mithen 1996, Kuzmin et al. 2004. Dunbar 2004:187–8 gives 22 ka; Harris 1989, Klein 2009 offer 24 ka; R. White 2003 gives 25–22 ka.

Neanderthals apparently had beads: some evidence suggests early *Homo sapiens* artifacts have been misattributed to Neanderthals: Benazzi et al. 2011.

Neanderthals using personal decorations: Joyce 1975, Marshack 1991, d'Errico et al. 1998, Conard 2005, Vanhaeren 2005, Gamble 2007:46, Zilhão 2007, Sterelny 2008, Currie 2009, Choi 2010, Zilhão et al. 2010. For contrary views or skepticism: Harris 1989, R. White 1992, 1993, 2003, Mithen 1999, 2005, Klein 2000, 2009, Lewis-Williams 2002, 2009, Sterelny 2003, Barham 2004, Mellars 2005, J. Renfrew 2009.

Bead artifacts as art: Barham 2004, Zilhão 2007, Klein 2009. Though Vanhaeren 2005 notes the aesthetic appeal of beads, she lists thirteen other uses for them.

Symbolic behavior: Marshack 1991, R. White 1992, 1993, 2003, Deacon 1998, Power 1999, Watts 1999, McBrearty and Brooks 2000, Henshilwood et al. 2002, Davidson 2003, Solso 2003, Tomasello 2003, Barham 2004, Mellars 2005, Mithen 2005, Marean et al. 2007, Lumley 2009, Sterelny 2012. For criticism that a view of the symbolic is too broad if it does not distinguish ornamentation and aesthetic appreciation from depiction or representation: Currie 2004, Mithen 2005. A reply is that ornamentation may have served as insignia identifying group membership: Coe 2002, B. Boyd 2007a, 2009a, De Smedt and De Cruz 2011.

Psychological (or behavioral) modernity: a skeptical response in Sterelny 2003:166: 'Our Pleistocene forebears did not have contemporary minds in a Pleistocene world; and we do not have essentially Pleistocene minds in our contemporary world.'

Blombos cave: Henshilwood et al. 2001, Power 2004, Mithen 2005, Klein 2009.

p. 4 Cave paintings and petroglyphs: older, simpler ones are known; for instance, those in Auditorium cave, Bhimbetka, India, are dated to 200 ka.

Erotic drawings in caves: Collins and Onians 1978, Marshack 1991. Guthrie 2005 argues that these were made by adolescent males. For the suggestion that these drawings might be symbols rather than erotic images, see Davis 1986, and for a response, see Marshack 1986.

Mistakes in depiction: Guthrie 2005:91–112.

Skepticism that cave drawings are art: Davis 1986. Klein 2000, 2009 is agnostic on the matter. Some put "art" in scare quotes: Conkey 2009, Van Gelder and Sharpe 2009. For discussion: Ucko and Rosenfeld 1967:117–22, 165–74, Coe 1992, R. White 1992, Corbey et al. 2004, Heyd 2005, Morphy 2005, Morales 2005.

Cave paintings identified as art: Grosse 1897, Sollas 1915, Ucko and Rosenfeld 1967, Berlyne 1971, Weiner 1971, Joyce 1975, Brothwell 1976, E. O. Wilson 1975, 1978, 1998, Collins and Onians 1978, Geist 1978, E. Fisher 1979, Hadingham 1979, Dissanayake 1980, 1988, 1995a, Pfeiffer 1982, 1985, Sandars 1985, Halverson 1987, Mithen 1988, 1996, 2005, Harris 1989, Marshack 1991, Coe 1992, 2002, Diamond 1992, 1997, Mellars 1996, 2005, 2009a, R. Boyd and Silk 1997, Deacon 1998, Tomasello 1999, Klein 2000, 2009, Lewis-Williams 2002, 2004, 2009, Conard 2003, 2005, Corballis 2003, Davidson 2003, Solso 2003, R. White 2003, Barham 2004, Berghaus 2004, Corbey et al. 2004, Dunbar 2004, Bataille 2005, S. Carroll 2005, Gräslund 2005, Guthrie 2005, Heyd 2005, Morales 2005, Richerson and Boyd 2005, B. Boyd 2009a, Clottes 2009, Currie 2009, Donald 2009, Dutton 2009, Lumley 2009, Scalise Sugiyama and Sugiyama 2009, Whitley 2009, Hampton 2010, Mark Landau et al. 2010, De Smedt and De Cruz 2011, Zaidel 2011. The term "portable art," for small, transportable items, such as carved figurines, is equally common.

Paintings have a religious function: Lewis-Williams 2002, 2009; see also Clottes 2009, Donald 2009, Mellars 2009a, Whitley 2009. For criticism: Marshack 1991:404–6, Guthrie 2005.

Under influence of hallucinogens: Allen 1999. Self-induced hallucination was involved: Lewis-Williams 2002, 2009.

Calendric function: Marshack 1991.

Critical discussion of claim that paintings used as hunting magic: Ucko and Rosenfeld 1967, Collins and Onians 1978, Hadingham 1979, Halverson 1987, R. White 2003, Montelle 2004, Bataille 2005, Guthrie 2005, Currie 2009, Klein 2009.

"For their own sake": Halverson 1987. For comment: Frost 1987.

Lamarque quote: 2005:22.

Pigment heated up to 1000°C: Ucko and Rosenfeld 1967, R. White 2003, Currie 2009.

Harsh weather: Ucko and Rosenfeld 1967, Joyce 1975, Mellars 1996, Mithen 1996, Lewis-Williams 2002, Berghaus 2004.

Dunbar quote: 2004:6.

Venus figurines: Dobres 1996, C. Renfrew 2009. The much older Venuses of Tan-Tan, Morocco, and of Berekhat Ram, Israel, which are dated to 200+ka, are crude and their interpretation as carved female representations is doubtful: Mithen 1999, 2005, Davidson 2003, R. White 2003, Conard 2005; but see Klein 2009:410.

Le Mas d'Azil spear thrower is one of seven that share a similar design. According to one interpretation, the animal is a juvenile ibex that is defecating, with two woodpeckers depicted on the large, extruded piece of feces: Guthrie 2002, 2005, B. Boyd 2009a. A more aesthetically coherent interpretation is that the animal is a chamois that is giving birth and that it is the fetal sack with no birds that is shown: Bandi 1988, Demoulin 2002. The representational design of this atlatl maximizes its strength: Guthrie 2002, 2005:290.

p. 5 Early flute found at Hohle Fels cave, Germany: Conard et al. 2009. Conard 2005 describes other flutes that may be as old; see also Klein 2009. Bones with holes have been claimed as earlier flutes, but their status as musical instruments is questioned: Kunej and Turk 2000, Mithen 2005. Discussion of Late Paleolithic musical instruments or sound-makers: Morley 2009.

Drums and rattles: Huron 2003. Pfeiffer 1982:180–1 speculates that a Mammoth hipbone could be used as a xylophone, struck with an antler hammer; see also Hadingham 1979:71.

Hunting bow at 64 ka: Lombard and Phillipson 2010. Klein 2009 gives 20 ka or earlier.

Chapter 1

p. 9 List of aesthetic properties: Sibley 1959, Hermerén 1988, Goldman 1990.

How a work's identity depends on relations between it and what lies beyond its borders: Gracyk 2009.

Aesthetic experience: Stecker 2006 identifies the aesthetic with the kind of experience to which it gives rise; N. Carroll 2000a, 2002, 2006 equates it to the kinds of properties on which it focuses. For different accounts of aesthetic experience: Walton 1993, Iseminger 2004.

p. 12 Reid quote: 1790:456.

Darwin quotes: 1880, pt. 1, ch. 3:92 and pt. 2, ch. 11:329; see also 1880, pt. 3, ch. 21:616.

Bowerbirds: Darwin 1880, pt. 2, ch. 13:381–2.

Birds have aesthetic taste: Comfort 1962a, Armstrong 1973, Thorpe 1974, Joyce 1975, Dawkins and Krebs 1978, Diamond 1982, 1991, 1992, Martindale 1990, F. Turner 1991a, DePryck 1999, Roele and Wind 1999, Ralevski 2000, de Waal 2001, G. Miller 2001, Welsch 2004. In choice experiments, birds, monkeys, and raccoons favored order, symmetry, and regularity over irregularity and asymmetry: Eibl-Eibesfeldt 1988. He interprets this as showing that they have aesthetic tastes.

Hartshorne quote: 1973:10.

Precursor of human aesthetic taste: Berlyne 1971, Fuller 1983, Allott 1994, Welsch 2004, Deacon 2006.

Hirn quote: 1900:188.

p. 13 Animal advocates reluctant to regard animal choices as aesthetic: for example, Rolston 1987.

G. Miller 2000a, 2001.

p. 14 Welsch 2004.

We cannot assume that mate choice in other species has an aesthetic motivation: Dissanayake 1995a:66.

Welsch 2004 quote: http://www.contempaesthetics.org/newvolume/pages/article.php?articleID = 243

Comfort quote: 1962a:121.

Darwin quote: 1880, pt. 1, ch. 3:92.

de Waal quote: 2001:175.

Joyce quote: 1975:10.

Equation of an aesthetic response with perceptually founded pleasure: noted in Schellekens 2011. Further examples are by F. Turner: 'The color and shapes of the flowers are a precise record of what bees find attractive, and it would be a paradoxically anthropocentric mistake to assume that . . . there is nothing in common between our pleasure in flowers and theirs. The

play behavior of many higher species has an irreducible element of pleasure in beauty' (1991a:40, also 1995:198). Welsch writes: 'Beauty is brain-happiness' (2008:25, see also 2004); see also DePryck 1999, S. Brown and Dissanayake 2009, Rolls 2011. Whiten 1976:37 contrasts viewing for pleasure, which he deems purely aesthetic, from viewing for interest and observes that chimpanzees do both.

A study of very non-aesthetic, lustful anticipation in quail: Domjan 2002.

p. 15 Chimpanzees have aesthetic sense: Whiten 1976, Pfeiffer 1982:74–5, Eibl-Eibesfeldt 1988, Grinde 1996, Lenain 1997, B. Boyd 2001, 2009a, de Waal 2001. B. Boyd 2001, 2009a claims that dolphins in a Hawaiian marine park have developed a gymnastic display that utilizes air bubbles for aesthetic effect.

Morris quote: 1962:14.

Aesthetic experience like an emotion: Cowie 2011, Prinz 2011, Rolls 2011.

Color sight in birds: Rand 1974:36. Birds see further into the ultraviolet end of the spectrum: Hunt et al. 1998.

p. 16 Kant 1951 [1790].

Disinterestedness: Bullough 1912, Ducasse 1929, Stolnitz 1960. For a less extreme view: Beardsley 1958, 1969, 1970.

Challenges to aesthetic attitude theory: Dickie 1964, 1965.

Some psychologists adopt the Kantian model: Martindale 1988, 1990, Overing 1996. For a more sophisticated approach: Lumsden 1991.

p. 17 Grosse 1897. For more recent examples: Overing 1996, Guthrie 2005.

Morreall 1991.

p. 18 A defense of sentimentality in art: Solomon 1997. On kitsch: Kulka 1988, 1996, Higgins 2009a. How kitsch is bad in art (though aesthetic): Dorfles 1969.

Dewey 1980 [1934]. For criticism that Dewey's account does not go far enough: Irvin 2008a.

Aesthetics of the everyday: Leddy 2005, Eaton 2006, Shelley 2007, Saito 2007, Irvin 2008b, Dowling 2010.

Itches and aesthetic experience: Irvin 2008b. For an exchange: Soucek 2009, Irvin 2009.

The distal senses: Korsmeyer 1999:ch. 1–2 records how philosophers ranked sight and hearing above the other senses from ancient times on epistemic, moral, and aesthetic grounds, and how in the eighteenth century this hierarchy of the senses was imported into aesthetic theory. Van Damme 1996 argues that a proper review of non-Western aesthetics requires the inclusion of all the senses.

Proprioception as an aesthetic sense: Montero 2006. For further discussion: D. Davies 2011a.

The aesthetics of smells: Sibley 2001, Brady and Kuehn 2005, and Shiner and Kriskovets 2007. Odor or scent in sexual attraction: Wedekind and Füri 1997, Milinski 2003, Thornhill and Gangestad 2003, Wedekind 2007. Dutton 2009 follows Beardsley 1958 in arguing that the lack of intrinsic relations among smells prevents them serving as an artistic medium.

Food: Korsmeyer 1999; see also Allhoff and Monroe 2007, C. Todd 2011.

Wine, beer, and whiskey: Allhoff and Draper 2007, Hales 2007, Allhoff et al. 2009.

Somaesthetics: Shusterman 2000.

Parsons and Carlson 2008. I am skeptical about the linguistic claim. In India and Southeast Asia, the term "*rasa*" has the same dual use as the English word "taste." In the aesthetic context, the *rasas* (states induced in the appreciator of a play or other artwork) include the erotic: Higgins 2009b.

p. 19 "Perhaps an element of personal taste remains in their shared judgments": see Hume 1995 [1757].

On the tension between the exercise of taste and the objectivity of aesthetic judgment in Kant and Hume: Schellekens 2009; see also Lumsden 1991.

On evaluation and objectivity: S. Davies 2006a:ch. 8.

On the aesthetic standing of simple properties: Dickie 1996:27, 118–19, 142, 151, Stecker 2006.

p. 20 Knowledge of art genres and traditions necessary for appreciation of art: Danto 1964, 1981, Walton 1970, Goldman 1990, Zangwill 1995, Iseminger 2004, Gracyk 2009.

Knowledge of natural science necessary for appreciation of nature: Carlson 2000, Budd 2002, A. Berleant 2002, Parsons 2002, Brady 2003.

p. 21 Functional beauty in history: Tatarkiewicz 1972.

Xenophon quote: *Memorabilia*, Book III, Ch. 8, Section 6–7. Socrates voices a similar view in the dialogue Hippias Major at 295c–d.

Functional beauty: S. Davies 2006b. Parsons and Carlson 2008 develop a related view according to which functional beauty measures an item's fitness for its proper (biological or artifactual) function. For a critical review of their arguments: S. Davies 2010a.

p. 22 Knowledge necessary for environmental aesthetic experience: Hepburn 1963, Saito 1984, N. Carroll 1993a, 2001, Stecker 1997a, Eaton 1998, Godlovitch 1998, Carlson 2000, Budd 2002, Matthews 2002, Brady 2003, Lintott 2004, Moore 2007, Saito 2007.

Parsons and Carlson quote: 2008:116; see also Parsons 2007.

p. 24 Distinguishing aesthetic from artistic properties: N. Carroll 2000a, 2002.

Conceptual art: N. Carroll 2006, Goldie and Schellekens 2009, D. Davies 2011b:ch. 10. Shelley 2003 argues that non-perceptual artworks can possess, and be appreciated for possessing, aesthetic properties.

Include artistic in aesthetic: Gaut 2005a, Goldman 2009.

Chapter 2

p. 25 Critical discussion of definitions of art: S. Davies 1991, 1997a, 2000, 2008.

Art a product of the Enlightenment: Shiner 2001, 2003; see also Overing 1996, Jannidis 2008. Art is a cultural construct and as such is not universal: Lewis-Williams 2002, 2004.

p. 26 Greek concept overlapped with ours: Moravcsik 1993.

Rejection of eighteenth-century aesthetic theory: S. Davies 2006a:ch. 3.

Contemplation one among many functions for art: N. Carroll 2004, S. Davies 2006b. Morales 2005 notes that attempts to disenfranchise the art of non-Western cultures rests on the mistaken assumption that art must be non-functional; see also Van Damme 1996. The primatologist de Waal 2001:152 questions whether humans make art only for its own sake and if their aesthetic sense is purely cultural rather than innate.

Art enhances functionality: Hirn 1900.

Dutton 2009.

p. 27 Cannot define art as the sum of its forms: S. Davies 2008.

Gaut 2000. Criteria of Egyptian art: Gaut 2000:34.

Dutton 2009:ch. 3.

Sometimes cluster accounts are presented as definitions of art: as in Bond 1975, Snoeyenbos 1978. At other times they are intended to be anti-definitional: as in Dissanayake 1988:ch. 2, Gaut 2000, Dutton 2009. For discussion of the issue: Adajian 2003, S. Davies 2004, Gaut 2005b.

Ethnocentric bias in cluster account: artistic individuality and freedom of expression are not acceptable in small-scale hunter-gatherer societies, such as those of the Bushmen of the Kalahari or the Aborigines of Arnhem Land: Barham 2004:107.

p. 28 Cluster theory accounts for marginal cases: Gaut 2000, Dutton 2009:63, Coe 2002:77.

Guthrie quote: 2005:374.

Barham quote: 2004:108. He adopts his definition from Bednarik 2000.

p. 29 For a hybrid definition similar to the one I propose: Stecker 1997b, 2000.

First art: S. Davies 1997a.

Art without the concept: Lopes 2007.

Philosophers' arguments for art in non-Western cultures: Moravcsik 1988, Blocker 1993, S. Davies 2000, Dutton 2000a, 2009, N. Carroll 2004, Lamarque 2005, Morales 2005.

Art of African civilizations: Layton 1991, Van Damme 1996.

Art institutions in small-scale societies: Van Damme 1996.

p. 30 Art is universal: Grosse 1897, Arnheim 1988, Dissanayake, 1988, 1995a, 1995b, 1999a, 2000a, Moravcsik 1988, D. E. Brown 1991, Lumsden 1991, Coe 1992, 2002, Blocker 1993, 2001, Ludmany 1999, S. Davies 2000, Dutton 2000a, 2003a, 2005, 2009, Ralevski 2000, Tooby and Cosmides 2001, N. Carroll 2004, Corbey et al. 2004, Guthrie 2005, Deacon 2006, Donald 2006, Steen 2006, M. Turner 2006, B. Boyd 2008a, 2009a, Welsch 2008, De Smedt and De Cruz 2010, Mark Landau et al. 2010, J. Carroll 2011. It is not always obvious whether these writers mean by this that art is found in every culture (pan-cultural) or, alternatively, that every person is a maker or appreciator of art.

Tourist art: for a detailed discussion of whether tourist art can express a culture's artistic values, with special attention to the case of Bali: S. Davies 2001:ch. 6.

Age of Australian rock art: this may be very ancient, but it is difficult to confirm precise dates: R. White 2003. Chaloupka 1984 offers 35 ka, as does Flood 2006:178, though Lewis 1988 challenges the adequacy of Chaloupka's evidence. Davidson 2003 gives 30 ka; Watchman 1993 and Klein 2009 both suggest 25 ka. Depictions of humans and animals are not common until 20 ka: Lewis 1988, Flood 1997, 2006.

p. 31 Humans as the tool-using animal: Oakley 1961.

Bowerbirds as artists: Diamond 1991, 1992, G. Miller 2000a:267–70, de Waal 2001:165. And let us not forget the male Three-spined Stickleback, which decorates its nest with shiny objects if it has access to them: Milius 2003, Östlund-Nilsson and Holmlund 2003.

Bowers as ritualized display: Dissanayake 1988:101. Precursors of human art: Allott 1994. Display something artistic: B. Boyd 2001, 2009a. Would be art if made by humans: Dutton 2009.

Elephants and/or chimpanzees as artists: Rensch 1973, Sebeok 1979, Davis 1986, Ehmann 1987, Diamond 1991, 1992, Henley 1992; see also Pfeiffer 1982:74–5. On the art of Congo, a chimpanzee: Morris 1962, de Waal 2001:168–74, E. O. Wilson 1975, Whiten 1976, Fuller 1983. An amusing spoof on cats as artists: Silver and Busch 1994.

Drumming in apes: Fitch 2005. Other creatures that drum, but not to musical effect, include Palm Cockatoos and woodpeckers.

Elephants and whales as musicians: Glausiusz 2001. Recordings of the Thai Elephant Orchestra are released by Mulatta Records.

Dickie 1974:45–6.

Dutton 2009:7.

p. 32 Lenain 1997, 1999; see also G. Miller 2000a.

de Waal 2001:171 disagrees with Lenain on the grounds that chimpanzees try to counterbalance marks introduced to the page by humans; see also Morris 1962:80–6, Davis 1986, Eibl-Eibesfeldt 1988:35–6.

Drawing in the wild: Diamond 1991, 1992 claims that wild elephants often draw in the dust with their trunks. Ehmann 1987 discusses drawing by captive elephants.

Transforming marks into more familiar shapes: Bleakney 1970.

Bird culture: Diamond 1991, 1992, Sterelny 2003:151.

Birdsongs are learned: Thorpe 1956, 1974, Ardrey 1967, E. O. Wilson 1975, Dawkins and Krebs 1978, Fagen 1981, Deacon 1998, Whaling 2000, de Waal 2001, Fitch 2005, McDermott and Hauser 2005a, Merker 2005, Mithen 2005, Levitin 2006.

Sexual selection: see Chapter 3.

Change in birdsong: Lynch et al. 1989.

Birdsong is like novel utterance in humans: one who makes this misleading comparison is Levitin 2006:265. He also suggests that change in birdsong is driven by a female preference for more complex songs.

Birdsong lacks hierarchical structure: Ball 2010.

Birdsong is musical: Darwin 1880, pt. 2, ch. 13. For criticism: Wallaschek 1891.

Birdsong as art: Joyce 1975. As possessing musical structure: de Waal 2001:155–6; see also Thorpe 1974 and Marler 2000.

McDermott and Hauser quote: 2005a:39; see also Hauser and McDermott 2003.

Importance of considering links between human and animal song: Marler 2000, Fitch 2005, 2006, Merker 2005, 2006.

p. 33 Bowerbirds attracted to colored items: Diamond 1991. The Satin Bowerbird in Australia seeks blue items. Those occurring naturally are mainly flowers, but (as Diamond 1982 notes) the birds are avid collectors of blue human rubbish. Hirn 1900 notes their indiscriminate collecting when arguing against the view that bowerbirds are artists.

Bowers as part of extended phenotype: Dennett 1991:415. Birds do show considerable flexibility in response to local conditions and available materials when constructing their nests, however: Hansell and Ruxton 2008. This may strengthen the case for regarding nests as artifacts.

Bower making automatic: Ardrey 1967, Lenain 1999.

Bowers replaced courtship plumage: Gilliard 1969, Matt Ridley 1994:158.

Birds too dumb to be musicians: Hartshorne 1973 disagrees; they vary their songs in the order in which these are sung and in the number of times phrases are repeated. For a more skeptical approach to these data: Armstrong 1973.

Parrots: Pepperberg 1999, Huber and Gajdon 2006. Lenain 1997:24 cites Conrad Lorenz as claiming that the acrobatic aerial displays of parrots are art.

Corvids: Balda and Kamil 2002, Heinrich 2000, 2002, Taylor and Gray 2009. Lenain 1997:24 cites Conrad Lorenz as claiming that the acrobatic aerial displays of Corvids are art.

Dancing parrots: Patel et al. 2009. Ball 2010 argues that the capacity of parrots to coordinate with a steady pulse shows not that they are musical but rather that a sense of rhythm is pre-musical.

Gibbon songs: Geissman 2000. Fitch 2005 denies these are songs because, while they are learned, they are not as varied as the songs of many birds are.

Humpback songs: Hartshorne 1973:29–31, Thorpe 1974:131–2, Payne 2000, Mithen 2005, Ball 2010. Dolphins, seals and sea lions are also singers: Hartshorne 1973, Fitch 2005.

p. 34 Payne quote: 2000:135.

Chapter 3

p. 35 The first edition of Darwin's *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle of Life* appeared in 1859. Wallace's *Contributions to the Theory of Natural Selection* was published in 1870. For accounts of the history of evolutionary theory: Cronin 1991, G. Miller 1998, Gould 2002, Bowler 2003. For detailed expositions of evolutionary theory: Dawkins 1986, Patterson 1999, Gould 2002, Mayr 2002, Mark Ridley 2004.

The spread of genes in a population: this calculation (from Pinker and Bloom 1992) is based on formulae outlined in J. B. Haldane 1927. In fact, the time in generations depends on the size of the population. Where the advantage is 1 percent and the population is 10,000 individuals, the mutation will become fixed in 1,980 generations: S. Carroll 2005:245.

Units and mechanisms of selection: Dawkins 1989, Godfrey-Smith 2000, 2009, Okasha 2006. Note both that organism genealogies used to map species in the tree of life can diverge from gene genealogies and that evolution often operates on organisms rather than genes, so there can be no simple reduction of organism talk to gene talk.

Multilevel selection theory: D. S. Wilson 2002, 2007, Richerson and Boyd 2005, D. S. Wilson et al. 2008. For criticism: Dawkins 1994, Sterelny and Griffiths 1999, Kerr and Godfrey-Smith 2002, Okasha 2006, Sterelny 2006, Godfrey-Smith 2009, Hampton 2010.

Developmental systems theory: Oyama 1985, Griffiths and Gray 1994, 2005; see also Oyama, Griffiths, and Gray 2001, Dunbar and Barrett 2007. For criticism: Sterelny et al. 1996, Godfrey-Smith 2001, Kitcher 2001, Sterelny 2001.

p. 36 Memes: Lumsden and Wilson 1985, Dawkins 1989, J. Brown and Greenhood 1991, Dennett 1991, Koch 1993, Gatherer 1997, Blackmore 1999, Laland and Brown 2011. For criticism: Sperber 1996, Whitmeyer 1998, Pinker 1999, 2007, Sterelny and Griffiths 1999, Aunger 2000, 2002, 2006, 2007, Godfrey-Smith 2000, 2009, Distin 2004, Richerson and Boyd 2005, Sterelny 2006, Mameli 2008. For an over-stretched account of music in terms of memes: Jan 2007. On artworks as memes: Dennett 1990a; for criticism: Brook 2002. For a selectionist account of artworks' survival as memes or cultural viruses: Comfort 1962a, Rancour-Laferriere 1981, B. Boyd 1998, 2009a, Cooke 1999a, Perricone 2004, D. S. Wilson 2005. For the related idea that artistic value can be analyzed on the model of evolutionary fitness: R. Richards 2004.

Cladistic relations between languages: Dunn et al. 2005.

Gene-culture co-evolution: Lumsden and Wilson 1985, Durham 1991, Tomasello 1999, Richerson and Boyd 2005, Sterelny 2006, Mameli 2008, J. Carroll 2011, De Smedt 2011, Laland and Brown 2011.

Changes in human dentition, jaw size, and gut: Charlesworth and Charlesworth 2003, Clack 2009, Wrangham 2009.

Increased lactose tolerance: Geist 1978, Harris 1989, Deacon 1998, Clutton-Brock 1999, Laland et al. 2000, Richerson and Boyd 2005, Tishkoff et al. 2007.

Increased resistance to malaria: Tishkoff et al. 2001.

Human evolution did not come to a halt in the distant past: Foley 1995, Buller 2005:108–12, J. Carroll 2006, Laland and Brown 2011.

Changing immune system: Matt Ridley 1994.

Ongoing adaptive evolution in ASPM, a gene that plays a role in brain size: Mekel-Bobrov et al. 2005.

Human evolution is rapid and ongoing: E. O. Wilson 1978:86–9, D. S. Wilson 2002, Sterelny 2003, Richerson and Boyd 2005.

p. 37 Choosy females, competing males: Bateman 1948. For a more complex and nuanced list of mating strategies: Trivers 1972, N. Davies 1991, G. Miller 1998, Paul 2002, Gangestad 2007.

Peacocks: Petrie et al. 1991. For criticism: Welsch 2004.

Peacock tails as signaling good genes: Petrie 1994.

Runaway sexual selection: R. A. Fisher 1958, Trivers 1972, Harvey and Bradbury 1991, Rolls 2011. By contrast, natural selection usually operates slowly, but under circumstances of rapid environmental change, for instance, it might be much quicker.

Sexual selection subsumed within natural selection: Caspari 1972, Mayr 1972, Simpson 1972. For the current state of sexual selection theory: Jones 1996, Paul 2002.

p. 38 Inclusive fitness: Hamilton 1964.

Simpson quote: 1972:30.

Darwin on animals as aesthetes: for a defense of Darwin and a review of the debate that ensued: Cronin 1991, Matt Ridley 1994:130–45, G. Miller 1998, 1999. See the discussion of this topic in Chapter 1.

Early critic of sexual selection: Wallace 1871.

Choosy animals: Cronin 1991:246, G. Miller 2000a:41–4.

Beauty as an honest signal of fitness: Lumsden 1991, Buss 1994, Matt Ridley 1994, Symons 1995, Zahavi and Zahavi 1997, Etcoff 1999, Pinker 1999, Ralevski 2000, D. S. Wilson 2002, Skamel 2003, Voland 2003, Flesch 2007, Perrett 2010. For skepticism about the honesty of such signals: Dawkins and Krebs 1978. Some, such as Thornhill 1998, 2003, think that the mate preferences of nonhuman creatures are aesthetic and also that they track fitness. G. Miller 1998, 1999, 2000a, 2001 argues that choosing for beauty is compatible with choosing for fitness where the two are correlated. As we saw in Chapter 1, Welsch 2004 argues against the correlation, but does so on unconvincing grounds. Meanwhile, some claim that beauty maps truth at a cosmic level because it characterizes the rules and operations of the physical universe: F. Turner 1991a, 1995, Trout 1993. For criticism: De Sousa 2004.

The "handicap principle": Grafen 1990, Harvey and Bradbury 1991, Matt Ridley 1994, Zahavi and Zahavi 1997, G. Miller 1998, 1999, 2000a, Power 1999, Getty 2006, Rolls 2011.

p. 39 Wallace 1889, 1891. By Wallace's account, a colorblind peahen would not be at a disadvantage in choosing a mate so long as the mate's comparative vigor was evident: see Hirn 1900:191–2. This contrasts with the handicap view, in which the peahen picks her mate by the excellence of his plumage, which indirectly testifies to the quality of his genes: see Cronin 1991:195.

Species recognition: Enquist and Arak 1993.

R. A. Fisher 1915, 1958. See Paul 2002 for a review, including discussion of whether mate selection detects or creates fitness.

Zebra finches: Burley 1988a, 1988b; see also Harvey and Bradbury 1991, Roele and Wind 1999.

Mate choice in humans has an aesthetic aspect: Skamel 2003.

Sexual dimorphism: Trivers 1972. Sexual dimorphism correlates in species according to the degree of their polygyny and is generally absent in monogamous species. With *Homo sapiens* males 5–12 percent taller than females, humans qualify as a mildly polygynous species: E. O. Wilson 1978, Alexander et al. 1979, Diamond 1992:71, Wright 1994, Storey 1996, G. Miller 1998, 2000a. It has been said (for example, in Caspari 1972) that sexual selection cannot operate if the sex ratio is 1:1 and the mating system is monogamous because all individuals pair. This is not correct, however, if individuals vary in their fitness and mates are selected to match the fitness of the chooser: Harvey and Bradbury 1991, G. Miller 2000a:196–8, Hooper and Miller 2008.

p. 40 Monogamous relationships: testes size provides one indication of a primate's mating pattern: Harvey and Harcourt 1984, Harris 1989, Diamond 1992, Buss 1994, Matt Ridley 1994. In chimpanzees, females copulate with many males. The more sperm a male produces, the higher his chances of impregnating any given female. In gorillas, males have almost exclusive mating rights with their female partners so for them sperm production is not a major issue. Male chimpanzees have large testes, gorillas have small ones, and humans have intermediate ones. This implies that humans are largely monogamous but may indulge in extra-pair copulations—that is, with someone other than the current long-term partner—under some conditions. Typically, it is human males that are open to casual sex, though extra-pair copulations may benefit women when they provide better genes for her children than those of her long-term partner: Symons 1979, Buss 1994, M. Wilson and Daly 1992, J. Simpson and Oriña 2003, Thornhill and Gangestad 2003, Guthrie 2005, Clack 2009, Perrett 2010. For critical discussion of this explanation: Buller 2005:290–300. There is a tendency to polyandry in all primates: Paul 2002.

Even-handed sexual selection in humans: Wright 1994, G. Miller 1998, 1999, 2000a, 2001, Power 1999, Hooper and Miller 2008, Rolls 2011.

G. Miller 2000a, 2001.

Sociobiology: E. O.Wilson, 1975, 1978. For criticism: Gould 1980a, Kitcher 1985, Gräslund 2005. For a more balanced evaluation: Sterelny 1995, Mameli 2008, Laland and Brown 2011. For a defense of E. O. Wilson: J. Carroll 2004:71–7.

p. 41 Biologically modern humans: the date of 160 ka is from T. D. White et al. 2003, S. Carroll 2005, Richerson and Boyd 2005, Richardson 2007. Others give about 200 ka: E. O. Wilson 1998, Tomasello 1999, McDougal et al. 2005, B. Wood 2005, Vanhaeren et al. 2006, Klein 2009, Wrangham 2009. The figure of 200 ka is also supported by mitochondrial DNA genetic mutation evidence: Tang et al. 2002. Klein 2000 has reservations about how anatomically similar to present-day humans these first specimens were. For discussion of the origins and subsequent global spread of modern humans: Mellars 1996, Klein 2000, 2009, Dunbar 2004, Gräslund 2005, B. Wood 2005:104–15. For doubt about the coherence of the notion of a "modern human": Gamble 2007, Sterelny 2008.

Cultural explosion at 45–35 ka: Weiner 1971, Pfeiffer 1982, 1985, Fuller 1983, Halverson 1987, Bräuer 1989, Harris 1989, J. Brown and Greenhood 1991, Marshack 1991, R. White 1992, 1993, 2003, R. Boyd and Silk 1997, Baron-Cohen 1999, Lock 1999, Currie 2004, Zaidel 2005, R. Berleant 2007, Clack 2009, Whitley 2009. Some extend the date to 50 ka: Diamond 1997, Corballis 2003, Dunbar 2004 (but cf. Dunbar 2000), Klein 2000, 2009. Or to 60 ka: Mithen 1996, 1999, J. Carroll 2004.

Earlier date for psychologically modern humans: Frost 1987, Foley 1995, Ambrose 1998, Corballis 1999, Watts 1999, Carruthers and Chamberlain 2000, McBrearty and Brooks 2000, Lewis-Williams 2002, Gosden 2003, Henshilwood and Marean 2003, Solso 2003, Sterelny 2003, 2012, Barham 2004, Conard 2005, Gräslund 2005, Henshilwood 2005, Mellars 2005, Soressi 2005, Vanhaeren 2005, Gamble 2007, McBrearty and Stringer 2007.

The environment of evolutionary adaptation: Orians 1980, Tooby and Cosmides 1989a, 1989b, 1990a, 1992, Pinker 1994, 1999, Symons 1995, Cosmides and Tooby 1997, Thornhill 1998, Allen 1999, Scalise Sugiyama 2001a, Barrow 2005, Grodal 2008, Hampton 2010. For critical discussion: see Chapter 6.

Representative discussions of Evolutionary Psychology: Tooby and Cosmides 1990a, Cosmides et al. 1992b, Cosmides and Tooby 1997.

Critics of Evolutionary Psychology: Sterelny 1995, 2001, 2003, Griffiths 1996, Eagly and Wood 1999, M. Clark 2002, Gould 2002, Lloyd and Feldman 2002, D. S. Wilson 2002, Gray et al. 2003, Hogan 2003a, 2003b, Sterelny and Fitness 2003a, Travis 2003, Buller 2005, Richerson and Boyd 2005, J. Carroll 2006, 2011, Richardson 2007, Smolak and Murnen 2007, Swami and Furnham 2007, Mameli 2008, Kramnick 2011, Laland and Brown 2011. For a response to Buller: Machery and Barrett 2006. For a response to Hogan: Gottschall 2004.

Modular minds: Tooby and Cosmides 1989a, 1992, Cosmides and Tooby 1997, Pinker 1999. For discussion: Mithen 1996, Frankenhuis and Ploeger 2007, De Smedt 2011. For a review: Barrett and Kurzban 2006.

Evolutionary psychologists now favoring cognitive plasticity: Dunbar and Barrett 2007.

Just So adaptationist stories: Gould and Lewontin 1979, Gould 1980a, Schlinger 1996.

Reverse engineering as abductive explanation: Holcomb 1996; see also Dennett 1987, 1990b, 1995, D. S. Wilson 2002. For criticism: Griffiths 1996.

Just So *non*-adaptationist stories: Brandon 1990, Richerson and Boyd 2005.

Cannot reverse engineer Evolutionary Psychology's hypotheses: Griffiths 1996, Sterelny and Fitness 2003b, Buller 2005:93–107, Richardson 2007.

Child development: in the past it was commonly assumed that ontogeny—the structural development of the fetus and child—recapitulates phylogeny—the species' history. But even if this is not the case, child development studies are often used to see which abilities do not depend upon substantial cultural input and are stably part of human cognitive architecture.

Social reasoning: Cosmides and Tooby 1992a, 1992b, 2000a. For skepticism: Prinz 2007:265–6. For a list of other successful research programs in evolutionary psychology: Frankenhuis and Ploeger 2007.

p. 43 New evolutionary psychology: Dunbar and Barrett 2007 (the introductory essay of a recent handbook on evolutionary psychology).

Chapter 4

p. 45 Spandrel: an architectural term first applied to biological features by Gould and Lewontin 1979. They characterized spandrels as *necessary* by-products of the structures on which they are based, but this aspect of the view has been challenged: Dennett 1995:272–3, Houston 2009. For further discussion: J. Carroll 2004:237–40.

Art as a vestige: both Hegel 1975 [1835–8] and Danto 1986 hold that contemporary art is like a vestige in that it outlives an historically necessary function it played in the past. They suggest

that art has now discharged its purpose, so that it persists in a post-historical phase. Dissanayake 1988 holds a similar view. She maintains that post-eighteenth-century Fine Art no longer builds community, which is art's evolutionary purpose on her view. All these writers are here referring to Western Fine Art.

p. 47 Aesthetics discourse is a product of Western culture and modernist thought: Overing 1996, Gow 1996, Lewis-Williams 2002, 2004.

Arguments against the view that aesthetics is a modernist Western invention: Anderson 1990, Blocker 1993, 2001, Coote 1996, Morphy 1996, 2005, Van Damme 1996, Ludmany 1999, Lamarque 2005, R. Berleant 2007. Studies on or mentioning the aesthetic judgments made within non-Western cultures include: Crowley 1966, Fernandez 1966, Davenport 1968, 1986, R. Thompson 1968, Layton 1991, Van Damme 1996, D. Washburn 2006. Statistically significant agreement between New Haven (Connecticut) art experts and BaKwele (Bantu-speaking people from western equatorial Africa) carvers concerning the aesthetic qualities of photographs of African masks: Child and Siroto 1965. For further discussion: Van Damme, 1996, especially ch. 5.

p. 48 Language as an adaptation: Pfeiffer 1985, Harris 1989, Pinker and Bloom 1992, Pinker 1994, 2003, R. Boyd and Silk 1997, Deacon 1998, Corballis 1999, Hurford 1999, Lock 1999, Falk 2000, G. Miller 2000a, Sterelny 2003, J. Carroll 2004, 2011, Dunbar 2004, Barrow 2005, Patel 2008, Clack 2009, Fitch 2010, Hampton 2010. But for skepticism that we can know that human languages are adaptations: Gould 2002, Hauser et al. 2002, Richardson 2007. And note that there is considerable disagreement over when language evolved. How one answers that question will depend on whether one characterizes language as purely verbal, and hence as requiring a specialized larynx and the neural resources for fine breath control, or whether communication via gestures and facial expressions qualifies. For a defense of a gestural account of the origins of language: Corballis 2002, 2003; see also Marshack 1991, Pinker 1994, Mellars 1996. For criticism: Dunbar 2003. Language development correlated with the expansion of raw-material transfer networks over the period 1 ma to 130 ka: Marwick 2003.

Surveys of Komar and Melamid: Wypijewski 1997. For further detail, see Chapter 6.

Danto 1997.

Dutton 2003b, 2007, 2009.

Dissanayake 1998.

p. 49 Cross-cultural facial attractiveness: Langlois and Roggman 1990, Cunningham et al. 1995, Symons 1995, Jones 1996, Langlois et al. 2000, Dion 2002, Rhodes et al. 2002, Welsch 2008, Perrett 2010. Thakerar and Iwawaki 1979 recorded cross-cultural agreement in female judgments of male facial attractiveness, but noted that English participants, by contrast with Asian participants, attached more importance to physical than psychological features. Cross-racial agreement about the attractiveness of the faces of a cross-racial sample of men: Zebrowitz et al. 1993. In medieval texts, the markers of female beauty are those currently identified as such by evolutionary psychologists: Da Soller 2010.

Waist-to-hip ratio: Singh 1993a, 1993b, Matt Ridley 1994:282–4, Symons 1995, Jones 1996, Pinker 1999, Roele and Wind 1999, Low 2000, Cunningham and Shamblen 2003, Skamel 2003, Barash and Barash 2005, George et al. 2008, Perrett 2010, Rolls 2011.

Cross-cultural waist-to-hip ratio preference: Buss 1989, 1994, Singh 1994, 2002, Jones 1996, Cunningham and Shamblen 2003, Scott et al. 2007, Welsch 2008. For criticism: Gray et al. 2003, Buller 2005:227–8, M. Bateson et al. 2007. Yu and Shephard 1998 are skeptical of the

universality of the preference; for a reply: Singh 2002. Significant national differences in judgments based on waist-to-hip ratios concerning female attractiveness and health have been found: Tovée et al. 2007, Swami et al. 2008.

Processing universals in pictures: Eysenck 1941, Coss 1968, Bleakney 1970, Geist 1978, Eibl-Eibesfeldt 1988, Alland 1989a, Lumsden 1991, F. Turner 1991a, 1991b, 1995, 1999a, Solso 1994, 2003, Latto 1995, Grinde 1996, Aiken 1998, 1999, Akker 1999, Pinker 1999:526–30, Ramachandran and Hirstein 1999, Sütterlin 1999, 2003, Zeki 1999, 2000, 2006, G. Miller 2000a:142, Ralevski 2000, Edwards 2003, Thornhill 2003. For criticism: Voland 2003, M. Turner 2006, DeSmedt and De Cruz 2010. A number of authors draw attention to the recurrence of the "golden section" in visual art and architecture: Arnheim 1988, Eibl-Eibesfeldt 1988, Bourassa 1991, F. Turner 1991a, 1995, Ludmany 1999, Ralevski 2000, Edwards 2003, Welsch 2008. For skepticism about its alleged aesthetic value: Berlyne 1971, Perrett 2010, McManus 2011. For a detailed review: Green 1995.

Art as action, not artifact: Dissanayake 1980, 1988, 1995a, 1995b, 2007, 2008a, 2008b, S. Brown and Dissanayake 2009.

p. 50 We should focus on virtuosos and experts if the relevant behaviors and traits currently afford comparatively more fitness: G. Miller 2000a:14.

Heritability of creativity is modest and lower than that for general intelligence: Plomin et al. 1997, G. Miller 2000a. For commentary and disagreement about musical talent: Howe et al. 1998 and their discussants.

The extent to which expertise depends on practice: Ericsson et al. 1993.

The "handicap principle": see note to p. 37.

p. 51 Small "a" notion of art: S. Davies 2000, 2006a.

Mass and popular art: Novitz 1989a, 1992, 1993, Anderson 1990, N. Carroll 1993b, 1993c, 1998, Cohen 1993, 1999, Gracyk 2007. Connections between mass art and evolved human capacities: N. Carroll 2004.

Modernist and postmodernist art as no longer serving art's evolutionary function: Dissanayake 1988, 1995a, F. Turner 1995, G. Miller 1999, 2000a, Dutton 2000b, 2009, Pinker 2002. For criticisms: Easterlin 2005, Zunshine 2006, Goodheart 2007, Tanaka 2010.

The Iliad: Fox 1995, 2005, Gottschall 2001, 2008c, Barash and Barash 2005, B. Flesch 2007, B. Boyd 2009a.

The Odyssey: Fox 1995, Flesch 2007, B. Boyd 2009a.

Shakespeare: Hiatt 1989, Stiller et al. 2003, Barash and Barash 2005, B. Boyd 2005b, Nettle 2005a, 2005b, Nordlund 2005, 2007, Oatley and Mar 2005, Stiller and Hudson 2005, Flesch 2007, J. Carroll 2011.

Tolstoy: Rancour-Laferriere 1993, J. Carroll 1999, Barash and Barash 2005.

Jane Austen: J. Carroll 1995a, 1999, 2004, 2005, B. Boyd 1998, Barash and Barash 2005, Zunshine 2006, 2009, Flesch 2007, J. Carroll et al. 2009, Vermeule 2010.

Dickens: J. Carroll 1995a, 2004, Barash and Barash 2005, Flesch 2007, Zunshine 2008.

Other "serious" authors discussed by Literary Darwinists (see Chapter 11): Sophocles (J. Carroll 1995a), Dryden (Zunshine 2008), Defoe (J. Carroll 1995a, Zunshine 2006), Alexander Pope (Vermeule 2010), Richardson (Zunshine 2006, Vermeule 2010), Fielding (Vermeule 2010), Walter Scott and Anne Radcliffe (Kruger et al. 2005), Dumas (Barash and Barash 2005), Hugo (Barash and Barash 2005), Emily Brontë (J. Carroll 2008, 2011), George Eliot (J. Carroll 1995a, 2011), Flaubert (Barash and Barash 2005, Vermeule 2010), Dostoevsky (Cox 1999),

Lewis Carroll (Zunshine 2008), Hardy (J. Carroll 1999, 2004, 2011, Barash and Barash 2005), Henry James (J. Carroll 1995a, Flesch 2007), Oscar Wilde (J. Carroll 2011), Wharton (Saunders 2009, Vermeule 2010), Proust (Flesch 2007), Woolf (Zunshine 2006), F. Scott Fitzgerald (Barash and Barash 2005), Faulkner (Barash and Barash 2005), Hemingway (Scalise Sugiyama 1996b), Nabokov (Barash and Barash 2005, Zunshine 2006, 2008), Malamud (Swirski 2011), Steinbeck (Barash and Barash 2005), J. M. Coetzee (Vermeule 2010), and Peter Carey (Easterlin 2005).

Chided for concentrating on high literature: by Pinker 2007.

Non-Western literatures: Scalise Sugiyama 1996a, 2005, Thiessen and Umezawa 1998, Jobling 2001, B. Boyd 2005b, Gottschall 2005, Oatley and Mar 2005, Booker 2005.

Prehistoric theater: Hansen 1999.

Folk tales: Rabkin 1983, 1995, Cooke 1995, Niles 1999, Easterlin 2001, Jobling 2001, Scalise Sugiyama 2003, 2004, Booker 2005, Gottschall 2005, 2008a, Steen 2005.

Oral narratives: Niles 1999, Hernadi 2001, Scalise Sugiyama 2001a, 2001b, Scalise Sugiyama and Sugiyama 2009.

Myths, epics, and legends: J. Carroll 1995a, Fox 1995, Nesse 1995.

Popular fiction: Rabkin 1983, 1995, 1998, Cooke 1987, 2002, J. Miller 1987, Whissel 1996, Westfahl 1999, Barash and Barash 2005, Salmon 2005, Booker 2005, Zunshine 2006, 2008, Flesch 2007.

Children's stories: Astington 1990, Storey 1996, B. Boyd 2001, 2009a.

Nonsense rhymes etc.: Storey 1996.

p. 53 Quintilianus quote: 1983:120.

Darwin quote: 1880, pt. 3, ch. 19:570.

Music universal among adults: Blacking 1973, Cross 2003a, 2003b, Fitch 2005, Mithen 2005, Dissanayake 2006, Cross and Morley 2009.

Music only recently a spectator sport: Levitin 2006.

p. 55 Universals in music: Hutchinson 1978, Roederer 1984, Epstein 1988, Mâche 2000, Meyer 2000, Nettl 2000, Trehub 2000, Drake and Bertrand 2003, Hauser and McDermott 2003, Justus and Hutsler 2005, McDermott and Hauser 2005a, Higgins 2006, 2012, Cross 2007, J. McDermott 2008, Stevens and Byron 2009, De Smedt and De Cruz 2010.

Universal themes in literature: Polti 1977 [1895], Arnheim 1988, J. Carroll 1995a, 1995b, 1999, 2004, 2007a, 2011, E. O. Wilson 1998, Cooke 1999b, Hernadi 2001, Scalise Sugiyama 2001a, 2001b, Hogan 2003a, 2008a, Booker 2005, Dutton 2005, 2009, Gottschall 2005, 2008a, B. Boyd 2009a. Universals in poetic structure: F. Turner and Pöppel 1988, F. Turner 1991a, 1999a, 1999b, Trout 1993, Constable 1997, Swirski 2010.

Cross-cultural musical expression: Balkwill and Thompson 1999, Krumhansl 2002, Fritz et al. 2009, W. F. Thompson and Balkwill 2010. But for reservations and concerns, see S. Davies 2011.

Virtuosic skill across art traditions: Dutton 2003a, 2005, 2009.

Beauty of the body: see note to p. 49 on cross-cultural agreement concerning facial beauty. For discussion of the connection between the beauty of the Balinese *legong* dance and the beauty of the dancer: S. Davies 2012.

Westerners recognize non-Western art as such: S. Davies 1997a, 2000, 2003.

p. 57 "A fascinating experiment": Huron 2006:47–8, 53–5.

The complex iconography of "dot" paintings: Bardon 1991.

Bark paintings: Layton 1991:94–6, 137–44.

p. 58 Dissanayake 1988, 1995a.

Grosse quote: 1897:312–13.

Origins of feathers: Gould and Vrba 1982. This is seen as the most likely explanation, but sexual display and biomechanical support are recognized as other possible explanations: Sumida and Brochu 2000.

p. 59 Dennett 1995:233.

Richardson 2007:48–52.

Richardson quote: 2007:52.

Moore quote: 2007:168.

p. 60 Appleton quote: 1996:150.

p. 61 We should not always follow our nature: Kingsbury 2011.

Hildebrand quote: 1999:10.

Evolutionary utility is often not appealed to in reasons given for a choice: Thornhill 2003 goes too far, however, in suggesting that the utilities underlying such preferences are always totally out of reach of introspection; see also S. Kaplan 1992.

p. 62 Origin of art does not explain its current relevance: Currie 2004.

Art could be about sexual selection now, even if that is not how it originated: De Smedt and De Cruz 2010.

Part II. The Aesthetic

Chapter 5

p. 65 Neglected topic: Parsons 2007, Brady 2009.

Evolutionary psychologists on animals in environment: Heerwagen and Orians 1993, Kellert 1993. Preference for habitat research over animal study: Ulrich 1993.

Thornhill quote: 1998:562.

Aversion to spiders and snakes: Mundkur 1983, E. O. Wilson 1984, 1998, Herzog and Burghardt 1988, Tooby and Cosmides 1990b, J. Brown and Greenhood 1991, Kellert 1993, Ulrich 1993, B. Boyd 1998, Orians 2001, Tooby and Cosmides 2001, Gräslund 2005, Austin 2007, Dutton 2009, Kramnick 2011. We share this pre-programmed aversion with monkeys, baboons, chimpanzees and many other primates: Morris 1962, Coss 1968, E. O. Wilson 1984, Sagan and Druyan 1992, B. Boyd 2008a. In human infants aversive reactions to snakes are initially absent but emerge by the third year. "This delayed avoidance behavior appears to be triggered at the stage of maturity when the child would be capable of escaping" (Coss 1968:278). We do not have a similar automatic response to more dangerous technologies, such as guns: Heerwagen and Orians 1993, Ulrich 1993, Tooby and Cosmides 1997, Cooke 1999b, Orians 2001.

p. 66 Wittgenstein 1967:223.

Dog domestication: Diamond 1997, Clutton-Brock 1999, Coppinger and Coppinger 2001, Braastad and Bakken 2002, Sablin and Khlopachev 2002, Guthrie 2005, Wang and Tedford 2008, Clack 2009, Klein 2009. Some date the domestication of dogs or their *Canid* ancestors to 110 ka: Vilà et al. 1997. But the reliability of the mitochondrial DNA evidence for the early date is seriously challenged: Coppinger and Coppinger 2001, Wang and Tedford 2008:160–1.

DNA affinities and circumstantial fossil evidence suggest that dogs accompanied the humans who entered America via the Bering Strait in 15–10 ka: Wang and Tedford 2008.

Dingoes: Hadingham 1979, Serpell 1988, Diamond 1997. Dingoes apparently reached Australia, probably by boat, only 5 ka. By contrast, the first human settlers of Australia arrived about 50 ka. Corbett 1985 argues that dingoes can be tamed but not domesticated, that is, their pups are wild. Coppinger and Coppinger 2001 generalize this view to all wild *Canids*. They argue that dogs became self-domesticated by adapting to the village environment that then was new. Humanly selected breeding of dogs for desired canine traits is required to produce working dogs.

Dogs' sensitivity to humans' social clues: Hare et al. 2002.

Burials with animal parts: Geist 1978, Mithen 1999, Braastad and Bakken 2002, Currie 2004, Clack 2009, Lumley 2009, Mayer et al. 2009.

Burial of human with dog: Clutton-Brock 1999, Wang and Tedford 2008:155–8.

p. 67 Ritual burial of animals: Mithen 1996:224.

First domestic cat: Wang and Tedford 2008, Clack 2009, Driscoll et al. 2009.

Humans identified with animals: Whitt et al. 2001.

Ritual use of horns: Clutton-Brock 1999.

Totemism: Joyce 1975:44–6, Mithen 1996:166. Universal potency and appropriation of snake symbols: Mundkur 1983, E. O. Wilson 1984.

Therianthropes in cave art: Marshack 1991, Bataille 2005:55, 66, Guthrie 2005. The most famous and peculiar is the so-called Sorcerer of Trois Frères cave in south-western France. The cave is dated to 13 ka.

Arnhem Land art: Lewis 1988, Flood 1997, Chippindale 2004.

Number of animal representations in caves as compared to human ones: Guthrie 2005.

Animal pictures more realistic than human pictures: Joyce 1975, R. White 2003, Bataille 2005.

Accuracy of animal pictures: Gould 1996; see also Collins and Onians 1978, Geist 1978, Harris 1989, Marshack 1991, Guthrie 2005: ch. 2. An extinct species of flying fox has been posited on the basis of Australian rock art: Pettigrew et al. 2008.

Göbekli Tepe: Schmidt 2000, C. Renfrew 2009.

p. 68 Sheep and goats as meat: Clutton-Brock 1999.

Dairy cattle: Clutton-Brock 1999.

Domestication of horses, water buffalo, donkeys, camels, and elephants dates to 5–4 ka: Diamond 1997 (except that he holds that the elephant was tamed, not domesticated), Clutton-Brock 1999.

Few domesticated animals in Americas: Harris 1989.

Roman and Chinese dogs: Clutton-Brock 1999.

The Iliad: Steiner 2005.

Medieval knights: K. Clark 1977.

Dogs and cats not always well treated: Thomas 1983, Ritvo 1988, Serpell 1988.

Spread of cats: Braastad and Bakken 2002, Driscoll et al. 2009.

Indigenous Americans' fondness for pets: Serpell 1988, Clutton-Brock 1999.

Pets recorded in nearly all traditional societies: Diamond 1997.

Rousseau and Bentham: Thomas 1983, Steiner 2005, Wolloch 2006.

Christian saints and animals: K. Clark 1977.

p. 69 Dutch and Flemish animal painting: Wolloch 2006, ch. 6.

Number of dogs in US: Coppinger and Coppinger 2001.

Number of pet cats: Driscoll et al. 2009.

Animal names for cars and sports teams: E. O. Wilson 1998.

Sports teams include the badgers, blue jays, bobcats, broncos, bruins, buffalos, bulldogs, bulls, colts, cougars, coyotes, cubs, diamond-backs, dogs, dolphins, eagles, falcons, gamecocks, gators, hawks, kangaroos, kookaburras, lions, magpies, ospreys, panthers, pumas, rams, raptors, seahawks, sharks, springboks, tigers, wallabies, wolf pack, and wolverines. Cars include the barracuda, beetle, bluebird, bronco, cheetah, cobra, colt, cougar, eagle, falcon, firebird, firefly, fox, hornet, impala, jaguar, kitten, lark, lynx, mustang, palomino, pinto, pony, rabbit, ram, roadrunner, robin, skyhawk, skylark, spider, sunbird, swift, taurus, tercel, thunderbird, and viper.

p. 70 Attitudes to animals: Kellert 1988.

Bible's attitude to animals: Thomas 1983, Steiner 2005.

History of animal protection agencies: Ritvo 1988.

Changing attitudes to animals: Thomas 1983, Steiner 2005, Wolloch 2006.

Children's fascination with animals: animals occur in stories by and for children (B. Boyd 2007b), children's language and maths exercises (Kellert 1993), childhood taxonomies (Shepard 1993), and child art (De Smedt and De Cruz 2010). For surveys of modern children's attitudes to animals and how these develop: Kellert 1988.

Health benefits of pets: Katcher and Beck 1988, Kellert 1993, Shepard 1993, Coppinger and Coppinger 2001, Braastad and Bakken 2002, Hooker et al. 2002, Fine 2006. But note that the benefits are not necessarily mutual: Coppinger and Coppinger 2001. Shepard 1993 deplores the slavery imposed on pets.

p. 71 Rolston quote: 1987:195.

E. O. Wilson quote: 1984:130.

p. 72 Herzog and Burghardt quote: 1988:76–7.

Attribute nobility etc. to animals: Lorenz 1971, Eibl-Eibesfeldt 1988. On the prevalence of an anthropomorphic approach to animals in all societies: Steiner 2005, Wolloch 2006.

p. 73 Mickey Mouse: Gould 1980b.

Neotenous appearance of some animals or their young: Bleakney 1970, Lorenz 1971, Eibl-Eibesfeldt 1988, Herzog and Burghardt 1988, Morreall 1991, Perrett 2010. Modification of children's toy animals to make them more neotenous: De Smedt and De Cruz 2010.

Toddlers: Herzog and Burghardt 1988.

What we like about animals: Kellert 1988:159.

On breeding pure lines selected in part for appearance: Derry 2003.

Darwin quotes: 1859:39, 87.

Herzog and Burghardt quote: 1988:80.

p. 74 Appreciate adaptedness of animals: Parsons 2007, Parsons and Carlson 2008.

Share related perceptual systems: notice that we share more of our color vision with birds than with most other mammals. See note to p. 15 on bird color vision. We lose out by comparison with other mammals on most of the aesthetic delights of smells and scents. But see note to p. 18 on odor.

p. 75 Expressive association of animals with habitats: Brady 2009.

p. 76 Barrow quote: 2005:120–1.

Disliked creatures (bat, cockroach, mosquito, rat, snake, spider, wasp): Kellert 1988.

p. 77 Liked creatures: Kellert 1988.

Cave and rock art do not always accurately depict all and only the species present in the area or their relative abundance: Mithen 1988, Harris 1989, Guthrie 2005. For discussion of the flora and fauna of the region in the Upper Paleolithic: Mellars 2009a.

Herzog and Burghardt quote: 1988:78–9.

p. 78 Russow 1981.

Formal integrity is normative in biological kinds: S. Davies 2006b, 2010b.

p. 79 Paley 2006:107.

God as creator of natural beauty: Tatarkiewicz 1972.

Medieval theological tradition: Clement of Alexandria, Athanasius, Alcuin, Ulrich of Strasbourg, Robert Grosseteste, and the twelfth-century Victorines.

Animals imagined as artworks: Joyce 1975:10.

Zangwill quote: 1995:116. For criticisms: S. Davies 2006b, Parsons 2007.

p. 80 Snakes: E. O. Wilson observes that "it is possible to . . . learn to handle snakes without apprehension or even to like them in some special way, as I did—but the adaptation takes a special effort and is usually a little forced and self-conscious" (1984:95).

p. 84 Selective breeding has been to the detriment of many breeds: Lorenz 1971, Coppinger and Coppinger 2001, Hare et al. 2002.

Insects as food: the bigger, more abundant, and more concentrated that small creatures are, the more likely they will be regarded as good to eat, provided that larger animals are scarce and difficult to obtain: Harris 1989:161.

Different attitudes to bloodsports: Herzog and Burghardt 1988.

Chapter 6

p. 86 Melamid quote: in Wypijewski 1997:31–2.

p. 87 Dutton quote: 2009:18.

E. O. Wilson quotes: 2006:62, 68, 1984:1.

Ulrich quote: 1993:88.

p. 88 Subscribers to something like the biophilia hypothesis: Orians 1980, 2001, S. Kaplan 1982, 1992, Appleton 1984, 1990, 1996, Eibl-Eibesfeldt 1988, D. E. Brown 1991, Lumsden 1991, Sagan and Druyan 1992, Kellert 1993, Trout 1993, Thornhill 1998, 2003, Pinker 1999, 2002, Sütterlin 2003, Barrow 2005, Cowie 2011, Joye 2011, Rolls 2011. Ulrich 1993 argues that the genetic basis of landscape preferences is difficult to prove. He is more conservative than many in anticipating that the genetic contribution is in the range 20–40 percent, with some learning or conditioning necessary for emergence of the response. No doubt some authors overemphasize the biological aspect of the response to nature. Bourassa 1991, referring to the first edition of Appleton 1996, accuses Appleton of this.

The value of speed: S. Kaplan 1982, 1992, R. Kaplan and S. Kaplan 1989; see also Ulrich 1993, Ruso et al. 2003.

The value of depth assessment of habitat: Orians 1980.

Heerwagen and Orians 1993.

S. Kaplan 1982, 1992:585.

Trout quote: 1993:185.

Appleton quote: 1996:63; see also Barrow 2005:121.

p. 89 Doubt that the human evaluation of landscape is aesthetic: Swirski 2010.

For positive accounts of the environment of evolutionary adaptation, see note to p. 41.

Bipedalism: fossil evidence suggests that bipedalism evolved in *Ardipithecus* about 5.2 ma, soon after the split between the chimpanzee and Hominin lineages (Haile-Selassie 2001), although by 4.4 ma this bipedalism was still facultative rather than obligatory: Lovejoy et al. 2009. Increasing aridity forced early Hominins to extend their daily foraging range. This favored bipedal locomotion, which is more energy-efficient than all known forms of primate terrestrial locomotion: Leonard and Robertson 1997.

p. 90 Prospect and refuge: Appleton 1984, 1990, 1996; see also Orians 1980, Heyligers 1981, Clamp and Powell 1982, Woodcock 1982, Conrad 1993, Hildebrand 1999, Edwards 2003, Barrow 2005, Herrington 2009. For criticism of Appleton: Bourassa 1991.

S. Kaplan 1988, 1992; see also R. Kaplan and S. Kaplan 1989.

Signs of presence of humans a positive for landscapes: Orians 1980, Ruso et al. 2003.

Preference for mystery: S. Kaplan 1982, 1992, Woodcock 1982, Herzog and Smith 1988, R. Kaplan and S. Kaplan 1989, Orians and Heerwagen 1992, Thornhill 1998, Barrow 2005. Appleton 1990 discusses the draw of the horizon in similar terms. Hildebrand 1999 considers architectural features that entice exploration. But Bourassa 1991 doubts whether mystery would be preferred over the legibility of landscape.

p. 91 Dutton quote: 2009:27–8.

We are drawn to explore: R. Kaplan and S. Kaplan 1989 class both complexity and mystery under the heading "exploration" (with coherence and legibility grouped under "understanding").

The "out of Africa" account of the spread of *Homo sapiens*: Mellars 1996, 2005, Mithen 1996, 2005, Ambrose 1998, G. Miller 1998, Corballis 2002, Edwards 2003, Currie 2004, Dunbar 2004, Gräslund 2005, Richerson and Boyd 2005, Clack 2009, Klein 2009, C. Renfrew 2009. Hampton 2010 and Zaidel 2011 give the early date of 100 ka for the departure from Africa. Gosden 2003 suggests a little less than 100 ka. For an example of the earlier view that *Homo sapiens* first evolved in Europe: Geist 1978.

Dates of human global spread: these dates are from Dunbar 2004. B. Wood 2005 gives slightly later dates. Klein 2009 gives 60–50 ka for the departure from Africa, 45 ka for the arrival in Australia, 20 ka for the occupation of Siberia, and 12 ka for the Americas. Gräslund 2005 gives 90 ka for the departure from Africa, 60 ka for Australia, 45 ka for eastern Asia, and 30 ka for Japan. Weiner 1971 gives 30–11 ka for the crossing to America. Gosden 2003 gives 90 ka for the Middle East, 50 ka for Europe and Australia, and 20–15 ka for the Americas.

Dunbar quotes: 2004:33.

Weiner quote: 1971:160.

The comfort of familiar territory: Orians 1980.

Adults tend to prefer the environments they are most familiar with: Balling and Falk 1982, Lyons 1983, R. Kaplan and S. Kaplan 1989.

Environment preference studies: Balling and Falk 1982, S. Kaplan 1988, 1992, Nasar 1988:Sect. II, R. Kaplan and S. Kaplan 1989, Heerwagen and Orians 1993, Ulrich 1993.

p. 92 Decorate with plants: Eibl-Eibesfeldt 1988, Heerwagen and Orians 1993, Ulrich 1993, Hildebrand 1999, Sütterlin 1999.

E. O. Wilson quote: 1992:350.

Current real-estate preference: Orians 1980, E. O. Wilson 1984, Eibl-Eibesfeldt 1988.

Well-being, health, and recovery in natural habitats: R. Kaplan and S. Kaplan 1989, Orians 2001, Heerwagen and Orians 1993, Kellert 1993, Ulrich 1993, Ruso et al. 2003. This is noted also with respect to gardens in R. Kaplan and S. Kaplan 1989, Ross 1998, Marcus and Barnes 1999, Cooper 2006, Herrington 2009.

Reduction of stress improves performance: Ulrich 1993.

Painting studies: Paulson 1982, Appleton 1984, 1990, 1996, Heerwagen and Orians 1993, Edwards 2003, Barrow 2005. Bourassa 1991 also provides examples but makes the point, not widely acknowledged elsewhere, that the converse is (also) true: landscapes are approached through the prism of art.

Gender-differentiated landscape preferences: Woodcock 1982. Gender-differentiated preferences of architectural spaces according to their prospect-refuge characteristics: Nasar et al. 1983, Hildebrand 1999.

Landscape in other arts: Orians 1980, Appleton 1996.

Urban and architectural design: Appleton 1990, 1996, Ulrich 1993, Hildebrand 1999, Barrow 2005, Joye 2011.

Appleton quote: 1996:168.

"Inhabitants of a housing project": Hildebrand 1999.

p. 93 Many people like humanly modified landscapes: Ruso et al. 2003.

People regularly class humanly modified environments as natural: R. Kaplan and S. Kaplan 1989, Bourassa 1991, Kellert 1993, Appleton 1996, Herrington 2009.

E. O. Wilson quote: 1984:13.

Adaptiveness of negative responses to nature: R. Kaplan and S. Kaplan 1989, Orians and Heerwagen 1992, Kellert 1993, Ulrich 1993.

On ecocriticism in literature: J. Carroll 2001.

Snakes: according to an April 2010 BCC news report, about 1,000,000 people annually are bitten by snakes and as many as 100,000 of these die as a result. E. O. Wilson 1984:96 gives the annual death rate over large stretches of Asia as five persons per 100,000 each year.

p. 94 Advocates of the savanna hypothesis: E. O. Wilson 1975, 1984, Orians 1980, Balling and Falk 1982, S. Kaplan 1982, 1992, Tooby and DeVore 1987, Dissanayake 1988, 1995a, 2000a, Orians and Heerwagen 1992, Heerwagen and Orians 1993, Ulrich 1993, Appleton 1996, Cosmides and Tooby 1997, Thornhill 1998, 2003, Tooby and Cosmides 2001, Dutton 2003b, 2007, 2009, Edwards 2003, Barrow 2005, Guthrie 2005, Welsch 2008, De Smedt and De Cruz 2010.

High productivity of savanna: Orians 1980, E. O. Wilson 1984, Ulrich 1993.

Low-branching trees: Orians and Heerwagen 1992, Heerwagen and Orians 1993, Thornhill 1998, 2003.

We design our parks and gardens on the savanna model: Orians 1980, E. O. Wilson 1984, Eibl-Eibesfeldt 1988, Orians and Heerwagen 1992, Barrow 2005. Both the English landscape garden and Japanese garden are analyzed as savanna derivatives: S. Kaplan 1992, Heerwagen and Orians 1993, M. Miller 1993. For a different comparison between them: Appleton 1996:200–2.

E. O. Wilson quote: 1984:13.

Childhood preference for savanna: Balling and Falk 1982; see also Bourassa 1991, S. Kaplan 1992, M. Miller 1993, Orians and Heerwagen 1992, Ulrich 1993, Ruso et al. 2003, Barrow 2005.

p. 95 Balling and Falk quotations: 1982:10, 22.

Lyons 1983.

Synek and Grammer 1998.

Taste for pictorial complexity increases with age: Gardner 1982, Dissanayake 1988, Lumsden 1991, Synek and Grammer 1998.

Study of environment preferences: Han 2007.

The story of the environment of evolutionary adaptedness is incoherent: Foley 1995.

Brain chemistry suggests that modern humans evolved in a marine rather than savanna environment: Crawford et al. 1999.

Against the savanna hypothesis: Sterelny 1995, R. Boyd and Silk 1997, Potts 1998a, 1998b, McBrearty and Brooks 2000, J. Carroll 2004, 2006, 2011, Gräslund 2005, Dunbar and Barrett 2007, Laland and Brown 2011.

p. 96 Rapid environmental change in sites of Hominin development: Potts 1998a, 1998b, Richerson and Boyd 2000, 2005, M. Clark 2002, D. S. Wilson 2002, Sterelny 2003, Bamford 2005, S. Carroll 2005, Mellars 2005, Richardson 2007, Jeffares 2010.

Quick warming followed by slow cooling: Mellars 1996, Labeyrie 2000, Shackleton 2001, Guthrie 2005, Richerson and Boyd 2005, Klein 2009.

Change in climate and vegetation in habitat occupied by late Neanderthals: Bordes 1961, Hadingham 1979, Mellars 1996, Potts 1998a, Gilligan 2007.

Hadingham quote: 1979:87.

Mellars 2009a.

Potts quote: 1998a:129–30; see also Potts 1998b:95.

p. 97 For a list of both environmental and social factors relevant to our predecessors' evolution: Tooby and DeVore 1987:201.

Importance of poorly understood social environment: Sterelny 2003, Sterelny and Fitness 2003b, Buller 2005, Richerson and Boyd 2005, Richardson 2007, Klein 2009:683, Hampton 2010, Laland and Brown 2011. For the suggestion that this objection is exaggerated: Machery and Barrett 2006.

Group size: Wobst 1974 and Dissanayake 1995a estimate these bands at 25 people. Geist 1978 goes for 20–25. E. Fisher 1979:174 suggests 20–40. Guthrie 2005 opts for 25–40. Gräslund 2005 suggests 30–50. Dunbar 2000, 2004 puts the maximum at about 150 but argues that they lived in groups of about 30 most of the time. Mithen 1996 claims the groups would have been "large" but less than 130. Clack 2009 estimates 100, as does E. O. Wilson 1975 and G. Miller 2000a. By contrast, Richerson and Boyd 2005:229 suggest that tribes would bring together hundreds, perhaps a few thousand, people. Toward the end of the Pleistocene there is evidence that some sites attracted comparatively large groupings, perhaps on a seasonal basis: Gosden 2003, Mellars 2009a.

On the correlation between brain case volume and group size in primates generally: Dunbar 1992. On the role of diet in human brain size: Deacon 1998, Crawford et al. 1999, H. Kaplan et al. 2000, Solso 2003, Wrangham 2009.

High human rates of spontaneous abortion and stillbirth: Coe 2002. Infanticide was historically and geographically widespread: Harris 1989, see also Dunbar 2004.

Birth rates: hunter-gatherers have one child about every four years: Geist 1978, Symons 1979:91, 1995, Lancaster and Lancaster 1983, H. Fisher 1992, 2004, R. Boyd and Silk 1997, Diamond 1997, Low 2000, Dunbar 2004, Gräslund 2005, Clack 2009. G. Miller 2000a speculates that

among our distant ancestors a woman would have her first child when she was about 20 years of age and would have children at intervals of three years. M. Clark 2002:123 predicts each female would have had only four or five children; see also Weiner 1971. For skepticism about such calculations: Sterelny and Fitness 2003b.

Foley quote: 1995:202. Others who question the comparison between present-day foragers and our Pleistocene ancestors: Gosden 2003, Sterelny 2003, R. White 2003, J. Carroll 2006, Hampton 2010.

p. 98 Surviving in arid wastes: for a personal anecdote about the northern Australian environment: Diamond 1997: 295–7.

p. 99 Changing attitudes to nature: Ritvo 1988, Appleton 1990, 1996, Tuan 1993, Schama 1995, Herrington 2009, Cowie 2011.

The deer mouse: Wecker 1963.

p. 100 Bonner quote: 1980:147.

Potts quote: 1998b:95; see also 1998a:112, Henrich and McElreath 2003, Sterelny 2003, Richerson and Boyd 2005, J. Carroll 2006, Richardson 2007.

Chapter 7

p. 102 Beauty of virtuous character: Cooper 2008.

Differences in mate preferences according to gender: Ford and Beach 1951, Symons 1979, 1995, Crook 1980, Buss 1989, 1992, 1994, Kenrick et al. 1990, D. E. Brown 1991, Ellis 1992, Matt Ridley 1994, Wright 1994, Bouckaert and Boulanger 1997, R. Boyd and Silk 1997, G. Miller 1998, 2000a:211–15, Etcoff 1999, Pinker 1999:480–7, Low 2000, Fletcher and Stenswick 2003, H. Fisher 2004, Guthrie 2005:312–25, Einon 2007, Swami and Furnham 2007, Hampton 2010, Rolls 2011.

The relation between age and female fecundity: Jones 1996, Guthrie 2005. And in males: Buller 2005:220.

Folk tales from many different countries bear out these gender-based preferences: Gottschall 2005, 2008a.

For skepticism about the female desire for men with status and the male desire for youthful women: Buller 2005:ch.5. For skepticism about Buss's evidence: Vickers and Kitcher 2002. For arguments that mate preferences are cultural rather than biological: Eagly and Wood 1999, Smolak and Murnen 2007. And for a response: Fletcher 2002.

Male physical characters preferred by females: Cunningham et al. 1990, Ellis 1992, Buss 1994, Etcoff 1999, Bordo 2000, G. Miller 2000a, Little et al. 2002, Thornhill and Gangestad 2003, H. Fisher 2004, Swami and Furnham 2007, Rolls 2011.

Male traits sought by unpaired women looking for temporary relationships or by paired women looking for extra-pair copulations: Kenrick et al. 1990, Buss 1994, Penton-Voak et al. 1999, J. Simpson and Oriña 2003, Skamel 2003, Thornhill and Gangestad 2003, H. Fisher 2004, Rhodes et al. 2005, Perrett 2010. When it comes to sex with someone other than their long-term partner, women are fussy, but over different things. If they are not choosing for investment and commitment, which are crucial in a successful long-term partner, they are likely to choose instead for good genes.

Men unfussy in choosing short-term partners: Trivers 1972, Symons 1979, Buss 1994, Wright 1994, Jones 1996, Guthrie 2005, Clack 2009.

Men fussy in choosing long-term partners: Trivers 1972, Geist 1978, Buss 1992, 1994, Kenrick et al. 1990, Wright 1994, Pinker 1999, 2007, G. Miller 2000a, Fletcher and Stenswick 2003, H. Fisher 2004, Guthrie 2005, Swami and Furnham 2007, Clack 2009, Rolls 2011.

Reducing women to their bodies: these views might be especially insulting to the physically disabled: Kerner 2006. For discussion of relations between beauty and physical anomaly, see Silvers 2000.

p. 103 A nuanced and careful account of what evolutionary psychologists (and their opponents) might be committed to: J. R. Richards 2000.

Prettiness as distinct from beauty: Breidbach 2003. Harrowing but beautiful art: Silvers 2000, Korsmeyer 2006.

Beauty as an honest signaling for fitness: see note to p. 40.

Symons 1995.

Importance of the face: Alicke et al. 1986, Brewer et al. 2007, Rhodes and Simmons 2007, Perrett 2010. But note that the judgment usually covers a variety of factors, including the voice and body: Saxton et al. 2009.

The attractiveness of symmetry and hypernormalcy: Symons 1979, 1995, Eibl-Eibesfeldt 1988, Buss 1994, Grinde 1996, Jones 1996, G. Miller 1998, Thornhill 1998, E. O. Wilson 1998, 2003, Etcoff 1999, Pinker 1999, Ramachandran and Hirstein 1999, 2000a, Low 2000, Grammer et al. 2003, J. Simpson and Oriña 2003, Skamel 2003, Thornhill and Gangestad 2003, H. Fisher 2004, Barrow 2005, Rhodes and Simmons 2007, Swami and Furnham 2007, Welsch 2008, Perrett 2010, Rolls 2011. On symmetry and the face: Symons 1979, 1995, Alicke et al. 1986, Dissanayake 1988, Langlois and Roggman 1990, Langlois et al. 1994, Matt Ridley 1994:287–8, Pinker 1999:484, Rhodes et al. 2002, Rubenstein et al. 2002, Skamel 2003, Solso 2003, Zaidel et al. 2005, Clack 2009, Perrett 2010. Many of these authors also note that neotenous (youthful) proportions and features (such as comparatively large eyes) add to the attractiveness of female faces. For reservations about the correlation between facial attractiveness and health: Rubenstein et al. 2002. For reservations about the correlation of facial symmetry with long-term health and fitness: Rhodes et al. 2001, Laland and Brown 2011. But for contrary evidence: J. Simpson and Oriña 2003. For a review: Perrett 2010:ch. 7. The preference for symmetry carries over to artifacts and makes them appear attractive: Kohn and Mithen 1999, Halberstadt and Rhodes 2000, G. Miller 2001, Mithen 2003, Barrow 2005, Welsch 2008. On pictorial balance: Locher 2006.

Signs of health: Symons 1979, Morris 1985, Buss 1989, 1994, Etcoff 1999, Pinker 1999, Cunningham and Shamblen 2003. In women, light skin may indicate endocrinological health and fecundity: Symons 1995, Perrett 2010.

Medieval texts: Da Soller 2010.

We like what is unusual: Alley and Cunningham 1991, Perrett et al. 1994, Symons 1995, Jones 1996, E. O. Wilson 1998, Etcoff 1999:150–3, Martindale 1999, Pinker 1999:484, Cunningham and Shamblen 2003, Zaidel and Deblieck 2007, Perrett 2010. For reservations, see Langlois et al. 1994, Rubenstein et al. 2002.

The peak-shift effect: P. Bateson 1983, Martindale 1990, 1999, Alley and Cunningham 1991, Enquist and Arak 1993, Latto 1995, E. O. Wilson 1998, Kindy 1999, Pinker 1999, Ramachandran and Hirstein 1999, Cunningham and Shamblen 2003, Skamel 2003 Martindale 2007. So-called because it pushes the average to a different level.

p. 104 Darwin quote: 1880, pt. 3, ch. 19:585.

Female secondary sexual features a result of sexual selection: Hirn 1900, Geist 1978, Lancaster and Lancaster 1983, Morris 1985, Harris 1989, F. Turner 1991a, Buss 1994, Matt Ridley 1994, Jones 1996, G. Miller 1998, 2000a, Etcoff 1999, Low 2000, Skamel 2003, Guthrie 2005:340–2, Wells 2006, Clack 2009, Rolls 2011. There are cultural differences as regards the appropriate relative sizes of these features. Large buttocks are admired in Africa, and whereas Brazilian men prefer women with large buttocks and small breasts, with US men this is reversed: Jones 1996:145. For the view that selection by males is not responsible for such features: Symons 1979, Einon 2007. M. Clark 2002:43 argues that the breasts enlarged primarily to allow eye contact between the mother and her nursing baby.

Waist-to-hip ratio: see notes to p. 49.

Body weight: The ratio of 0.7 can be displayed by unusually slim women and by overweight women; the ratio depends on whether such fat as a woman has is on the hips rather than on the stomach. Different societies show different preferences for desired body mass. Singh's 1993a, 1994 male participants preferred the 0.7s in each weight class to those with higher waist-to-hip ratios, and of the 0.7s they preferred the one in the mid-weight (120 lb) range. Tassinary and Hansen 1998 suggest that body weight and the absolute width of the waist, rather than the waist-to-hip ratio, are what make women attractive to men. For comparison of waist-to-hip ratio with body mass index: McBurney and Streeter 2007, Swami and Furnham 2007.

Incest avoidance: Westermarck 1921; see also D. E. Brown 1991:ch. 5. For skepticism: Harris 1989. The deleterious effect of inbreeding on many species: E. O. Wilson 1978, D. E. Brown 1991, Sagan and Druyan 1992:249–50. The latter regard (1992:373–4) parent–child incest avoidance as nearly invariable among primates, as well as in birds. For discussion of cultural input into norms for incest avoidance: E. O. Wilson 1998, Prinz 2007:281–6.

Female preferences about male odor: Wedekind and Füri 1997, Penton-Voak et al. 1999, Milinski 2003, J. Simpson and Oriña 2003, Thornhill and Gangestad 2003, Gangestad 2007, Wedekind 2007, Perrett 2010. Men are also sensitive to the effect: Wedekind and Füri 1997.

Attractiveness of strangers: Buss 1994, G. Miller 1998, 2000a, H. Fisher 2004.

Faking mate attractiveness: Low 1979, 2000, Tooke and Camire 1991, Buss 1992, Clack 2009.

p. 105 Male chimpanzees prefer older females: Schultz 1969, Paul 2002.

Death in childbirth: at the site at which the hand axe Excalibur was found (see note to p. 1), where the remains of of 32 *Homo heidelbergensis* were interred, female mortality peaked at the age 15–19 years: Bermúdez de Castro et al. 2004, Lumley 2009.

Female fecundity: Symons 1995, Guthrie 2005:315.

p. 106 Women limiting conception: Guthrie 2005:370, citing animal population dynamics; see also Weiner 1971, Geist 1978, Symons 1995.

Our ancestors would often have gone hungry: Harris 1989, Guthrie 2005:346, Wells 2006, Wrangham 2009.

Family size: none of this is to suggest that our forebears lived in nuclear families, but it is likely that the groups were small (see note to p. 97) and that comparatively few people survived to be grandparents. Weiner 1971:162–3 suggests that only 10 percent of the population passed the age of 40 years and that only half survived to be 20.

Cave art shows chubby women: Guthrie 2005:342. As well, many Paleolithic depictions of large mammals show them with significant fat deposits which they would have possessed for only a

few months of the year: Guthrie 2005. Women are also shown as obese in Bushmen art: Power 2004.

Venus figurines: the assumption in Swami and Furnham 2007 that these are accurate representations of female body mass index for the time is implausible given how much the female features of these figurines are distorted in other respects.

Guthrie 2005:366–70. It has been suggested that many of the "fat" figurines show pregnant women: see Marshack 1991, McCoid and L. McDermott 1996. Marshack 1991 canvasses the view that they served as fertility magic and mother goddesses. For criticism: R. White 2003. On the view that the artists were women: E. Fisher 1979, McCoid and McDermott 1996, McDermott 1996. Women (and children) drew finger flutings (lines drawn by the fingers on soft surfaces): Clottes 2009, Van Gelder and Sharpe 2009.

Erotic appeal of figurines: Guthrie 2005:330–2, 338–9, 364–5; see also Geist 1978, Bataille 2005, Mellars 2009b. By contrast, Hadingham 1979:221–5 emphasizes the number of sexless figurines. The ratio of 0.655 is unusually low for women who are not corseted but is not unusual for representations of women. Singh 2002 reports a study of 330 (photographs) of artworks dating from 32 ka to 1999 that showed the most frequent waist-to-hip ratio was in the range 0.6–0.7. Jomon figurines from prehistoric (16.5–2.5 ka) Japan display the ratio of 0.7: Hudson and Aoyama 2007. Ramachandran and Hirstein 1999 offer Paleolithic Venuses and later statues of Indian goddesses as appealing to the peak-shift effect; see note to p. 103. For criticism: Hyman 2010.

Footprints of adolescents in caves: R. White 2003:79, 120, Guthrie 2005, Clottes 2009. Footprints of children are also recorded: Clottes 2009.

Men attracted to voluptuous women: Guthrie 2005:349.

P. Brown 1991.

Plumpness favored in many societies: Popenoe 2004, Richerson and Boyd 2005:20.

Cross-cultural variability in female weight preferences: Swami et al. 2008; see also Ford and Beach 1951. For a review: Swami and Furnham 2007.

p. 107 Food availability affects waist-to-hip preference: Scott et al. 2007, Tovée et al. 2007.

For alternative accounts of the causes of eating disorders: Hampton 2010.

Female thinness goes with status in industrialized cultures: Smuts 1992, Etcoff 1999, Ralevski 2000, Cunningham and Shamblen 2003, Clack 2009.

Female body fat: 15 percent of body weight is regarded as dangerously low and about 30–40 percent is considered normal in Western health manuals. It takes 50–80,000 calories (1 kilo/2.2 pounds of fat = 9,000 calories) to produce a viable infant: Frisch 1988. Lactation requires 500–1,000 calories per day above normal intake: Frisch 1988; Einon 2007 gives 800–1,100.

Food shortages regular among present-day hunter-gatherers: Scalise Sugiyama and L. Sugiyama 2009.

Feasting: Harris 1989, Wrangham 2009:180–1.

Rosenblatt quote: 1974:87.

Perrett quote: 2010:141.

Mortality in *Homo heidelbergensis*: see note to p. 105.

Hunter-gatherer mortality: Meindl 1992.

p. 108 Diversity of sexual preferences: Swami and Furnham 2007.

Effects of sexual selection: the Wodaabe of Nigeria and Niger provide an example: see Trout 1993, Dutton 2000b, G. Miller 2000a, B. Boyd 2005a, 2009a, 2009b. The men display

endurance and health in dances at which women, who favor tallness, big eyes, white teeth and straight noses, select their preferred male. All these traits are more apparent in the Wodaabe than in neighboring tribes.

Evolutionary psychologists not usually interested in individual differences: Foley 1995, J. Carroll 1999, 2004, 2006, 2011. But see Tooby and Cosmides 1990b, G. Miller 1998, 2000a, Nettle 2007 for discussion of individual differences.

p. 109 Parents select their children's spouses: this was Westermarck's 1921 line of objection to Darwin's account of sexual selection.

The importance to men of sexual fidelity in their partners (as a guarantee of their paternity): Trivers 1972, Symons 1979, Crook 1980:157–8, J. Brown and Greenhood 1991, Buss 1994, Matt Ridley 1994:227–30, Wright 1994, Pinker 1999:488–9, G. Miller 2000a:332–4, Thornhill and Gangestad 2003, Guthrie 2005, Clack 2009. For the view that this is more a social than biological behavior: W. Wood and Eagly 2002; for criticism: Gottschall 2008a. How male concerns about paternity turn into attempts to control women's bodies: Dinnerstein 1976, Chodorow 1978, Symons 1979, Ong 1981, Benjamin 1988, Diamond 1992:95–7, M. Wilson and Daly 1992, Storey 1996, Okin 1998, Low 2000, Thornhill and Gangestad 2003, Clack 2009. On violence such as "honor killings" against women: Talbott 2005:93–5.

Male genital mutilation: male circumcision is common though it apparently does not have the hygiene benefits sometimes claimed for it. Some Australian Aborigines have the practice of penile sub-incision: E. Fisher 1979:155.

Female genital mutilation in Africa: Buss 1994:138.

Footbinding held to promote health: Mackie 1996.

Clitoral contact allegedly fatal: Mackie 1996, Talbott 2005:95–8.

Older women and mothers complicit in supporting agendas of masculine control of younger women: Okin 1998.

Footbinding as means to seclude women and ensure their fidelity: Mackie 1996:1001–2; see also Sagan and Druyan 1992:214, M. Wilson and Daly 1992, Low 2000, Veblen 2001:109, Dunbar 2004:94, Swami and Furnham 2007.

Matchmaking: Buss 1989, Rockman 1994.

High failure of arranged marriages: A. P. Wolf and Haung 1980, M. Wilson and Daly 1992:310, Buller 2005: 272–3. For skepticism: Rosenblatt 1974, Prinz 2007:282–3.

Dress as sign of marital status or wealth: Low 1979, 2000.

End of footbinding: Mackie 1996.

p. 110 Others against opposing biology and culture: Tooby and Cosmides 1992, Griffiths and Gray 1994, Pinker 1999:45–7, Goldie 2000, D. S. Wilson 2002, Richerson and Boyd 2005.

Ethics and evolution: the nineteenth-century evolutionists Spencer 1966, vol. 11 [1851] and Huxley 1893 thought of ethics as beyond the scope of evolution. For Spencer, that was so much the worse for conventional morality; whereas for Huxley, it showed the importance of moral constraints on our evolved natures. For discussion: J. Carroll 1995a.

Altruism as well as selfishness part of our nature: Talbott 2005.

Altruism: the evolutionary psychology literature on topics such as human reciprocal altruism lies beyond my remit. For a review: Prinz 2007:ch. 7.

F. Turner quote: 1991a:6.

p. 111 Love: not always seen as a good basis for marriage: Rosenblatt 1974. Its biochemistry and neurology: H. Fisher 2004, Zeki 2009. As an emotion: Lazarus 1991. As an adaptation:

E. O. Wilson 1978, Frank 1988, Fletcher 2002, Fletcher and Stenswick 2003, H. Fisher 2004, Rolls 2011. As not adaptive: Prinz 2004.

Nonhuman animals experience love: H. Fisher 2004.

The need for cooperation and mutual trust among our forebears: Geist 1978, Pinker 1994, H. Kaplan et al. 2000, G. Miller 2000a, Gosden 2003, Guthrie 2005, Flesch 2007. For accounts of the centrality of cooperation in human nature: Richerson and Boyd 2005, Tomasello 2009.

Love in at least 147 of 166 cultures: Jankowiak and Fischer 1992.

Love a literary universal: Gottschall 2008a.

p. 112 Spencer quote: 1966, vol. 14:387.

Halo effect: Shapiro et al. 1976, Bull and Rumsey 1986, Kuhlenschmidt and Conger 1988, Eagly et al. 1991, Feingold 1992, Zebrowitz 1997, Etcoff 1999, Langlois et al. 2000.

Men predict that attractive personality goes with low waist-to-hip ratio: Singh 1994.

Ugly effect: Editors of the *Harvard Law Review* 1987, Etcoff 1999.

Better treatment of attractive people: West and Brown 1975, Patzer 1985, Bull and Rumsey 1986, Raza and Carpenter 1987, Langlois et al. 1990, Hamermesh and Biddle 1994, Zebrowitz 1997, Langlois et al. 2000, Swami and Furnham 2007, Perrett 2010.

Attractive people treated better in court: Stewart 1980, Zebrowitz and McDonald 1991, Swami and Furnham 2007.

p. 113 Women may overrate their physical attractiveness: Brewer et al. 2007.

The rebuffed did not breed: Fletcher and Stenswick 2003.

p. 114 R. A. Fisher quote: 1915:191.

Being treated as beautiful enhances self-esteem and performance: Etcoff 1999.

Helpful people look more attractive: Perrett 2010.

p. 116 We value what is evolutionarily useful: N. Carroll 2002 argues that the reality of evolution shows that nothing is intrinsically valuable. Not everything serves an evolutionary purpose, however, and many of the things that do are intrinsically pleasurable. Stecker 2006 criticizes Carroll's view.

Part III. The Arts

Chapter 8

p. 121 Pinker 2007.

Art enables science: B. Boyd 2009a:124.

B. Boyd quote: 2005a:166–7.

Ball quote: 2010:29; see also Kingsbury 2011 on Dutton.

p. 122 DePryck 1999.

Writing, reading, and mathematics are not adaptations: Justus and Hutsler 2005.

No correlation between artistic value and a connection with evolution: Easterlin 1999, Dissanayake 2006, Dutton 2009.

Literary Darwinism: coined by J. Carroll 2004. B. Boyd 2009a prefers "evocriticism."

Discussions of literature and evolution often highly polemical: see J. Carroll 1995a, 1995b, 2004, 2007a, 2007b, 2011, Evans 2005, B. Boyd 2006a, 2009a, Gottschall 2008a, 2008b, Swirski 2010.

Pinker quote: 1999:534.

p. 123 Pinker quote: 2002:405.

Later reformulation: Pinker 2007.

p. 124 Dissanayake and Miller vulnerable to the charge that art relies on some more basic adaptation: S. Davies 2005, De Smedt and De Cruz 2010.

Dissanayake on art, ritual, and play: 1988:75–105, 1995a:45–56, 2006.

G. Miller on gossip, humor, etc.: 2000a.

G. Miller's sexual selection explanation for art: 1998, 1999, 2000a, 2001. Miller's conclusion was anticipated by other writers: Hirn 1900, Comfort 1962b, E. O. Wilson 1978, Eibl-Eibesfeldt 1988, Harris 1989, Diamond 1992, Power 1999, and for music, Darwin 1880. Miller's supporters include Dutton 2000b, 2009, Voland 2003, Barash and Barash 2005, Zaidel 2005, Levitin 2006, Perricone 2011, and up to a point, Welsch 2004.

Sexual selection and sexual dimorphism: some object to Miller that sexual selection always goes with a high degree of sexual dimorphism, which humans do not display: S. Brown 2000a, Huron 2003, Patel 2008, Cross 2009, Ball 2010. But this does not seem to be right. Runaway sexual selection in polygynous species goes with runaway change, but selection for sex-based markers of fitness in largely monogamous species need not do so: Low 1979, G. Miller 2000a. See notes to pp. <39> and <40>.

Artistic talent not highly heritable: see note to p. 50.

Males compete for partners more than females: Trivers 1972.

p. 125 Coe 2002. It seems to me that Coe's own theory—that art originated in the need to identify ancestors and that it serves as a badge of clan membership and kinship—must be open to the same objection. Much of the cave art of Europe was not suited to that function because of its underground location.

Cave art not publicly viewed: children of both sexes, adolescents, and women did enter some caves: Guthrie 2005, Stapert 2007, Clottes 2009, Van Gelder and Sharpe 2009. Nevertheless, much cave art would be unlikely to have been widely viewed. The most spectacular images of Chauvet are in a cave that was rarely frequented: Clottes 2009.

Art did not originate in sexual competition or display: Dissanayake 1999a, 2000a; see also: B. Boyd 2005a, 2007a, 2009a, J. Carroll 2007b, Ball 2010.

Women and children disenfranchised as art makers by Miller: Dissanayke 2000b, Glausiusz 2001, B. Boyd 2005a, 2009a, Cross 2007, J. Carroll 2007b. Guthrie 2005 argues that the prehistoric record favors men's art only because women's art employed less durable materials.

Children not rehearsing mate selection: Fitch 2006 argues that this shows that music did not originate in the service of sexual selection.

Art separated from reproduction: B. Boyd 2005a, Dissanayake 2006, Pinker 2007.

Males make most art: G. Miller 1999. Rolls 2011 thinks this is plausible, but that women's interest in gossip might make them more creative in literary fiction!

Miller's examples are all Western: Cross 2001, 2003b, Ball 2010, De Smedt and De Cruz 2010.

Lack of evidence that musicians leave more children: Fitch 2005.

p. 126 Composers left fewer children than the average: Fukui 2001a. A confounding factor here, however, is that only legitimate children were considered.

Men's artworks serve as fitness indicators in female mate choice: Clegg et al. 2008.

p. 127 B. Boyd quote: 2009a:79, 2009b:218; see also 2005a, 2007a. Others who conclude sexual selection piggybacks on more central functions of art: Dissanayake 1999a, Dunbar 2005, Cross and Morley 2009.

J. Carroll quote: 2004:xxi.

Ball quote: 2010:21.

Mithen quote: 2005:180.

B. Boyd 2001, 2005a, 2007a, 2008a, 2008b, 2009a. For a critical response to 2009a: Mellmann 2010. For a similar theory: Donald 2009.

B. Boyd quote: 2005a:152 (and 2005b:10).

B. Boyd quote: 2009a:108.

Pinker quote: 2007:174.

Ralevski 2000.

p. 128 Koch quotes: 1988:96 (see also 1984), 1993:77.

For criticism of Koch's theory: J. Carroll 2004.

Art refines perceptual skill: Alland 1977, 1989a, Ludmany 1999, F. Turner 1991a, 1991b, Zeki 1999, 2000, Tooby and Cosmides 2001, Huron 2003, De Sousa 2004, B. Boyd 2007a, 2008a, 2009a.

Allott 1994; see also B. Boyd 2005a, 2009a.

p. 130 Not all sensory pleasures or preferences are aesthetic: Dissanayake 1995a:66, 1999a.

Neuroscientific approaches to painting: see note to p. 49.

Artistic quality: Dissanayake 1998, 1999a, 2000a.

Biological fitness not reducible to copulatory frequency: Dissanayake 1982, 1984, 1988, 1995a, 2000a.

Human evolution stopped 40–20 ka: for the contrary view, see notes to p. 36.

Universal and innate dispositions: De Sousa 2004 thinks that Dissanayake confuses what is innate with what is universal. Eye color is innate but not universal; and English may become the universal language but would not be innate. On the distinction between developmental fixity and universality or pan-culturalism, see Griffiths 2002.

Fitness as reproductive success: Dissanayake 1995a:36, 2000a:21.

Change over past 20,000 years is cultural: Dissanayake 1988, 1995a, 2000a.

Art behaviors as patterns or syndromes of creation and response: Dissanayake 1988.

Art behaviors as rhythms and modes of mutuality: Dissanayake 2000a.

Art as universal, innate, old, and a source of intrinsic pleasure: Dissanayake 1988, 1995a.

Dissanayake "Homo aestheticus" quote: 1995a:xix.

Art as making special: Dissanayake 1980, 1982, 1984, 1988, 1995a, 1995b, 2006, 2008b.

Art as elaboration: Dissanayake 2000a.

Making special dates to 100 ka: Dissanayake 1988, 2008b.

Appearance of art 60–40 ka: Dissanayake 2000a.

Arts united with ritual and play: Dissanayake 1974, 1979, 1982, 1988, 2000a, 2008a, 2008b. The identification of music with religious ritual in many societies: Morley 2009.

Art promotes group benefits: Dissanayake 1974, 1979, 1982, 1988, 2000a, 2008a. De Smedt and De Cruz 2010 see a potential inconsistency in Dissanayake's stressing group benefits while holding that selection operates on individuals, not groups. It is fairly clear, though, that Dissanayake has in mind that favorable group conditions improve the fitness of individual members of the group.

Art promotes group benefits: B. Boyd 2005a denies that societies which treated important activities as special would have greater success because important activities need to take place regardless of embellishment. However, that they must occur does not show that they cannot be made more effective by being made yet more special.

Art promotes social identity and cohesiveness: in Dissanayake 2007 she places the emphasis somewhat differently. She suggests that art has the function of relieving tension and anxiety and she affirms its role in group coordination.

Alienation of modern life: Dissanayake 2000a:188–92, 198–200, 1990, 1995a:137.

p. 131 Dissanayake quote: 1988:194–5. Alland 1989b objects to the assumptions derived from sociobiology that he detects as underlying this aspect of Dissanayake's view.

Criticism of high Western art of twentieth century: Dissanayake 1980, 1988:183, 188–92, 198–200, 1990, 1995a:137.

Theories focusing on art's origins tend to be reductive: S. Davies 2005.

Four criteria of aesthetic quality: Dissanayake 1998, 2000a:209–21.

Some super stimuli do not engage what matters to us: Dissanayake 2000a:120, 123.

Making special too broad a notion: Lewis-Williams 2002, S. Davies 2005, De Smedt and De Cruz 2010.

Dissanayake ignores art's semantic, symbolic, and representational character: S. Davies 2005. In this respect Dissanayake might deserve Ralevski's 2000 objection that she hardly differentiates animals (peacock's tails) from humans (Armani suits).

Dissanayake quote: 1995a:85, 94.

Dissanayake deals with proto-aesthetic behaviors rather than the aesthetic itself: see Dissanayake 1998, 1999a.

p. 132 Art originated in play: Hirn 1900, Spencer 1966, vol. 5:693–4 [1880], Dissanayake 1974, Alland 1977, 1989a, Collins and Onians 1978, Geist 1978, Fuller 1983, Ralevski 2000, Tooby and Cosmides 2001, Carruthers 2002, B. Boyd 2004, 2005a, 2007a, 2008a, 2008b, 2009a, Currie 2004, Guthrie 2005, Zaidel 2005, Deacon 2006, Heath 2006, Eibl and Mellmann 2008. Molino 2000 holds that art and play have a common origin. For Grosse 1897, play is the transition from practical matters to art.

Play in animals: Groos 1898, Spencer 1966, vol. 5:694–8 [1880], Rensch 1973, Fagen 1981, Smith 1984, Bekoff and Byers 1998, B. Boyd 2004, 2007a, 2008a, 2009a.

Origin of music in pre-linguistic vocalizing: Darwin 1880, pt. 3, ch. 19:572, Grosse 1897, Sperber 1996, S. Brown 2000b, Falk 2000, Merker 2005, Mithen 2005, Baroni 2008, Gardiner 2008, Fenk-Oczlon and Fenk 2009–10, Panksepp 2009–10.

Origin of music as by-product of the evolution of language: Spencer 1966, vol. 14 [1857], Granit 1977, Pinker 1999, Falk 2000, Barrow 2005, De Smedt and De Cruz 2010.

Origin of music in infant-directed speech: Roederer 1984, Eibl-Eibesfeldt 1988, Storr 1992, Dissanayake 1999b, 2000a, 2000b, 2006, 2008a, Freeman 2000, Trehub 2000, 2003a, 2003b, Trainor and Schmidt 2003, Falk 2004, Fitch 2005, Koelsch and Siebel 2005, Mithen 2005, Alcorta et al. 2008, Baroni 2008, Panksepp 2009–10. Wermke and Mende 2009–10 identify babies' crying as the source of music. Parncutt 2009–10 suggests that the origins of music are prenatal.

Origin of music in attracting mates: Darwin 1880, Hirn 1900, G. Miller 2000a, 2000b, Levitin 2006, Dutton 2009.

Origin of music in cross-domain cognitive development: Cross 2001, 2003a, 2003b, 2003c, 2008, 2009, 2009–10. Music prepares the baby for future mental life and speech: Roederer 1984, Tooby and Cosmides 1989b, Trehub 2003a, 2003b, Levitin 2006, Merker 2006.

Origin of music in evocation of affectively charged memories: Schubert 2009–10.

Origin of music as a response to the significance for our ancestors of environmental sounds: Boero and Bottoni 2008.

Origin of music in effecting social differentiation of individuals: Ralevski 2000, Grewe et al. 2009–10.

Origin of music in inciting group effort: S. Brown 2000a, Huron 2003, B. Boyd 2005a, 2007a.

Origin of music in ensuring bonding, synchrony, coordination, entrainment, and group emotional catharsis: Hirn 1900, Roederer 1984, Dissanayake 1988, 1995a, 1999a, Eibl-Eibesfeldt 1988, Storr 1992, S. Brown 2000a, 2000b, Merker 2000, Fukui 2001a, Cross 2001, 2003a, 2003b, 2009, Dunbar 2003, 2004, Huron 2003, B. Boyd 2005a, 2007a, 2009a, Koelsch and Siebel 2005, Mithen 2005, Alcorta et al. 2008, Morley 2009, Bisphan 2009–10.

Origin of music in promoting conflict resolution: Fukui 2001b, Huron 2003, Bown and Wiggins 2009–10, Cross 2009–10.

Origin of music in serving as a form of mutual grooming: Dunbar 2003, 2004.

Origin of music in providing group defense of territory: S. Brown 2000b, B. Boyd 2009a, Hagen and Hammerstein 2009–10. Koch 1984, 1993 traces the origin of all art to displacement behaviors involved in territorial defense.

Other benefits: Huron 2003.

Music is multifunctional: This is consistent with the view presented in Brattico et al. 2009–10, that the explanation of the origin of aesthetic experience in music is likely to involve a more heterogeneous set of biological mechanisms than is often assumed.

Music cannot unite the group if its prime purpose is as a competitive form of male display: B. Boyd 2005a, Pinker 2007, Dutton 2009.

p. 133 Ball quote: 2010:5–6.

Spencer quote: 1966, vol. 14:443–4; see also 1966, vol. 19:40.

p. 134 The origins of the cochlea: Granit 1977:12–13, C. Nussbaum 2007:52.

Writing and reading are approximately 5,000 years old: for a useful discussion: Gosden 2003.

Chapter 9

p. 136 Spandrel: Gould and Lewontin 1979. Strictly speaking, their architectural example from San Marco in Venice is called a "pendentive" and pendentives are far from architecturally irrelevant because they add strength: Mark 1996, Houston 1997.

"The default assumption": Tooby and Cosmides 2001.

Facial recognition circuits activated by portraits: Solso 2003, Costa and Corazza 2006, De Smedt and De Cruz 2010, 2011.

p. 137 De Smedt and De Cruz quote: 2010:710. For recent examples of the view that visual art is a by-product: Deacon 2006, Donald 2006, De Smedt and De Cruz 2010.

Disagreement about whether art behaviors are supported by art-specific brain networks: consider music. Among those who deny that there are music-specific modules are Justus and Hutsler 2005, Patel 2008, Ball 2010. Mithen 2005 notes that music centers are dispersed throughout

the brain, but suggests that this is consistent with modularity. Among those who claim that there are music-specific brain circuits are S. Brown 2000a, Peretz 2000, Peretz and Hébert 2000, Lewis 2002, Huron 2003, Peretz and Coltheart 2003, Levitin 2006, Feist 2007, C. Nussbaum 2007:72–7.

Problem of distinguishing innate neural structures from those acquired via learning in music: McDermott and Hauser 2005a.

Evidence indecisive for music: McDermott and Hauser 2005a.

The absence of specialized circuits does *not* show that art is not an adaptation: argued for music in Merker 2006.

Evolutionary psychologists have been wary of equating modularity of the mind with neural localization and specificity: Barrett and Kurzban 2006.

Zeki 2000, 2006; see also Solso 2003.

p. 138 Darwin quote: 1880, pt. 3, ch. 19:569–70.

Wallace quote: 1889:468. For a modern version of the view: Feist 2007.

Pinker "cheesecake" quote: 1999:534, 538.

The other arts: Pinker 2002, 2007.

More theories of music as a spandrel: see Patel 2010 for a similar list.

Music a by-product of language: Granit 1977, Falk 2000, Barrow 2005, De Smedt and De Cruz 2010.

Barrow quote: 2005:233.

p. 139 Spencer 1966, vol. 14. For early skepticism: Grosse 1897.

Sperber quote: 1996:142.

Music an offshoot of affective systems: Panksepp 2009–10.

Music and "Theory of Mind": Livingstone and Thompson 2009–10.

It is difficult to understand Pinker's metaphor: J. Carroll 1998, 2011, Hernadi 2001, Grodal 2008, Dutton 2009. On J. Carroll versus Pinker: Eibl and Mellmann 2008.

p. 140 Pinker did intend to identify music as a by-product: Justus and Hutsler 2005 suggest instead that Pinker regards music as an exaptation—that is as an adaptation based on structures that evolved earlier. But they give the term an unusual definition and, in my view, misrepresent Pinker. For the classic description of exaptation: Gould and Vrba 1982.

Exercise of the senses is a source of pleasure: Berlyne 1971, Martindale 2007, B. Boyd 2009a.

Purely instrumental music invites "off-line" exploration of scenarios: Levinson 2006, C. Nussbaum 2007. For criticism of Levinson's approach: S. Davies 2006c.

Music provides respite from the world: Goldman 1992.

p. 141 Most discourse is thin in informational content: Dunbar's 1996 account of language as social grooming would be one theory that runs against the model that sees language as adaptive solely for its information-bearing capacity.

As a costly spandrel, music should have been selected against: J. Carroll 1998, Huron 2003, B. Boyd 2005a, 2008a, 2009a, Levitin 2006. Gottschall 2008b rightly questions the validity of this argument by substituting *senescence* for *music*.

p. 142 Music is not always pleasant: Cross 2005–6, Ball 2010.

Pinker's view of music trivializes its value: J. Carroll 1998, 2004, Patel 2010.

Pinker's view of music is ethnocentric and focused on historically recent models: Cross 2001, 2003b, 2005, 2007, B. Boyd 2005a.

Literature is not adaptive: Pinker 2002, 2007; see also Eibl and Mellmann 2008, De Smedt and De Cruz 2010.

Literature is adaptive: Tooby and Cosmides 2001. On the relation between their view and Pinker's: Mellmann 2011.

Barkow 1992.

Flesch quotes 2007: 21, 46.

p. 144 Form becomes norm: Griffiths 2002 characterizes the tendency to think this way as involving "folk essentialism," but concedes the reality of the effect. See also Kingsbury 2011.

p. 145 Absent navel: surgery can result in the absence of a belly button. A reduced one can be the outcome of a lotus birth or premature caesarean.

Comparatively minor departures from norms of bodily structure: where these may impact on performance more generally and are easily adjusted, of course we can and should make the alteration. To mention just one relatively common problem, cleft palates, which can interfere with enunciation, are surgically restored as a standard procedure in First World countries.

Honest because costly signals: see note to p. 37 on the "handicap principle."

Many different kinds of techno music: Sean Cooper in M. Erlewine et al. 1997: 1155–6.

p. 146 Social Darwinism: the mistaken equation of nature with norm is criticized in Goodheart 2007.

Left-handedness: historically, many societies tried to prohibit the use of the left hand for certain tasks such as eating or writing, but this did not eliminate left-handedness from the population. There are, however, cultural influences on its prevalence. For a review: Llaurens et al. 2009.

Chapter 10

p. 148 Writing and reading are spandrels: Gould 1997a, 1997b.

Language and culture products of large brain: Gould 1977.

Tomasello 1999; see also Grodal 2008.

Mithen 1996.

p. 149 Richerson and Boyd 2005.

Patel 2008, 2010. For different reasons, musicologists and social scientists are liable to assume that biology is irrelevant to culture and to view music as a culturally determined product: for example, Walker 2004.

p. 150 Patel quote: 2008:401; his italics.

p. 151 Language as an adaptation: Patel 2008:259–366. See note to p. 48.

Gene for language: S. Carroll 2005:274–6.

Compared to language, music is not an adaptation: Patel 2008:371–400. Kramnick 2011 adopts a parallel strategy of comparing fictional literature to language in arguing that the former is not an adaptation as the latter is.

Musical responses of newborns not innocent: Patel 2008; see also Justus and Hutsler 2005, McDermott and Hauser 2005a.

p. 152 Swiss army knife model of the human mind: see note to p. 41 on modular minds.

Modular functioning need not be underpinned by specific neural circuits: Barrett and Kurzban 2006.

Human cognition not all modularly encapsulated: Sterelny 1995, 2003, Mithen 1996, Tomasello 1999, Fodor 2000, Currie 2004, Dunbar 2004, Buller 2005, Justus and Hutsler 2005, Richerson and Boyd 2005, J. Carroll 2011.

p. 153 Patel allows for beat-based rhythm module: 2006, 2008:402–11.

Patel allows for music-specific neural circuitry generated by experience: 2008:357.

Debate about the existence of music-specific brain networks: see notes to p. 137.

Overlap in language and music brain areas: Maess et al. 2001, Levitin and Menon 2003, Besson and Friederici 2005, Fitch 2005, Justus and Hutsler 2005, Koelsch and Siebel 2005, Ball 2010.

Parallels between processing of music and language: Fenk-Oczlon and Fenk 2009–10.

Music preceded language or both had a common origin (that is, the musilanguage hypothesis): see notes to p. 32.

Language's modularity special: Sterelny 2003:177–81.

Not all developmentally robust behaviors are adaptations and not all adaptations are developmentally robust: Mameli 2008.

Low heritability of high-level musical talent: three of Johann Sebastian Bach's sons were also composers, and Mozart's father, Leopold, was a professional musician; but it is not clear whether this sort of evidence points to an inherited genetic component in musical talent. See Pratt 1977, Howe et al. 1998 and their discussants.

p. 154 Low- versus high-level musical capacities: Barrow 2005 argues against music's being an adaptation on much the same grounds as Patel, by contrasting how mixed musical abilities are by comparison with the robust expertise all show in language mastery. He makes very clear, however, that he is considering high degrees of musicianship in composing and performing.

Children's acquisition of language: Bloom 2000.

Most survival skills not acquired until late teens: H. Kaplan et al. 2000, Sterelny 2003:168.

p. 155 Children sing melodies at 18 months: Ball 2010.

Trehub 2003a, 2003b; see also Feist 2007, J. McDermott 2008. Infants as young as eight months are able to extract and remember three-note sequences: Saffran et al. 1999.

Cross 2001, 2003a, 2003b, 2005–6.

Appeal of music to babies: see references to p. 132 for those who find the origins of music in infant-directed speech.

p. 156 Music stimulates motor as well as auditory regions of the brain: Janata and Grafton 2003, Koelsch et al. 2006.

Origin of fire control: Pfeiffer 1982, 1985, Gräslund 2005, Fessler 2006, Sterelny 2012. Klein 2009 allows that control over fire might date to 1.51 ma but gives the established date as 780 ka. Gamble 2007 and Lumley 2009 offer the more conservative date of 400 ka for hearths. Klein 2000 identifies the first "incontestable" hearth at 200 ka. While our nearest relative, the chimpanzee, does not control fire, in some respects it shows a more sophisticated understanding of wild fire than modern humans: Pruetz and LaDuke 2010.

Fire changed human evolution: Tooby and DeVore 1987, Sterelny 2001, Barrow 2005, Fessler 2006.

Fire changed digestion: H. Kaplan et al. 2000, Clack 2009, Wrangham 2009. For criticism: Schoeninger 2010. Earlier I quoted Patel 2008:401 on fire as saying "there is no going back, *even though we might be able to live without this ability*." This fails to acknowledge how fire has changed us in irreversible ways.

Wrangham 2009. For critical discussion of the hypothesis: Sterelny 2003:110–12.

Fire has altered the human genome: Sterelny 2001.

Chapter 11

p. 159 Livingstone 2002:38–40 (*Impression Sunrise*), 68–73 (*Mona Lisa*).

Art used to illustrate the processing and organizational principles of perception: for example, F. Turner 1991a, Solso 1994, 2003, Latto 1995, Ramachandran and Hirstein 1999, Zeki 1999, 2000, 2006. S. Brown and Dissanayake 2009 observe critically that neuroaesthetics applies as much to the visual appreciation of things generally as to art.

Zeki quote: 2000:1.

p. 160 Irradiation: Livingstone 2002:122–7, De Smedt and De Cruz 2010, N. Carroll et al. 2012.

Portraits exaggerate facial features: Costa and Corazza 2006.

Eye-like circles and snake-like squiggles: Eibl-Eibesfeldt 1988, Aiken 1998.

Currie quote: 2003:708.

For other philosophers' evaluations of the relevance of neuroaesthetics for understanding visual art: Lopes 2003, Rollins 2004, Kulvicki 2006, Stokes 2009, Hyman 2010, N. Carroll et al. 2012.

Neuroscientific work on reading: M. Wolf 2007, Dehaene 2009.

Brain locations rather than domain-specific modules associated with reading: Kramnick 2011.

p. 161 Universal themes in literature: see note to p. 55.

Polti's 1977 [1895] 36 plot types: supplication, deliverance, crime pursued by vengeance, vengeance taken for kindred on kindred, pursuit, disaster, falling prey to cruelty or misfortune, revolt, daring enterprise, abduction, the enigma, obtaining, enmity of kinsmen, rivalry of kinsmen, murderous adultery, madness, fatal imprudence, involuntary crimes of love, slaying of a kinsman unrecognized, self-sacrificing for an ideal, self-sacrifice for kindred, all sacrificed for a passion, necessity of sacrificing loved ones, rivalry of superior and inferior, adultery, crimes of love, discovery of the dishonor of a loved one, obstacles to love, an enemy loved, ambition, conflict with a god, mistaken jealousy, erroneous judgment, remorse, recovery of a lost one, and loss of loved ones.

Booker 2005 augments an initial seven basic plots with two more, giving: overcoming the monster, rags to riches, quest, voyage and return, comedy, tragedy, rebirth, rebellion, and mystery.

J. Carroll 1995a, 1999, 2004.

Westfahl quote: 1999:220.

Universality of literary themes reflects cultural diffusion rather than common human nature: Hogan 2003a, 2003b, 2008a, 2008b. For criticism: Gottschall 2004.

Bohannon 1966.

The Tiv share some of our responses to *Hamlet*: Konner 1988, Storey 1996, Scalise Sugiyama 2003, B. Boyd 2005b.

Literary interpretation as applied evolutionary psychology: J. Miller 1987, Hiatt 1989, Rancour-Laferriere 1993, J. Carroll 1995a, 1999, 2004, 2005, 2007a, 2011, Fox 1995, 2005, Nesse 1995, Scalise Sugiyama 1996b, Storey 1996, Whissel 1996, B. Boyd 1998, 2001, 2005b, 2009a, Cox 1999, Easterlin 2001, 2005, Cooke 2002, Barash and Barash 2005, Kruger et al. 2005, Nettle 2005a, 2005b, Nordlund 2005, Salmon 2005, Zunshine 2006, 2008, 2009, Flesch 2007, Swirski 2010, 2011, Vermeule 2010. For salutary warnings about dangers of the approach: Mellmann 2011.

p. 162 Quantitative studies: these are advocated and conducted most prominently by Jonathan Gottschall; see Gottschall 2005, 2008a, and J. Carroll et al. 2009, J. Carroll 2011.

"It might be objected": as in Dissanayake 1999a. By contrast, and unconvincingly in my view, Harpham 2008 suggests that the mystery of literary value can now be solved.

Evolutionary story just another interpretative tool: some such view is advocated in Nordlund 2002, Zunshine 2006, 2007, Mellmann 2011. For an exchange on the topic: B. Boyd 2006b, 2007c. Flesch 2007 suggests that narrative fiction is a by-product rather than an adaptation; see Chapter 9. Vermeule 2010 is agnostic about whether literature is an adaptation.

p. 164 Interested in the broader notion of narrative: Niles 1999, Scalise Sugiyama 2001a, 2001b, 2008, Scalise Sugiyama and L. Sugiyama 2009.

All explanations are at bottom narrative: Rabkin 1983.

Narrative is the fundamental instrument of thought: M. Turner 1996:4–5.

Narrative is an adaptation for regulating relations: Hoeg 2009:1.

Narrative evolved to tell humans who we are: Booker 2005; see also Oatley and Mar 2005.

The self is a concatenation of narratives, etc.: Storey 1996.

Centrality of narrative: Misia Landau 1991.

Creation myths and communications with spirits treated as like fictions: for example, B. Boyd 2005a, 2009a:199–206.

Fictional storytelling is an extension of non-fictional storytelling: Dutton 2009.

Fictions usually describe many factual matters: Scalise Sugiyama 2001a, 2001b, 2008.

Hernadi 2001.

Fiction versus history: for perceptive discussions, see Zunshine 2006, Swirski 2010.

Need narratives for identity and history: Novitz 1989b, Fireman et al. 2003.

p. 165 Hernadi 2001.

Literature compensates for dissonance of modern life: Storey 1996, Austin 2007. A different view is that art buffers fear of death: Mark Landau et al. 2010.

J. Carroll quote: 1999:160.

Literary behaviors have long history: Kramnick 2011 thinks the Literary Darwinist must be committed to saying that contemporary novels have the same function as Stone Age tales, but I argue later that this need not be so.

G. Miller 2000a, Dutton 2009.

Constable 1997; see also G. Miller 2000a.

p. 166 Scalise Sugiyama 1996a.

Forager or hunter as narrator: Scalise Sugiyama 2001a, 2001b, Scalise Sugiyama and L. Sugiyama 2009.

Fiction might be interpreted as a kind of simulated gossip: Nettle 2005a, Flesch 2007, Pinker 2007, Vermeule 2010.

B. Boyd quote: 2001:201; see also 2005a:166–7.

The fictive stance: Lamarque and Olsen 1994. For a review of empirical work on literary reading: Miall 2006.

Fiction mix of familiar and fantastic: B. Boyd 2005a, 2009a.

Gifted few fiction authors: see Dunbar 2005 on why good storytellers might be rare.

Niles quote: 1999:129; see also Storey 1996, Dunbar 2005.

p. 167 Stories define moral and social boundaries: Rabkin 1983, 1995, Argyros 1991, Cox 1999.

Stories dramatize heroes and villains: Cooke 1999b, Hernadi 2001.

Art keeps society stable: Argyros 1999.

N. Carroll quote: 2004:102.

Hernadi 2001.

Dissanayake 1988, 1990, 1995a, 1995b.

Some adopt multilevel selection theory: S. Brown 2000a, B. Boyd 2005a, 2009a, Flesch 2007. As an opponent of multilevel selection theory, Pinker 2007 thinks this is an error.

p. 168 Aggressive fiction: Kernan 1973.

Fictional literature more about competition than group unity: B. Boyd 2005a, Dutton 2009.

Fictional literature provides social knowledge and skill: Rabkin 1983, Hobbs 1990, Argyros 1991, Scalise Sugiyama 1996a, 2001a, 2001b, 2005, J. Carroll 1999, 2004, 2007a, Gottschall 2004, Zunshine 2006, Swirski 2008, Scalise Sugiyama and L. Sugiyama 2009. Pinker 2002, 2007 allows the plausibility of the position—and is applauded on this score in B. Boyd 2005a, J. Carroll 2006, Austin 2007, Dutton 2009—but ultimately he is critical of it. De Smedt and De Cruz 2010 share Pinker's reservations.

p. 169 Dutton quote: 2009:118.

B. Boyd quote 2009a:192–3.

Kramnick quote: 2011:345.

Goodheart 2007; see also Flesch 2007, Kelleter 2008, Spolsky 2008, Eibl 2009. For critical discussion: Slingerland 2008, Swirski 2008, J. Carroll 2011.

J. Carroll 2011:81. For discussion: Kelleter 2008.

Narrative fiction furnishes cognitive maps: J. Carroll 1995a, 2004, 2005, 2007b.

Narrative fiction reveals our nature: J. Carroll 1999:170.

Narrative fiction models resolution of goal conflict: Scalise Sugiyama 2005.

Narrative fiction enhances empathy and sympathy: Storey 1996.

Narrative fiction trains Theory of Mind: Zunshine 2006, 2008, 2009; see also Oatley and Mar 2005, Austin 2007, Flesch 2007, Vermeule 2010, Rolls 2011.

Narrative fiction teaches deception: Cooke 1998, Hansen 1999, Hernadi 2001, Zunshine 2006, Flesch 2007, Hoeg 2009, Vermeule 2010.

p. 170 Can learn about the real world from fictions: S. Davies 1997b, Currie 1998.

Fiction can miseducate: Currie 1997, Flesch 2007, Foy and Gerrig 2008.

Learn only platitudes from fiction: Lamarque 2006, 2010. Pinker 2007 also suspects that we might take from fiction nothing subtler than the psychological assumptions we started with.

Narrative fiction as instruction does not adequately account for the pleasure we take in it: Flesch 2007.

Learn Theory of Mind too early to need fictional stories for its development: B. Boyd 2005a, 2009a, Swirski 2010.

Children master Theory of Mind at three levels of intentionality—he believes that she wants her mother to think—at about 5 years of age: Callaghan et al. 2005.

Understanding stories presupposes mastery of Theory of Mind and counterfactual reasoning: Astington 1990.

We are often given direct access to minds of fictional characters: N. Carroll 2000b.

Literature refines Theory of Mind skills: by the age of ten, children have not yet fully mastered higher-order Theory of Mind skills: Liddle and Nettle 2006. There is evidence that subtle refinements to the skill occur later in adult life: Happé et al. 1998.

p. 171 Deception in animals: Dawkins and Krebs 1978, de Waal 1998, Byrne 1999.

Literature as repository of knowledge: J. Carroll 1999, 2004, Scalise Sugiyama 2005, 2008.

p. 172 Cosmides and Tooby 2000b, Tooby and Cosmides 2001. Although he does not agree that the mind is massively modularized, J. Carroll 2004, 2011 also sees fiction as a way of organizing motivational systems that are not driven by instinct; see also Eibl and Mellmann 2008, Scalise Sugiyama 2008.

Tooby and Cosmides quote: 2001:21.

Childhood play involves modes of counterfactual and hypothetical thinking: Leslie 1987, 1994, Carruthers 2002, Singer and Singer 2011.

B. Boyd 2008a, 2009a stresses how pretend play kindles interest in narrative fictions.

p. 173 Stecker 1997b:282–3 emphasizes the use of fiction in counterfactual reasoning.

Remembering the past, thinking of the future and conceiving the viewpoint of others involve the same neural circuits: Buckner and Carroll 2007, Schacter and Addis 2007a, 2007b.

Kramnick quote: 2011:331.

Tooby and Cosmides 1990a, 2001, Cosmides and Tooby 2000b; see also Scalise Sugiyama 2008, Swirski 2008.

p. 174 Fiction extends our imaginations in ways that factive literature cannot: B. Boyd 2009a:188–99.

M. Nussbaum quotes: 1990:139, 138; see also 1995.

p. 175 Critics of Nussbaum: Kalin 1992, Lamarque and Olsen 1994, Posner 1997, 1998. For a response to the latter: Nussbaum 1998.

On the origins of writing and reading: see note to p. 134.

Early Western novels: Daniel Defoe's *Robinson Crusoe* is from 1719, Jonathan Swift's *Gulliver's Travels* is 1726, Voltaire's *Candide* is 1759, Laurence Sterne's *Tristram Shandy* came out in 1759–67.

Earlier novels: Thiessen and Umezawa 1998 discuss *The Tale of Genji*; Zunshine 2006 considers Heliodrus' *An Ethiopian Romance*.

Novel allows possibilities oral literature does not: Easterlin 2005.

Austin quote: 2007:217.

p. 176 Darwin quotes: 1880, pt. 1, ch. 3:87 and pt. 3, ch. 19:572. For early skepticism: Grosse 1897.

G. Miller 2000a, 2000b. Other adherents of sexual selection accounts for music include Hirn 1900, P. Todd 2000, Levitin 2006, Alcorta et al. 2008, Dutton 2009, Dean et al. 2009–10, van den Broek and Todd 2009–10.

Sexual exploits of pop musicians: G. Miller 1999, 2000a, 2000b. Ball 2010:21 deplores this style of "theorizing by celebrity anecdote."

p. 177 Music made *in* but not *for* groups: G. Miller 2000b.

Love songs only small part of repertoire in small-scale cultures: Grosse 1897, S. Brown 2000a.

Composers produced fewer children: Fukui 2001a, Fitch 2005.

S. Brown quote: 2000a:248–9.

Cross reiterates basically the same position in 1999, 2001, 2003a, 2003b, 2003c, 2005, 2005–6, 2007, 2008, 2009, 2009–10, and Cross and Morley 2009.

p. 178 Cross quote: 2007:658.

Music's semantic openness: Tooby and Cosmides 1989a suggest that music's lack of reference makes it a non-confrontational system for the expression of mood and feeling. See also Levitin 2006. Listening to music can lower testosterone levels in males (while increasing it in females)

and certain kinds of music reduce stress by lowering cortisone levels: Fukui and Yamashita 1998, Fukui 2001b, Lewis 2002.

Cross quotes: 2005–6:114, 123.

p. 179 Langer 1942.

Critical discussion of Langer's theory: S. Davies 1994.

Music originated in song: Spencer 1966, vol. 14:403 [1857], Darwin 1880, pt. 3, ch. 19:569, Grosse 1897, Dissanayake 1995a:118, Huron 2003, Besson and Friederici 2005, Levitin 2006, Fenk-Oczlon and Fenk 2009–10, Lehmann et al. 2009–10.

Philosophers' arguments against a high degree of mind modularity: Tomasello 1999, Fodor 2000, Sterelny 2003, Currie 2004, Buller 2005.

Evolutionary psychologists reject a high degree of mind modularity: Dunbar and Barrett 2007.

Training affects the brain: on changes to brain structure resulting from training in juggling, see Draganski et al. 2004.

p. 180 Cross cites a study: Schellenberg 2004 cited in Cross and Morley 2009.

Music lessons increase IQ: Schellenberg 2004; see also 2006. For critical review: Ball 2010:251–3. There is evidence that the learning of specific musical skills can influence the learning of specific non-musical skills, such as mathematics: Gardiner 2008. Musical training also increases a person's ability to identify certain emotions (particularly sadness and fear) in human speech (both in her own and in a foreign language): W. F. Thompson et al. 2004.

Emergence of general intelligence: Cross 1999, 2001, 2003b approvingly cites Mithen 1996 in which it is argued that the human mind developed by breaking down barriers between separate, specialized mental modules.

Critical discussion of Mithen's account: Lewis-Williams 2002, Gosden 2003, Sterelny 2003, Currie 2004. And for skepticism about the role assigned to modularity within evolutionary psychology, see notes to pp. 153>, and <this page.

Music aids infant development: Roederer 1984, Dissanayake 1999b, 2000a, 2000b, 2008a, Trehub 2000, 2003a, 2003b, Trainor and Schmidt 2003, Koelsch and Siebel 2005, Ball 2010.

Congenital musical defects do not diminish other mental capacities: Patel 2008.

Social benefits of music: see notes to p. 132.

Music releases endorphins: Dunbar 2003, 2004.

Williams syndrome and autism support hypothesis that music has social benefits: Huron 2003, Levitin 2006.

Patel quote: 2008:371. On the improvisational and other musical skills of "savant" autistics: Mottron et al. 2006.

Not obvious that music's function is to provide social grooming: Fitch 2005.

p. 181 Lists of many functions regularly served by music: S. Brown 2000a, Dissanayake 2006, Ball 2010:11–16.

Hauser and McDermott 2003, McDermott and Hauser 2005b, McDermott 2008.

Justus and Hutsler quote: 2005:21.

Paucity of the Hominin fossil record: Fitch 2006; see also Ball 2010.

Overlap in brain areas used by music and language: see note to p. 153.

p. 182 Merker quote: 2006:95–6.

Chapter 12

p. 184 Thornhill quotes: 2003:20, 1998:553.

p. 186 Dissanayake 1988.

p. 187 Upper Paleolithic cave painting called art: see note to p. 3.

Glossary

adaptation: a feature that helped previous members of a species reproduce more successfully than others of their species and that was passed on by them to their descendants.

adaptive: fitness-enhancing (see below).

aesthetic, the: in eighteenth-century philosophic theory, this referred to the beautiful and sublime (see below) and to their opposites, as well as to their apprehension or to the experience of them. Contemporary aestheticians generally class a wide range of properties as aesthetic—for instance, being graceful, awkward, elegant, or balanced—but these often can be viewed as subspecies of the beautiful, the sublime, or their opposites.

fitness: an organism's comparative potential for reproductive success. *Realized* fitness is measured in terms of comparative reproductive success, or in terms of the comparative number of genes an organism succeeds in passing down to future generations. (See *inclusive fitness*.)

gene-culture coevolution: the theory that biology and culture do not operate independently, but rather influence and alter each other. Our biology can constrain culture: the Olympics are unlikely to feature sustained yet unassisted human flying. Yet, by altering the social and physical environment, culture can affect what adaptations are favored: control of fire altered the requirements of digestion and the energy obtainable from foodstuffs.

Holocene: period covering the last 10,000 years, which saw the emergence of larger human groups, agriculture, animal domestication, settled village life, and stored surpluses.

Hominid: see *Hominin*.

Hominin: humans and their immediate ancestors, back to the ancestor shared in common with the chimpanzee line. Excludes Gorillini (gorillas) and Panini (chimps), though these belong with humans in the order of Hominoids. Hominins were formerly and less precisely called Hominids.

inclusive fitness: a gene-centered version of fitness that measures it not only by counting the genes passed down by an individual but also by taking account of genes passed down by his or her relatives, these being weighted according to the closeness of the relationship.

ka: thousand years ago.

levels of intentionality: thoughts that consider the thoughts others have about yet other people. For example, where I know that he thinks that his wife cares that her mother worries that her father regrets . . . After about five levels we tend to get confused.

ma: million years ago.

multilevel selection theory: the view that, under certain conditions, the units of evolutionary selection may be groups rather than individuals.

Paleolithic: covers the period from 2.6 ma to about 10 ka. The Lower Paleolithic runs from 2.5 ma to 180 ka. The Middle Paleolithic falls between 180 and 40 ka, and the Upper Paleolithic encompasses 40–10 ka. The Paleolithic overlaps with the Pleistocene (see below) and was followed by the Holocene (see above).

Pleistocene: covers the period from 2.6 ma to 10 ka. Overlaps with the Paleolithic (see above) and is succeeded by the Holocene (see above).

selection: in biology, the process by which some traits spread within a population as a result of improving the comparative fitness of the organisms which have them. Selection is "natural" when the traits in question improve fitness by suiting the organism better to its environment. Selection is "sexual" when the traits in question improve the organism's chances of being chosen as a mate relative to other members of its sex. Sexual selection falls within natural selection if it is appropriate to see potential mates simply as elements additional to those that make up the organism's environment.

spandrel: in evolutionary theory, a by-product of an adaptation (see above) that is not an adaptation for direct utility or fitness (see above) in itself.

sublime, the: in eighteenth-century philosophic theory, this typically referred to the aesthetic quality of being awesome, impressive, grave, or elevated. The sublime, though powerful and potentially negative, yields a positive experience through being comprehended by the human mind.

Theory of Mind: our awareness of others as having a mental life like our own and our capacity to project into and understand that mind and the beliefs, intentions, and desires that move it, even where these differ from our beliefs, intentions, and desires.

Venus figurines: small statuettes (often classed as portable art) or reliefs of the heads, busts, or bodies of women, often depicted as naked or partially clothed. Hundreds of examples are known. The majority of examples fall in the period 30–11 ka and, though concentrated in Europe, they have been located as far to the east as Siberia. Some of these (from the region of France and east to the former Soviet Union) have exaggerated breasts, buttocks and genitals, with other parts of the body, including the face, de-emphasized or even missing.

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Web Resources

The following websites illustrate or discuss items and topics covered in this book.

Part I. Key Concepts

Introduction

p. 1

Excalibur: found Sima de los Huesos (Bones Pit), the Atapuerca mountains, Spain in 1998.
http://www.atapuerca.org/excaliburin.htm
http://www.modernhumanorigins.com/sima-de-los-huesos-and-hominids
http://www.sciencephoto.com/media/136943/view
http://www.sciencephoto.com/media/170699/view

Hand axes: http://antiquity.ac.uk/ProjGall/marshall/marshall.html
http://www.cope.co.za/archaeo/masterhandaxe.htm

p. 2

Hominin timeline: http://bio1151.nicerweb.com/Locked/media/ch34/homo.html
http://commons.wikimedia.org/wiki/File:Humanevolutionchart.jpg
http://donsnotes.com/science/biology/evolution.html

Es-Skhul cave: http://www.mfa.gov.il/MFA/History/Early%20History%20-%20Archaeology/Archaeological%20Sites%20in%20Israel%20-%20The%20Carmel%20Caves-

p. 3

Sungir graves: http://www.donsmaps.com/sungaea.html
http://evolution-of-man.info/sungir.htm

Blombos cave: http://www.accessexcellence.org/WN/SU/caveart.php
http://archaeology.about.com/cs/humanorigins/a/blombos.htm

Chauvet cave: http://www.ancient-wisdom.co.uk/francechauvet.htm
http://www.bradshawfoundation.com/chauvet/chauvet_cave_art.php
http://www.culture.gouv.fr/culture/arcnat/chauvet/en/index.html
http://www.lehsd.k12.nj.us/users/dupuis/chauvet.htm

Cougnac cave: http://www.grottesdecougnac.com/Sitefr/index.htm

Pech Merle cave: http://www.pechmerle.com/english/introduction.html

Lascaux cave: http://www.bradshawfoundation.com/lascaux/index.php
http://www.lascaux.culture.fr/
http://www.mazzaroth.com/ChapterOne/LascauxCave.htm

Altamira cave:
http://museodealtamira.mcu.es/
http://whc.unesco.org/en/list/310

p. 4

Prehistoric art. Useful sites are:
http://arthistoryresources.net/ARTHprehistoric.html
http://www.bradshawfoundation.com/

Carvings of Vogelherd cave:
http://www.ice-age-art.de/anfaenge_der_kunst/vogelherd.php
http://www.showcaves.com/english/de/caves/Vogelherd.html
Lion person of Hohlenstein: http://www.ianslunarpages.org/lionhead.html
http://www.ice-age-art.de/anfaenge_der_kunst/hohlen/mensch.php
http://www.loewenmensch.de/lion_man.html
http://www.showcaves.com/english/de/caves/Hohlenstein.html
Venus figurines. A number of Venus figures, including those of Tan-Tan and Berekhat Ram are shown at:
http://www.bradshawfoundation.com/sculpture/gallery.php
Venus of Kostenski: http://www.donsmaps.com/lioncamp.html
Venus of Dolní Věstonic: http://www.donsmaps.com/dolni.html
Venus of Brassempouy:
http://commons.wikimedia.org/wiki/File:Venus_of_Brassempouy.png
http://maisondeladame.chez-alice.fr/
La Mouthe lamp: http://www.donsmaps.com/lamouthe.html

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Le Mas d'Azil spear thrower: http://www.donsmaps.com/masdazil.html
Australian Aborigine rock art:
http://www.environment.gov.au/parks/uluru/visitor-activities/rock-art.html
http://mc2.vicnet.net.au/home/aura/web/index.html

Chapter 1

p. 13

Welsch (2004) article:
http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=243

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Dinka cattle: http://www.eurekastreet.com.au/article.aspx?aeid=478
http://www.thedailybeast.com/galleries/2010/10/19/dinka-legendary-cattle-keepers-of-sudan.html

Chapter 2

p. 27

Massim betel nut paraphernalia:
http://www.art-pacific.com/artifacts/nuguinea/massim/trobkula.htm
See figures 10–12.
For a documentary on paper folding: http://www.greenfusefilms.com/index.html

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Shadow puppet plays: http://en.wikipedia.org/wiki/Wayang
Japanese tea ceremony: http://japanese-tea-ceremony.net/
Islamic calligraphy: http://www.islamicart.com/main/calligraphy/index.html

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Chimpanzee paintings: http://primarilyprimates.org/videos/ppvid_Painting.htm

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Bowerbirds, including Stain Bowerbirds with blue straws:
http://www.oceanwideimages.com/categories.asp?cID=204&p=2
http://www.superstock.com/stock-photography/Ptilonorhynchidae
Listen to the songs of humpback whales: http://www.whalesong.net/

Chapter 3

A timeline of evolutionary thought: http://www.ucmp.berkeley.edu/history/evotmline.html
History of evolution: http://www.iep.utm.edu/evolutio/
The complete works of Darwin online: http://darwin-online.org.uk/
Understanding evolution: http://evolution.berkeley.edu/

Chapter 4

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Komar and Melamid's "Most Wanted" paintings: http://awp.diaart.org/km/

p. 56

Later Cubism. Picasso's *Three Musicians* (1921):
http://www.artquotes.net/masters/picasso/pablo_musicians1921.htm
North-west Amerinidian split perspective. Robert Davidson *Split Beaver* (1975):
http://www.alcheringa-gallery.com/past/rd_splitbeaver.html
http://coghlanart.com/rdbr4.htm
Links to classic Chinese paintings: http://www.chinapage.com/paint1.html
Six principles used to classify Chinese painters by Xie He:
http://www.rice-paper.com/uses/painting/essay.html
Egyptian perspective: http://www.bmimages.com/preview.asp?image=00244326001&imagex=9&searchnum=0002jpg

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Paintings from Bali in shadow puppet style:
http://australianmuseum.net.au/image/Detail-of-panel-from-the-Bima-Swarga-story
http://blog.baliwww.com/arts-culture/416
Contemporary examples of Australian Aborigine "dot" paintings:
http://www.tribalworks.com/Aboriginal-Art-Dot-Painting-Gallery.htm
Various styles of contemporary Australian Aborigine paintings can be viewed at:
http://cooinda-gallery.com.au

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Archaeopteryx: http://www.talkorigins.org/faqs/archaeopteryx/info.html

Part II. The Aesthetic

Chapter 5

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Çatal Hüyük: http://www.catalhoyuk.com/
http://globalheritagefund.org/what_we_do/overview/completed_projects/catalhoyuk_turkey
Hohlenstein-Stadel therianthrope: see websites listed at note to p. 281.

Therianthropes in cave art: Sorcerer of Trois Frères cave in south-western France.
http://www.faculty.umb.edu/gary_zabel/Courses/Phil%20281/Philosophy%20of%20Magic/My%20Docu ments/Therianthropes.htm
Arnhem Land art: http://www.bradshawfoundation.com/bradshaws/index.php
http://www.environment.gov.au/parks/kakadu/visitor-activities/rock-art.html
Lascaux "cave of bulls": see websites listed at note to p. 280.
Göbekli Tepe: http://www.dainst.org/en/project/goebeklitepe?ft=all
http://globalheritagefund.org/what_we_do/overview/current_projects/gobekli_tepe_turkey

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Nevali Çori: http://www.hageneuer.de/fundort_anzeige.php?id=126

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Leonardo da Vinci:
http://www.royalcollection.org.uk/collection/912342/studies-for-an-equestrian-monument
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