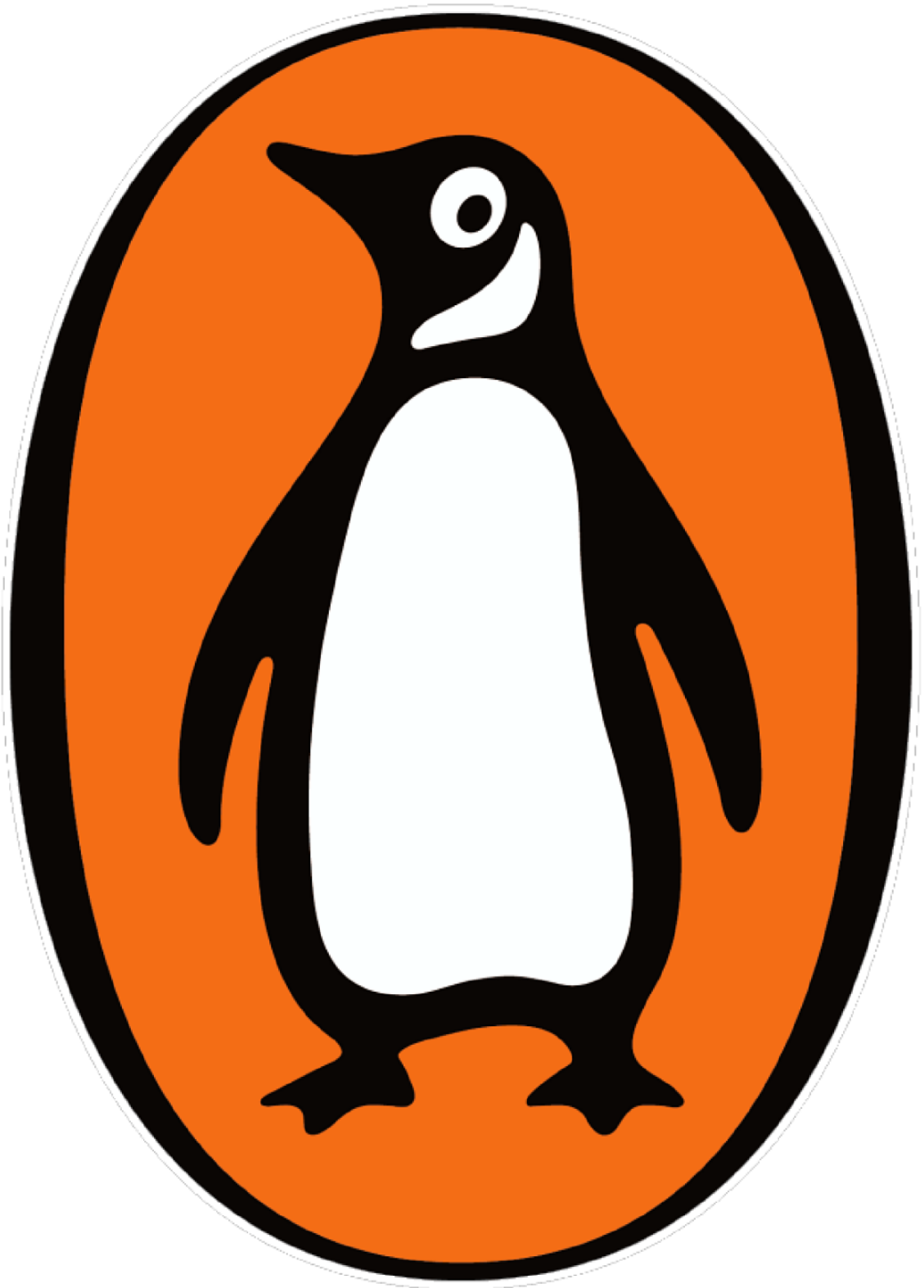

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About the Author

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To RC and LRG

CHAPTER 1

Taking It from the Top

or "The Hills Are Alive …"

On my desk right now I have a stack of music CDs that couldn't be more different: an eighteenth-century opera by Marin Marais whose lyrics describe the gory details of a surgical operation; a North African griot singing a song, offered to businessmen passing by in the hopes of securing a handout; a piece written 185 years ago that requires 120 musicians to perform it properly, each of them reading a very specific and inviolable part off of a page (Beethoven's Symphony no. 9). Also in the pile: forty minutes of groans and shrieks made by humpback whales in the Pacific; a North Indian raga accompanied by electric guitar and drum machine; a Peruvian Andes vocal chorus of how to make a water jug. Would you believe an ode to the gustatory plea sures of homegrown tomatoes?

> *Plant 'em in the spring eat 'em in the summer*
> *All winter without 'em's a culinary bummer*
> *I forget all about all the sweatin' and diggin'*
> *Every time I go out and pick me a big 'un*
>
> *Homegrown tomatoes, homegrown tomatoes*
> *What'd life be without homegrown tomatoes?*
> *Only two things that money can't buy*
> *That's true love and homegrown tomatoes*
>
> *(Guy Clark)*

That all these are music may seem self-evident to some, or the stuff of argument to others. Many of our parents or grandparents or children say that the music *we* listen to isn't music at all, it's just noise. Noise by definition is a set of sounds that are random, confused, or uninterpretable. Could it be that all sound is potentially musical if only we could understand its internal structure, its organization? This is what the composer Edgar Varèse was driving at when he famously defined music as "organized sound"—what sounds like noise to one person is music to another, and vice versa. In other words, one man's Mozart is another's Madonna, one person's Prince is another's Purcell, Parton, or Parker. Perhaps there is a key to understanding what is common to all these collections of sounds, and to what has driven humans since the beginning to engage with them so deeply as not just sound but music.

Music is characterized both by its ubiquity and its antiquity, as the musicologist David Huron notes. There is no known culture now or anytime in the past that lacks it, and some of the oldest human-made artifacts found at archaeological sites are musical instruments. Music is important in the daily lives of most people in the world, and has been throughout human history. Anyone who wants to understand human nature, the interaction between brain and culture, between evolution and society, has to take a close look at the role that music has held in the lives of humans, at the way that music and people co-evolved. Musicologists, archaeologists, and psychologists have danced around the topic, but until now, no one has brought all of these disciplines together to form a coherent account of the impact music has had on the course of our social history. This book is a lot like making a family tree, a tree of musical themes that have shaped our ancestors' lives: their working days, their sleepless nights—the soundtrack of civilization.

Anthropologists, archaeologists, biologists, and psychologists all study human origins, but relatively little attention has been paid to the origins of music. I find that odd. Americans spend more money on music than they do on prescription drugs or sex, and the average American hears more than five hours of music per day.[1, 2] We know now that music can affect our moods and our brain's chemistry. On a day-to-day level, a better understanding of the common history between music and humanity can help us to better understand our musical choices, our likes and dislikes, to harness the power of music to control our moods. But far more than that, understanding our mutual history will help us to see how music has been a shaping force, how music has been there to guide the development of human nature.

The World in Six Songs explains, at least in part, the evolution of music and brains over tens of thousands of years and across the six inhabited continents. Music, I argue, is not simply a distraction or a pastime, but a core element of our identity as a species, an activity that paved the way for more complex behaviors such as language, large-scale cooperative undertakings, and the passing down of important information from one generation to the next. This book explains how I came to the (some might say) radical notion that there are basically six kinds of songs that do all of this. They are songs of friendship, joy, comfort, knowledge, religion, and love.

In trying to understand the evolution of humanity and the role that music has played in it, it seems wise to begin with open minds (and ears) and not exclude any form of music too soon. However, the evolution of mind and music is easiest to follow in music that involves lyrics, because the meaning of the musical expression is less debatable. When the notes are hung on words (or is it that the words are hung on notes?), the meaning is easier to talk about usefully. Because music wasn't recorded until about a hundred years ago, nor even accurately notated until a few hundred years before that, the historic record of music is substantially lyrics. For these two reasons, music with lyrics will be the predominant focus of *The World in Six Songs.*

Much of the world's music is now available on compact disc, or on the medium that is rapidly replacing it, digitized sound files on computers (generically—and somewhat inaccurately—referred to as MP3s). We live in a time of unprecedented access to music. Virtually every song ever recorded in the history of the world is available on the Internet somewhere—for free. And although recorded music represents only a small proportion of all the music that has ever been sung, played, and heard, there is so much of it—estimates suggest 10 million songs or more—that recorded music is as good a place as any to start to talk about the music of the world. Thanks to intrepid musicologists and anthropologists, even rare, indigenous, and preindustrial music is

now available to us. Cultures that have been cut off from industrialization and Western influence have had their music preserved, and by their own accounts, it may have been unchanged for many centuries, giving us a window into the music of our ancestors. The more I listen to music like this and to Western artists that are new to me, the more conscious I become of how large music is and how much there is to know.

The diversity of our musical legacy includes songs that tell stories about people, such as "Bad, Bad Leroy Brown" or "Cruella de Vil"; there's a catchy song about a murderous psychopath who kills the judge at his own trial; songs exhorting us to buy this meat product and not that (Armour hot dogs versus Oscar Mayer wieners); a song promising to keep a promise; a song mourning the loss of a parent; music made on instruments believed to be one thousand years old and on instruments invented just this week; music played on power tools; an album of Christmas carols sung by frogs; songs sung to enact social and political change; the fictional Borat singing the equally fictional national anthem of Kazakhstan, boasting about his country's mining industry:[3, 4, 5]

Kazakhstan greatest country in the world
All other countries are run by little girls
Kazakhstan number one exporter of potassium
All other countries have inferior potassium

and a song about suburban noise pollution:

Here comes the dirt bike
Beware of the dirt bike ...
Brainwashing dirt bike
Ground-shaking dirt bike
Mind-bending dirt bike
In control
Soul-crushing dirt bike

In spite of all this diversity, I have come to believe that there are basically six kinds of songs, six ways that we use music in our lives, six broad categories of music. No less.

I have been making and studying music for most of my life—I had a career producing pop and rock records for a number of years and now I direct a research laboratory studying music, evolution, and the brain. Yet I was concerned when I started this project that I might be blinkered. I didn't want to discover I was being ego- or ethnocentric. I didn't want to be culturally biased, or fall prey to any of a number of other insidious biases of gender, genre, or generation, or even pitch bias or rhythm bias. So I asked a number of musician and scientist friends what they thought all music has in common.

I visited Stanford University to meet with my old friend Jim Ferguson, who is the chairman of the Anthropology Department there; we went to high school together and have been close friends for thirty-five years. Anthropologists study culture, how it shapes our thoughts, ideas, and our worldview, and I thought for sure Jim would help me to avoid all the pitfalls and prejudices that I feared could be so seductive. Jim and I discussed how songs have many roles in the daily lives of people throughout the world and that over the millennia music has been used in so many ways we can't hope to enumerate them all.

Ubiquitous are work songs, blood songs, lust and love songs .... There are songs about how great God is, songs about how our god is better than yours; songs about where to find water or how to make a canoe; songs to put people to sleep and to help

them stay awake. Songs with lyrics, songs of grunting and chanting, songs played on pieces of wood with holes in them, on tree trunks, with sea and turtle shells, songs made by slapping your cheeks and chest Bobby McFerrin style. I asked Jim what all these types of music had in common. His answer was that this was the *wrong question.*

Quoting the great anthropologist Clifford Geertz, Jim persuaded me that the *right* question to ask, in trying to understand music's universality, is not what all musics have in common, but how they differ. The notion that humanity can be best appreciated by extracting those features common to all cultures is a bias that I held without even knowing it. Ferguson—and Geertz—feel that the best way, perhaps the *only* way, to understand what makes us most human is to thrust ourselves face-to-face with the enormous diversity of things that humans do. It is in the particulars, the nuances, the overwhelming *variety* of ways we express ourselves that one can come to understand best what it means to be a musical human. We are a complicated, imaginative, adaptive species. How adaptable are we? Ten thousand years ago humans plus their pets and livestock accounted for about 0.1 percent of the terrestrial vertebrate biomass inhabiting the Earth; now we account for 98 percent.[6] Humans have expanded to live in just about every climate on the surface of the Earth that is even remotely habitable. We're also a highly *variable* species.[7] We speak thousands of different languages, have wildly different notions of religion, social order, eating habits, and marriage rites. (Kinship definitions alone account for mind-boggling variability among us, as any introductory college anthropology text will attest.)

The right question then, after due consideration of music's diversity, is whether there is a set of functions music performs in human relations. And how might these different functions of music have influenced the evolution of human emotion, reason, and spirit across distinct intellectual and cultural histories? What role did the musical brain have in shaping human nature and human culture over the past fifty thousand years or so? In short, *how did all these musics make us who we are?*

The six types of songs that shaped human nature—friendship, joy, comfort, knowledge, religion, and love songs—I've come to think are obvious, but I accept you may take some persuading. The people of a given time or place may not have used all six. The use of some has ebbed while others flowed. In modern times with computers, PDAs, even since the beginning of written language, we haven't needed to rely so much on knowledge songs to encapsulate collective memory for us, although most English-speaking schoolchildren still learn the alphabet through song and the number line through counting songs, such as the politically incorrect "One Little Two Little Three Little Indians." For many of the world's still preliterate cultures, memory and counting songs remain essential to everyday life. As the early Greeks knew, music was a powerful way of preserving information, more effective and more efficient than simple memorizing, and we are now learning the neurobiological basis for this.

By definition, a "song" is a musical composition intended or adapted for singing.[8] One thing the definition leaves unclear is who does the adapting. Does the adaptation have to be constructed by a professional composer or orchestrator, as when Jon Hendricks took Charlie Parker solos and added scat lyrics (nonsense syllables) to them, or when John Denver took Tchaikovsky's Fifth Symphony and added lyrics to the melody?[9] I don't think so. If I sing the intro guitar riff to "(I Can't Get No) Satisfaction" by the Rolling Stones (as my friends and I used to do frequently when we were eleven years old), *I* am the one who has done the adapting, and even if separated from the vocal parts of that song, this melodic line then stands alone and *becomes* a "song" by virtue of my friends and I singing it. More to the point, you can sing "As Time Goes By"

with the syllable "la" and never sing the words—you may have never seen *Casablanca* and you may not even *know* that the composition has words—and it becomes a song by virtue of you singing it. For that matter, suppose that only one person in the world knew the words to "As Time Goes By," and that all of us went on blissfully humming, whistling, and la-la-la-ing the melody. My intuition here is that just because we didn't sing words wouldn't mean that it wasn't a song.

Most of us share an intuition that "song" is a broad category that includes anything we might sing or any collection of sounds that resembles such a thing. Again, *The World in Six Songs* is not, I hope, culturally narrow-minded. African drum music has an important role in the daily lives of millions of people and might not strike some as being songs, but to ignore such purely *rhythmic* (and difficult to sing, unless you're Mel Tormé or Ray Stevens) forms of expression would betray a bias toward melody. The rock, pop, jazz, and hip-hop that are the most popular forms of music today would not exist without the African drumming that they evolved from. As I will show, drumming, among its many qualities, can produce powerful songs of friendship.

I have used the word *song* as a convenient shorthand and, in its most inclusive sense, as a stand-in for music in all its forms, to refer to any music that people make, with or without melody, with or without lyrics. I'm particularly interested in that portion of musical compositions that people remember, carry around in their heads long after the sound has died out, sounds that people try to repeat later in time, to play for others; the sounds that comfort them, invigorate them, and draw them closer together. I confess that I unwittingly came to this project with the bias that the best songs become popular and are sung by many. Maybe my background in the music industry put that bias in place. After all, "Happy Birthday" has been translated into nearly every language on earth (even into Klingon, as fans of *Star Trek: The Next Generation* can attest; the song is called "*qoSlIj DatIvjaj*").[10]

Pete Seeger set me straight on this, telling me about how in some cultures, the best songs are meant to be sung and played for only one other person! Seeger is the great folk singer-songwriter who penned such songs as "Where Have All the Flowers Gone?", "If I Had a Hammer," and "Turn, Turn, Turn" (the latter with lyrics taken from Ecclesiastes).

"Among American Indians," Seeger explained, "a young man got his eye on a girl and he would make a reed flute and compose a melody. And when she came down to get a pail of water at the brook, he would hide in the weeds and play her his tune. If she liked it, she followed and saw where things led. But it was her special tune. A tune wasn't thought of as being free for everybody. It belonged to one person. You might sing somebody's song after they're dead to recall them, but each person had a private song. And of course today, many small groups feel their song belongs to them and they're not happy when it becomes something that belongs to everybody."

The fact is we are all biased to some degree by our specific life history and culture. I carry the biases of an American male growing up in California in the 1950s and 1960s. But I was lucky to have been exposed to a wide variety of music. My parents took me to see ballet and musicals before I was five, and through them (*The Nutcracker* and *Flower Drum Song)* I gained an early appreciation for Eastern scales and intervals—neuroscientists now believe that such early exposure to other tonal systems is important for later appreciation of music outside one's own culture. Just as all of us can acquire any of the world's languages as young children if we are exposed to them, so too can our brains learn to extract the rules and the structures of any of the world's musics if we're exposed to them early enough. This doesn't mean that we can't learn to

speak other languages later in life, or learn to appreciate other musics, but if we encounter them as young children, we develop a natural way of processing them because our brains literally wire themselves up to the sounds of these early experiences. Through my father I developed a love of big bands and swing, through my mother a love of piano music and Broadway standards. My mother's father loved Cuban and Latin music, as well as Eastern European folk songs. Hearing Johnny Cash on the radio when I was six conditioned me for country, blues, bluegrass, and folk music.

A sentiment that I've heard many times is that classical music cannot be compared to anything else. "How can you honestly say that that repetitive, loud *garbage* called rock and roll is even *close* to the sublime *music* of the great masters?" To take this position is to ignore the inconvenient fact that a major source of joy and inspiration for the great masters themselves was the "common" popular music of their day. Mozart, Brahms, and even great-grandaddy Bach took many of their melodic ideas from ballads, bards, European folk music, and children's songs. Good melody (let alone rhythm) knows no boundaries of class, education, or upbringing.

Most of us could effortlessly construct a list of our favorite songs, of songs that just make us feel joyful, or comforted, or spiritual, that remind us of who we are, who we loved, of groups we belong to. When I ask people to do this in my laboratory, it is always surprising to see how diverse these lists are. Music is *large*. It is made by as many different types of people, with as many different backgrounds, as there are listeners. New forms of music are being invented and evolving from earlier forms every day. And each new song is a link in a millennia-long chain of evolutionary enhancements to previous song building—slight alterations in the "genetic structure" of one song lead us to a new one.

Some songs celebrate a particular individual, but then become enhanced (or diluted) by overapplication and overgeneralization. Anyone named Maria or Michelle in the 1960s (think Bernstein and Beatles) or Alison or Sally in the 1970s (think Elvis Costello and Eric Clapton) knows what it is like to be accosted by the song bearing your name, mentioned by a friend or new acquaintance intoxicated by his own wit at having made this childishly simple connection. Anyone who has the lack of common sense to actually *sing* you the song with your name in it suffers from the doubly foolish notion that she was the first one to think of doing so. My own past has been bothered, annoyed, and taunted by endless choruses of "Danny Boy" or "Daniel" (Elton John), by people expecting me to howl at their cleverness. Steely Dan have made it a habit, a fashion even, to elevate main characters with uncommon names like Rikki, Josie, and Dupree. But the rarer the name, of course, the more exuberant is the tormentor. I have actually known people named Maggie Mae, Roxanne, Chuck E., and John-Jacob (think Rod Stewart, the Police, Rickie Lee Jones, and an old children's song), and they are astonished when people sing these songs to them as though no one has ever thought to do this before.[11]

Friendship songs like "Smokin' in the Boy's Room" and "Tobacco Road" legitimized and banded together tens of thousands of high school (or even junior high school) students who were otherwise marginalized at the fringes of their school, engaging in an illegal but oh-it-seems-so-cool activity. School songs and national anthems are an extension of this banding together song on increasingly larger scales, the ultimate perhaps being songs uniting the entire world, such as the Michael Jackson/Lionel Richie composition "We Are the World." This sort of group formation and reinforcement finds its expressions in songs of friendship, and there is evidence that this type of song served a very important function throughout human history.

Love songs also bind people together; they express a love desired, a love found, or a love lost. They reflect a bond powerful enough to make people do things that are not always in their own best, personal interest. As Percy Sledge sang, when a man loves a woman, he'll spend his last dime trying to hold on to the woman he needs.[12]

He'd give up all his comforts
And sleep out in the rain
If she said that's the way it ought to be.

Why does music have such power to move us? Pete Seeger says it is because of the way that medium and meaning combine in song, the combination of form and structure uniting with an emotional message.

"Musical force comes from a sense of form; whereas ordinary speech doesn't have quite that much organization. You can say what you mean, but similarly with painting or with cooking, or other arts, there is a form and design to music. And this becomes intriguing, it becomes something you can remember. Good music can leap over language barriers, and barriers of religion and politics."

The powerful mix of emotion and cultural evolution in our musical brains produced diversity, power, even history. And it has done it in six definable ways.

The study of human behavior has undergone a revolution in the past twenty years, as the methods of neuroscience have been applied to cognition and the musical experience. We can now actually see the brain at work, mapping those regions that are active during certain activities. Together with the work of evolutionary biologists, neuroscientists are beginning to build a picture of how the human brain has become adapted for thought, and to formulate theories about why it evolved the way it did. Part of my goal in writing this book is to bring these perspectives to bear on the question of music, the brain, culture, and thought. If music has lasted so long in our species, what are the cultural and biological forces driving its forms and uses?

In the beginning, there was no language. We may have had music before we had a word for it. We had sounds, of course, and they communicated to us. Thunder, rain, and wind. The sound of boulders or avalanches rolling down hills. The warning calls of birds and monkeys. The growls of lions and tigers and bears (oh, my!). And sights and smells added to our awareness of things happening-in-the-world, sometimes benign, sometimes a warning. Before language, we were critically limited in our ability to represent what wasn't there. Was this a limitation of our brains or simply that we lacked verbal communication, words to serve as placeholders for things that weren't immediately in our consciousness?

The evidence from evolutionary neuroscience suggests that these are really the same question. We usually think of evolution as governing our physical bodies—the opposable thumb, walking upright, depth vision—but our brains evolved as well. Before there was language, our brains did not have the full capacity to learn language, to speak or to represent it. As our brains developed both the physiological and cognitive flexibility to manipulate symbols, language emerged gradually, and the use of rudimentary verbalizations—grunts, calls, shrieks, and groans—further stimulated the growth potential for the types of neural structures that would support language in the broadest sense. So how did language and music happen—who invented them and where did they come from?

It is unlikely that either language or music was invented by a single innovator or at a single place and time; rather, they were shaped by a large number of refinements,

contributed to by legions of developers over many millenia and throughout all parts of the world.[13] And they were no doubt crafted upon structures and abilities that we already had, structures we inherited genetically from protohumans and our nonhuman animal ancestors. It's true that human language is qualitatively different from any animal language, specifically in that it is generative (able to combine elements to create an unlimited number of utterances) and self-referential (able to use language to talk about language). I believe that the evolution of a single brain mechanism—probably located in the prefrontal cortex—created a common mode of thought that underlies the development both of language and of art.

This new neural mechanism gave us the three cognitive abilities that characterize the musical brain. The first is *perspective-taking*: the ability to think about our own thoughts and to realize that other people may have thoughts or beliefs that differ from our own.[14] The second is *representation*: the ability to think about things that aren't right-there-in-front-of-us. The third is *rearrangement*: the ability to combine, recombine, and impose hierarchical order on elements in the world. The combination of these three faculties gave early humans the ability to create their own depictions of the world—paintings, drawings, and sculpture—that preserved the essential features of things though not necessarily the distracting details. These three abilities, alone and in combination, are the common foundation of language and art. Language and art both serve to represent the world to us in ways that are not exactly the world itself, but which allow us to preserve essential features of the world in our own minds, and to convey what *our* minds perceive to others. The awareness that what *we* are feeling is not necessarily what another is feeling, coupled with our drive to create social bonds with others, gave rise to language and art, to poetry, drawing, dance, sculpture ... and music.

An important property of language is that we can talk about things that are not there. We can talk *about* fear without actually being scared, or talk about the word *fear* without having any feelings of fright. All this representing requires massive computational power. To support this kind of abstract thought, our brains had to evolve to handle billions of bits of simultaneous, often contradictory, information and to connect those bits to other things that came before and will come again.

One of the things that humans are good at and animals are not is encoding *relations*. We can easily learn the idea of one thing being bigger than another. If I ask even a five-year-old to select the *largest* of three blocks in front of her, she will do this effortlessly. If I then bring in a new block that is twice the size of the one she just selected, she can shift her thinking, and choose *that* when I re-ask the question. A five-year-old understands this. No dog can do this, and only some primates.

This understanding of *relations* turns out to be fundamental for music appreciation; it is a cornerstone of all human musical systems. One such musical relation is *octave equivalence,* the principle that allows men and women to sing a song together and sound like they're singing in unison, even though the women are (typically) an octave higher.[15] This relative mode of processing also permits us to recognize "Happy Birthday" as the same song regardless of what key it is sung in, a process musicians call *transposition.* It is also the basis of composition in nearly every musical style we know of. Take the opening to Beethoven's Fifth for example. We hear three notes of the same pitch and duration, followed by a longer note at a lower pitch. Beethoven takes this pattern and moves it lower in the scale, so that the next four notes follow the same contour and rhythm. Our ability to recognize that this pattern is essentially the same, even though none of the notes are the same, is relational processing. De cades of

research on music cognition have shown that humans process music using both absolute and relational processing—that is, we attend to the actual pitches and duration we hear in music, as well as their relative values. This dual mode of processing is rare among species, having not yet been confirmed in any species other than our own.

These modes of processing and the brain mechanisms that gave rise to them were necessary for the development of language, music, poetry, and art. And as I said earlier, I believe they were made possible by the evolution of a common brain structure. All art seeks to represent some aspect of human experience, and it does so selectively. If an artistic object represents the thing-itself perfectly, it is just another copy of that thing. The point of art is to emphasize some elements at the expense of others—to focus on one or more aspects of the thing's visual or auditory appearance or of the way we feel about it—in order to call particular attention to them. We may do it so that we can remind ourselves of how we felt about a certain experience, or to communicate that experience to others. Music combines the temporal aspects of film and dance with the spatial aspects of painting and sculpture, where pitch space (or frequency space) takes the place of three-dimensional physical space in the visual arts. The brain has even developed frequency maps in the auditory cortex that function much the way that spatial maps do in the visual cortex.

Our drive to create art is so powerful that we find ways to do it under the greatest hardships. In the concentration camps of Germany during World War II, many prisoners spontaneously wrote poetry, composed songs, and painted—activities that, according to Viktor Frankl—gave meaning to the lives of those miserably interred there. Frankl and others have noted that such creativity under exceptional circumstances is not typically the result of a conscious decision on the part of a person to improve his outlook or his life through art. To the contrary, it presents itself as an almost biological need, as essential a drive as that for eating and sleeping—indeed, many artists, absorbed in their work, temporarily forget all about eating and sleeping.

Ursula Bellugi of the Salk Institute discovered a form of poetry invented by people who are deaf and who communicate using American Sign Language. Rather than using a single hand to make certain signs, they'll use two—holding one sign in the air with the left hand while the right hand takes over, creating a legato, overlapping visual. The signs will be altered, creating certain visual repetitions—a visual music—that are analogous to verbal repetitions, phrasing, and meter in spoken poetry. We create because we cannot stop ourselves from doing so. Because our brains were made that way. Because evolution and natural selection favored those brains that had a creative impulse, one that could be turned toward the service of finding shelter or food when others were unable to find it; toward enticing mates to procreate and care for children amid competition for mates. Creative brains indicated cognitive and emotional flexibility, the kind that could come in useful on the hunt or during interpersonal or intertribal conflicts.

Creative brains became more attractive during centuries of sexual selection because they could solve a wider range of unanticipatable problems. But how did musical brains become attractive? Consider why we find babies attractive as an analogy. Suppose that some people, due to random processes that we don't understand (and that they don't understand either!), happen to find babies cute and other people do not. These random processes are formally similar to the ones that make you taller than your father, make you go bald at twenty-five, give you a keen sense of direction, or the ability to laugh when all around you is falling apart. The people who find babies cute—

again, they may have simply won some sort of genetic lottery and be the first ones in their family to have this characteristic—are going to spend a lot more time with their babies, nurturing them, playing with them, and attending to them, compared to the people who just don't find babies all that cute. Over millions of cases like this, the parents who just happen to find babies cute will tend to have babies that grow up to be more well adjusted, well educated, and healthy than the other parents' babies. This difference in upbringing may well cause the nurtured babies to be more likely to find mates and have babies of their own, if only because they were more likely to be healthy and live that long, or to have the knowledge and support system necessary to acquire food and shelter when it is their time to mate. In the long run, the offspring of these nurtured babies will tend, therefore, to outnumber the offspring of the non-nurtured babies.

This is the basic principle of Darwinian natural selection. In other words, as the philosopher Daniel Dennett points out, we don't think babies are cute because they are intrinsically or objectively cute (whatever that would mean).[16] Rather, the process of evolution favored those people and their offspring who found babies cute, and in turn this characteristic became widely distributed in the population.

By analogy then, humans who just happened to find creativity attractive may have hitched their reproductive wagons to musicians and artists, and—unbeknownst to them at the time—conferred a survival advantage on their offspring. Early musicians may have been able to forge closer bonds with those around them; they may have been better able to communicate emotionally, diffuse confrontation, and ease interpersonal tensions. They may also have been able to encode important survival information in songs, an easily memorable format that gave their children an additional survival advantage. Making and listening to music, then, feels good not because of anything intrinsic in the music. Rather, those of our ancestors who just happened to feel good during musical activities are the ones who survived to pass on the gene that gave rise to these feelings.

One important thing that makes us human, one thing we have that separates us from all other species on our planet, has been noted by psychologists and biologists. It's not the fact that we have a language to communicate with—other animals, such as birds, whales, dolphins, even bees, have sophisticated signaling systems. It's not that we've learned to use tools (chimpanzees do that), that we have built societies (ants have those), or learned to deceive (crows and monkeys). It's not that we're bipedal and have opposable thumbs (primates) or that we often mate for life (gibbons, prairie voles, angelfish, sandhill cranes, termites). What distinguishes us most is one thing no other animals do: *art.*[17] And it's not just the existence of art, but the centrality of it. Humans have demonstrated a powerful drive toward making art of all different kinds—representational and abstract, static and dynamic, creations that employ space, time, sight, sound, and movement.

Our urge toward artistic expression shows up in cave paintings, and decorations on otherwise solely utilitarian items, such as thirty-thousand-year-old water jugs. Some of the earliest cave paintings show humans dancing. Nearly one hundred years ago the *Encyclopedia Britannica,* in its 1911 edition, stated that poetry had exerted "as much an effect upon human destiny as ... the discovery of the use of fire." Equating poetry with fire is both metaphorically satisfying and dramatic (the fire in men's and women's souls? the burning desire to express feelings with rhythm and rhyme?). But are we meant to believe that poetry actually exerted such a profound effect on the course of human events? *Britannica* argues just this—that poetry, and presumably lyrics, have

changed history, started and stopped wars, documented the history of humankind, and changed men's [sic] minds about the course of their lives.

Apart from signaling creativity and the ability to engage in abstract thinking, the development of the artistic (poetic, musical, dancing, and painting) brain allowed for the metaphorical communication of passion and emotion. Meta phor allows us to explain things to people in indirect ways, sometimes avoiding confrontation, sometimes helping another to see that which she has difficulty understanding. Art allows us to focus another's attention on aspects of a feeling or a perception that he might not otherwise see, literally framing the point of interest in a way that it becomes separated from a background of competing ideas or perceptions.

The auditory arts of music and poetry hold a privileged position in human history, and we see this reflected in our own time in neurological case studies. Individuals suffering from Alzheimer's disease, victims of strokes, tumors, or other organic brain trauma, may lose the ability to recognize faces, even of people they've known their entire lives. They may lose the ability to recognize simple objects such as hairbrushes or forks. But many of these same patients can still recite poetry by heart, and sing songs that they knew as children. Verse—whether spoken or sung—appears to be deeply encoded in the human brain. Many artists throughout history have felt an overwhelming drive to write music and poetry, on battlefields, in dungeons, on their deathbeds. This drive no doubt arose from those same frontal cortex mutations and adaptations that made art possible in the first place, the structural changes that gave rise to language and art in general. We write and recite music and poetry not because it feels good intrinsically, but because those ancestors of ours for whom it felt good are the ones who survived and reproduced, passing on this visceral preference. We are a musical species today because our ancestors were, going back tens of thousands of years.

But we are not today as much of a poetic species as the historical record suggests we used to be, having traded poems for songs over the last several hundred years. The average fourteen-year-old will hear more music in a month than my grandfather heard in his entire life. An iPod today easily holds twenty thousand songs, more than the libraries of seven urban radio stations, an order of magnitude more songs than an entire tribe of our hunter-gatherer ancestors would have encountered in their entire lives. Before looking at the six songs that shaped human nature, it is important to take a closer look at just what a song is and isn't with respect to its lyrics; whether the words are poetry by definition (or what poetry actually is, if indeed it is something different). Do lyrics convey the same meaning when they are divorced from their music?

In the introduction to his book of lyrics, Sting writes:

> The two, lyrics and music, have always been mutually dependent, in much the same way as a mannequin and a set of clothes are dependent on each other; separate them, and what remains is a naked dummy and a pile of cloth. Publishing my lyrics ... [invites] the question as to whether song lyrics are in fact poetry or something else entirely .... My wares have ... been shorn of the very garments that gave them their shape in the first place.

The shape of lyrics is influenced by different things than the shape of poetry—the melody and rhythms of music provide an extrinsic framework, whereas poetry's structure in intrinsic. In music, some notes are accented relative to others, by virtue of their pitch, loudness, or rhythm; these accents constrain the words that will fit well with the melody, and help establish the musical mannequin on which the lyrical

clothing will be hung. In poetry, on the other hand, different conventional structures and forms that poets impose on themselves carry meaning—epics, elegies, and odes may signal history, mourning, and love. Traditionally poetry has been discussed in terms of these forms (rhyming patterns, metrical patterns, number of lines).[18] Sonnets were for love. Epics suited couplets. Dirges were for misery.

I've been writing songs all my life, but my friends who are *real* songwriters tell me that while my melodies are strong, my lyrics are not. I think of myself as a verbal person, so the irony of this is clear to me. I have to confess that for most of my life I never engaged much with poetry, and didn't really understand it, in spite of having taken a course in it in college in the 1970s. About ten years ago, my friend Michael Brook (a composer of instrumentals and film scores) suggested that if I wanted to make my lyric writing better, I should read poetry.

The next day, coincidentally, I ran into my old poetry professor, I'll call him Lee, on campus where—following a most unlikely path through the music industry—I had become a professor myself. We went for coffee together and I told him of my desire to become a better lyricist. I asked him to explain how poetry and song lyrics differ. Once again, I found I was asking the wrong question!

"Lyrics *are* poetry," Lee explained. "They are two varieties of the *same thing.* The lyrics of popular songs are only a particular kind of poetry. You seem to believe there exists an absolute distinction between the two, and there doesn't. Lyric poetry has been around since the beginnings." Lee mentioned the trea sure trove of medieval and Elizabethan lyrics—the poems/songs of Campion, Sydney, Shakespeare (and Schubert's "Who Is Sylvia?", for example, and other lieder). He pointed out that it is not uncommon for written poetry to be later rendered into song, as in Jonson's "Drink to Me Only with Thine Eyes," or Burns's poems or William Bolcom's music-making with Blake and Roethke.

This sentiment was echoed more recently by John Barr, president of the Poetry Foundation, and himself a respected poet. In defending poetry not of the ivory tower sort, he writes:[19]

> People who care about their poetry often experience genuine feelings of embarrassment, even revulsion, when confronted with cowboy poetry, rap and hip-hop, and children's poetry .... Their readerly sensibilities are offended. (If the writing gives them any plea sure, it is a guilty plea sure.) The fact that Wallace McRae, Tupac Shakur, and Jack Prelutsky wrote these works for large, devoted audiences simply adds insult to the injury. Somewhat defensively, the serious poetry crowd dismisses such work as verse, not poetry, and generally acts so as to avoid it, if at all possible, in the future .... The result is a poetry world of broad divides.

Of course song lyrics do have something that conventional poems don't—the melody, the mannequin on which Sting was saying he had hung his lyrical clothes. That is, most poems, by definition, have to convey an emotional message through some combination of rhyme, meter (the way the sounds are organized in time, including their accent structure), meta phor, and verbal imagery that add up to great beauty of expression. They also must convey a sense of movement—a forward, rhythmic momentum all their own. Song lyrics may do all these things, but they don't have to. They always have the music there to help them along, melodies and harmonies that can provide accent structures, forward motion, and a kind of harmonic-textual context. In other words, lyrics are not *intended* to stand alone (and as to the words of poems, to quote another Sting lyric, "they dance alone").

Lee and I met once a week for that academic term. He brought in some of his favorite written poetry; I brought in my favorite popular music lyrics (which he never failed to remind me were also poetry). I came to see that, whatever its form, written poetry is characterized by a kind of music. Accent structures in words naturally make a sort of melody. In the word *melody* itself the first syllable is stressed, which makes it louder than the others, and most native English speakers will give it a higher pitch than the other syllables. The word *melody* has a melody! Good poetry plays with speech sounds to create a pleasing set of pitch patterns, and good poetry contains rhythmic groupings that are songlike. When a poem succeeds, it is a sensual experience—the way the words feel in the mouth of the speaker and the way they sound in the ears of the hearer are part of the encounter. Unlike prose, most poems ask to be read aloud. This is why poetry lovers usually do so. Just reading the poem is not enough. The reader needs to *feel* the rhythms. Song lyrics ask to be sung; reading them doesn't typically convey all the nuance of expression that was imbued in them during their creation.

Occasionally, a song lyric *can* stand completely on its own, but Lee was quick to point out that this doesn't make it any better than one that cannot; it is simply another feature of that par tic ular piece of writing. But through our weekly meetings, I gained a deep appreciation for the interplay between sound and form, between meaning and structure, that characterizes both forms of writing.

One characteristic of poetry and lyrics, compared to ordinary speech or writing, is compression of meaning. Meaning tends to be densely packed, conveyed in fewer words than we would normally use in conversation or prose. The compression of meaning invites us to interpret, to be participants in the unfolding of the story. The best poetry—the best art in any medium—is ambiguous. Ambiguity begets participation. Poetry slows us down from the way we normally use language; we read and hear poetry and stop thinking about language the way we normally do; we slow down in order to contemplate all the different reverberations of meaning it contains.

The spiritual or emotional aspects of art are perhaps their most important qualities. Poetry is no exception—it is written in order to capture feelings and personal, subjective interpretations of events, rather than to deliver a mere description—you might say that it is the right-brain equivalent of a news report. As Helen Vendler (a Harvard professor and leading poetry critic) says, "Poems are hypothetical sites of speculation, not position papers.[20] They do not exist on the same plane as actual life; they are not votes, they are not uttered from a podium or pulpit, they are not essays. They are products of reverie."

Once in a while we run into people who can recite poetry from memory. We all know people who memorize song lyrics and drop them into conversation at opportune moments. What makes a good lyric or poem? That it is easy to remember? I have lyrics bouncing around in my head all the time, and they are released from their neural prison at even the slightest provocation. During an uncharacteristic weeklong rainstorm at Stanford, it seemed as though my brain had a mind of its own (!), calling up one rain song after another. It began in one of those Jungian synchronicity experiences that Sting writes about. I was listening to the song "Rain" when I heard a crack of thunder followed by a few taps of light droplets on my roof. Within minutes, the rain was pounding. I raced outside to put the top up on my car (California—it was a convertible of course) and to bring in the dog, who was already cowering underneath the hydrangeas. I had the first verse of that Beatles song stuck in my head ("When the rain comes/they run and hide their heads"), and to get it unstuck I tried to think of another song. The first one that came to mind was "Raindrops Keep Fallin' on My

Head" by Bacharach and David, a great song, but one that—from hard-won experience—I knew would be stuck in my head for a solid week if I didn't nip this one in the bud, and fast.

It's funny how memory works—instead of a segue to another Bacharach and David composition ("Do You Know the Way to San Jose?" or "I Say a Little Prayer") or another B. J. Thomas record ("Hooked on a Feeling," "I Just Can't Help Believing") or another song with the same I-I maj 7-I7-IV chord progression ("Everybody's Talkin'," "Something"), my frontal cortex was bent on searching my hippocampus for a song with "rain" in the title, and instantaneously, unconsciously, my brain delivered "You and Me and Rain on the Roof" by the Lovin' Spoonful. I love this song. The melody descends the scale from the fifth degree, *sol,* down an octave to the *sol* below, suggesting the Greek lydian mode, and I knew from experience that there was little danger this would get stuck in my head, but it would at least push out the Bacharach melody. Why was I trying to get rid of that? Oh yes, because the Beatles' "Rain" was reverberating around in there. Oh no! Soon I had that back. Quick! Think of John Sebastian. Ahhhh. "You and me and rain on the roof ..." Sol - fa - mi - re - do - sol - la - sol.

It rained all day. Puddles started to gather and the little sewer drain on every corner started to back up. Water began to gather in street intersections. The city engineers had not had to design for water runoff because it usually doesn't rain much in this part of the world. It continued to rain for a week. My overactive hippocampus kept offering me more rain songs, floating up from my unconscious: "No Rain" by Blind Melon, "Fire and Rain" by James Taylor (and the haunting cover version by Blood, Sweat & Tears), "I Can't Stand the Rain" by Tina Turner, "Still Raining, Still Dreaming" by Hendrix, and of course "The Rain Song" by Led Zeppelin, the opening chord a downward arpeggio, itself falling like rain. I congratulated myself on successfully avoiding getting stuck with an earworm from "Here Comes the Rain Again" by Eurythmics or "Walk Between the Raindrops" by Donald Fagen. I fired up the stereo with "Rainy Days and Mondays" (the Carpenters), "Rainin'" (Rosanne Cash), "Let It Rain" (Eric Clapton with his group Derek and the Dominos), and two rain songs by one of my favorite groups: "Who'll Stop the Rain" and "Have You Ever Seen the Rain?" (Creedence Clearwater Revival). Two more of my favorite groups finally weighed in from down below in my hippocampus, playing in my head as if a CD player were wired directly to my neurons: "Prayers for Rain" by the Cure, and "Bangkok Rain" by the Cult. So many rain songs! And it kept raining outside.

When I talked to one of my favorite songwriters, Rodney Crowell, about *Six Songs*, he argued that the first songs composed by humans probably dealt with the elements, with weather, sun, moon, rain, and so on, because these would have been so central to early man.

Lee and I met the following week and the sun had been out for a couple of days by then. ("Here Comes the Sun," I thought as I walked across campus to meet him, and this gave way to auditory images of "Sun King" and "I'll Follow the Sun" [Beatles], "Let the Sunshine In" [The 5th Dimension], "Sunny" [Bobby Hebb], "You Are My Sunshine" [as performed by Ray Charles], "Wake Up Sunshine" [Chicago], "Who Loves the Sun" [The Velvet Underground], "California Sun" [the Ramones and the Dictators], "House of the Rising Sun" [Eric Burdon back when he was with the Animals, one of the first rock songs I ever wanted to play nonstop for a week].) Lee brought Robert Frost's "The Wind and the Rain" and Walt Whitman's "Give Me the Splendid Silent Sun" from *Leaves of Grass*. I brought Cole Porter and Joni Mitchell.

Many of my favorite lyrics have internal rhymes. By "internal rhymes," I'm referring to rhymes and near rhymes that occur anywhere other than the end of a line, like these from Cole Porter:

> *Oh by Jove and by Jehovah, you have set my heart aflame,*
> *(And to you, you Casanova, my reactions are the same.)*
> *I would sing thee tender verses but the flair, alas, I lack.*
> *(Oh go on, try to versify and I'll versify back.)*

Notice in the first two lines the long o sound that is repeated in Jove, JeHOvah and CasaNOva, and the near rhyme of *heart* and *are* near the end of those two lines. Another thing Porter is famous for is invoking common, everyday expressions in playful ways. We are familiar with the phrase "alas and alack," which the composer plays with when he writes, in the third line, "alas, I lack." All this while maintaining the end-of-the-line rhymes we've come to expect in contemporary song: aflame/same and lack/back.

Or consider these lines, from "Begin the Beguine," where the song title itself is a visual and auditory wordplay:

> *To live it again is past all endeavor,*
> *Except when that tune clutches my heart,*
> *And there we are, swearing to love forever,*
> *And promising never, never to part.*

Notice in the third line the internal rhyme in *there* and *swear.* The first and third lines rhyme, as they ought to, ending with *endeavor* and *forever.* But Porter adds an additional rhyme to these in the middle of the fourth line with the repetition of *never.* I sure wish I could write like that! (I'd lure bright fish, I'd swish as I sat, my heart would go pitter pat, if only I could dish out fine lines such as that!)

Of course some people don't care about this sort of wordplay as much as they do about the content; they may study lyrics intently, looking for wisdom, sage advice, just as many of us did in the sixties. Rock stars were our poets; we felt that they had hard-won life lessons to pass on to the rest of us.

Others learn the lyrics syllable-by-syllable as a means of recalling the music, but don't pay much attention to the lyrical content itself. I had a girlfriend who was born and raised in Belgium, and we spent many wonderful vacations visiting her family and friends in her hometown Mons (*Bergen* in Flemish), where she went to university at the Faculté de Polytechnique there. Every one of her friends knew the Eagles' song "Hotel California" syllable-for-syllable, but most of them didn't speak a word of English. They had no idea what they were saying when they sang "warm smell of co-li-tas/rising up through the air/up ahead in the distance/I saw a shim-mer-ing light." Not knowing English, they didn't know where the beginnings and endings of words were. Just as my little sister used to think that "The Star-Spangled Banner" spoke of a particular kind of lamp called a donzerlee light (for "dawn's early light"), my Belgian friends thought there must be a type of lamp called a "murring light" (from shim-mer-ing light). And what was this thing called a "prizzonerzeer" that all of us are ("we are all just prisoners here ...")? They were even more curious to know what the song *meant,* and I had to confess that as much as I loved the song—I had even learned the guitar solo note-for-note to impress fellow musicians—I didn't have the slightest idea what it was about. The emotional impact of the line "you can check out anytime you like/but you can never leave" was not diminished at all by the fact I didn't know what Don Henley was trying to say.

This is the power of the song lyric—the mutually supporting forces that bind rhythm, melody, harmony, timbre, lyrics, and meaning in a song allow some of the elements to fill in for others when there is ambiguity, contradiction, or outright opacity, as is the case with "Hotel California." That the literal meaning is not apparent in that song—or for that matter, in almost any song by Steely Dan, the kings of cryptic lyrics—doesn't reduce the power of the song. Each song's elements add up to an artistic result. The whole invokes meaning but does not constrain it. In fact, this is one of the features that gives songs their power over us: because the meaning is not perfectly defined, each of us as listeners becomes a participant in the ongoing process of understanding the song. The song is personal because we've been asked or forced to fill in some of the meaning for ourselves.

Many of us feel a peculiarly intimate relationship with popular songwriters because it is their very voices that we hear in our heads. (And it is for this reason that poetry fans so highly value recordings of a favorite poet reading his or her own works.) Most of us listen to songs we like *hundreds* of times. The voice, nuances, and singer's phrasing become embedded in our memories in a way we don't get with poetry that we read to ourselves. We feel we know something about the lives, the thoughts and feelings of our favorite songwriters because we know several or dozens of their songs. And because of the mutually reinforcing constraints of rhythm, melody, and accent structure—combined with a shot of dopamine or other neurochemicals that are known to accompany music listening—our relationship with song becomes vivid and long-lasting, activating more regions of the brain than anything else we know of. The connection to some songs is so long-lasting that patients with Alzheimer's disease remember songs and song lyrics long after they've forgotten everything else.

The Beatles ushered in an era of singers writing their own songs. Although Chuck Berry wrote his, and Elvis cowrote a few of his own, it wasn't until the Beatles and their enormous commercial success—followed by the success and writing of Bob Dylan and the Beach Boys, among others—that fans began to expect musicians to write their own material. The Beatles even cultivated this sort of personal connection to their audience. In their early songs, Paul McCartney says, he and John intentionally—somewhat calculatingly—tried to inject personal pronouns into as many of the early lyrics and song titles as they could. They took seriously the task of forging a relationship with their fans in a very personal way. "She Loves *You,*" "*I* Want to Hold *Your* Hand," "P.S. *I* Love *You,*" "Love *Me* Do," "Please Please *Me,*" "From *Me* to *You.*"

Still, it is important to note that some people ignore the lyrics more or less, and are drawn primarily to rhythm and melody. Although many people are attracted by the storylines of opera, equal numbers report that they don't even try to follow the plot, enjoying simply the colorful scenery and the beautiful vocal sounds they hear. Even in pop, jazz, hip-hop, and rock, legions of people believe that the lyrics function primarily as an afterthought, something to hang the melody on. "What do lyrics have to do with music?" many demand. "They're just there so that the singer doesn't have to go 'la la la' with the melody all the time." And as far as many people are concerned, "la la la" would be just fine.

But for those who love lyrics, for whom "la la la" won't do, there are many rewards in studying the ways in which the best of them are crafted. While researching this book, Sting and I discussed the relationship between poetry and lyrics. Both of us being Joni Mitchell fans, we discussed her song "Amelia" as an example of a lyric we admire:

> *I was driving across the burning desert*
> *When I spotted six jet planes*

I feel nice, like sugar and spice
So good, so nice, I got you

Apart from the fact that all (but one) of the words are monosyllabic, the accent structure of the melody supports the accent structure of how this might be spoken—contributing to the pounding insistence of the groove.

"Russians" delivers as a song lyric because it marries text to melody, and because the lyrics feel effortless. It succeeds as a poem because even without the melody, it conveys its own rhythm, the forward momentum created by its accent structure and use of plosive consonants.

"Amelia" and "Russians" demonstrate great beauty in language and expression, used to convey an intensely imaginative interpretation of their subjects. Rather than delivering a literal description, they effectively capture feelings and impressions of events by telling us the most evocative parts of the story—often with figurative language, instead of the sort of objective details we would get in a newspaper article. We sense in them also a drive toward art—an unstoppable internal force that impelled the writer to write. In these lyrics, as in many great works of art, we feel an inevitability about them—that they have always existed and were just waiting to be discovered. When attached to the song, the words evoke additional emotions because of the harmonic tension that the musical notes add. Together, the lyrics plus melody, harmony, and rhythm bring nuances and shades of meaning that the words alone can't deliver.

Both poetry and lyrics and all the visual arts draw their power from their ability to express abstractions of reality. When the poet Herbert Read wrote,

> Art, at the dawn of human culture, was a key to survival, a sharpening of the faculties essential to the struggle for existence. Art, in my opinion, has remained a key to survival.[22]

I believe he was referring to this abstraction process that is intrinsic in the creation and appreciation of all artistic objects, and that is a feature of the musical brain. Drawings, paintings, sculpture, poems, and song allow the creator to represent an object in its absence, to experiment with different interpretations of it, and thus—at least in fantasy—to exert power over it.[23] Songs and poems derive their ultimate power in this way.

Songs give us a multilayered, multidimensional context, in the form of harmony, melody, and timbre. We can experience them in many different modes of enjoyment—as background music, as aesthetic objets d'art independent of their meaning, as music to sing with friends or sing along with in the shower or car; they can alter our moods and minds. Each of the elements of melody, rhythm, timbre, meter, contour, and words can be appreciated alone or in combination. "I Got You (I Feel Good)" may not have changed the course of human history, but it has been enjoyed by millions of people over many millions of hours. To the extent that we are the sum total of all our life's experiences, it has become a part of our thoughts, and (as neuroscientists know) that means a part of the very wiring of our brains.

But that is not the same as guiding human destiny. *The World in Six Songs* is the story of just how music has changed the course of human civilization, in fact, the story of how it made societies and civilizations possible. Other art forms—poetry, sculpture, literature, film, and painting—can also fit into these functional categories, but this is the story of music and its primacy in shaping human nature. Through a process of co-evolution of brains and music, through the structures throughout our cortex and

neocortex, from our brain stem to the prefrontal cortex, from the limbic system to the cerebellum, music uniquely insinuates itself into our heads. It does this in six distinctive ways, each of them with its own evolutionary basis.

I attended the annual meeting of Kindermusik teachers this summer. Parents, children, and teachers came from more than sixty countries to participate in workshops and listen to lectures. The highlight of the conference for me was the music before the keynote speech. Fifty young children, between the ages of four and twelve, sang this song, based on a traditional German folk song, accompanied with syncopated clapping and synchronized movement:

> *All things shall perish from under the sky*
> *Music alone shall live*
> *Music alone shall live*
> *Music alone shall live*
> *Never to die.*

Pairs of children from different countries took turns at the microphone, singing lines from the song in their native languages: Cantonese, Japanese, Romanian, !Xotha, Portuguese, Arabic, with each stanza ending in the English refrain in three-part harmony:

"Music alone shall live, never to die."

And the music that will never die has been with humans since we first *became* humans. It has shaped the world through six kinds of songs: friendship, joy, comfort, knowledge, religion, and love.

CHAPTER 2

Friendship

or "War (What Is It Good For?)"

I. It is the near twilight hour, the fog hanging thick, close to the ground like a heavy, leaden weight. Imagine that you're an early human, sleeping with your villagers, huddled together on the ground, near the dying embers of the fire circle. First there is a feeling that disturbs your sleep—not all of your group is roused, but you notice that a few others were also disturbed—by a vibration more than a sound. And you wonder: Was it real or a dream? Rumbling, a boom-boom-ka-boom like distant thunder, like rocks tumbling. The earth shakes and then the sound comes closer, louder; your body is being assaulted. Drums are coming toward you, a purposeful, synchronized stampede, like fifty rhinoceroses, coordinated, all of one mind, as though they have devised a terrible, directed plan for attack and total destruction. It has to be real, you think, but it is a sound you've never heard before. What starts as a quiver of apprehension turns into collective fits of shaking as all of your family and friends wake and tremble with helplessness, all the gumption draining out of your bodies before you even know what is going on. The terrifying synchrony of it, the bone-shaking intensity of it, the sheer loudness. Do you run or prepare to fight? You sit frozen, in awe, paralyzed. What in the world is happening? As they crest the hill, you see them, and for a brief moment before the deafening sounds knock you senseless you see a band of warriors banging on drums in an eerie demonstration of coordinated, malevolent power.

Throughout history, tribes often attacked their enemies stealthily, in the dead of night while their opponents slept. Clever tribespeople, lucky recipients of a bit more cognitive capacity than their neighbors (thanks to random mutation), at some point recognized the power of drum music to incapacitate the enemy, to sap their resolve and simultaneously impassion their own warriors. Each drum tuned slightly differently, skins stretched over wooden stumps, sticks, and rocks knocked together; shells and beads banged, hit, struck, scraped, and shaken: the sound of a well-coordinated, well-practiced single mind. If these invaders could synchronize so tightly to something as nonvital as drumming, that same synchronization put into the service of killing would be so relentless and merciless as to crush even the most formidable resistance.

When Joshua fit de battle of Jericho, it was not melody that made the walls come tumbling down, according to one rabbinic midrash, it was the rhythms of the Hebrew army drum corps. And it was the terrified Jerichoans who themselves opened the walls to the invaders, realizing the futility of putting up a fight, hoping that their conciliatory gesture would eke out a trace of compassion. (It didn't.) At the foot of Balin's tomb in *The Lord of the Rings,* surrounded by dozens of skeletons, Gandalf reads the last entry from the watchman's logbook: "The ground shakes. Drums ... drums in the deep. We cannot get out. A shadow lurks in the dark. We can not get out ... they are coming."

II. It is 7:45 A.M. on a November morning at a high school in Kansas City, Missouri, fifteen minutes before the first period bell rings. Out in back of the school, near the Dumpsters and an abandoned basketball court, a group of students smoke cigarettes. For some it's the first of the day, for others their third. They are not the good students, the star athletes, members of the chess club, glee club, or drama club. They aren't the worst students either, the ones who are being threatened with expulsion or who are being evaluated by a stream of head-scratching school psychologists. These are average students who would otherwise go completely unrecognized and unnoticed by the rest of the school except that they come here several times a day. Most have been in trouble with their teachers or the principal for breaking one rule or another, but nothing serious—being in the hall without a pass, tardiness, late homework—crimes of laxity and neglect, not of violence. The alley where the municipal garbage trucks come has been named Tobacco Road by generations of students at the school. The morning cigarette ritual is followed by the ten o'clock mid-morning recess, lunchtime, and afternoon recess cigarette breaks. They blow smoke rings; they spit. The boys talk about cars they know they'll never own, and Bruce Lee movies they've memorized. The girls talk about older siblings who don't come home at night, with mind-numbing jobs and boyfriends.

None of them has much money, and with the cost of cigarettes approaching fifty cents each, they share a daily concern about where the money for the next pack will come from. But they are generous to anyone who shows up without a cigarette, sharing among one another what they have. When a stranger asks to bum a cigarette, several of the teens offer the outsider the hospitality of a shared nicotine rush. The group are alternately chatty and reflective as the chemicals simultaneously rouse their frontal lobes and calm their limbic systems.

Most of them have beat-up iPods or early MP3 players, but when they're smoking together, the earbuds hang at their sides, and they listen to a boom box or portable player with a speaker built in. "The fidelity is whack," says one, "but least this way we can all hear it together." They tap their feet to 50 Cent—some of them raising the *back* of their heel and pounding it down on the pavement in time with the bass drum. They sing along with all the words to Ludacris, and when Christina Aguilera comes on, the girls do some steps, cop some poses, as the boys try unsuccessfully to feign disinterest. But it's when an old song from thirty-five years ago comes on that one of the girls cranks the volume. Soon the entire group is moving as one to "Smokin' in the Boy's Room" by Brownsville Station:

Smokin' in the boy's room
Smokin' in the boy's room
Teacher don't you fill me up with your rules
'Cuz everybody knows that smokin' ain't allowed in school!

They are singing at the tops of their lung capacity, laughing, and a transformation has come over them. This is *their song.*

Two different scenarios, far removed in time and place. Music, or at least the rhythmic aspects of it, binds the first group together in fear. A seventies song with a distorted electric guitar binds the second group together in defiance. They are two very different types of bonding, but both with an important survival component. Both are bonds of cooperation.

The surprise, predawn attack was a gruesome innovation in prehistoric warfare.[1] The attackers would wait until their opponents were in deep sleep and attack just an hour before dawn, sometimes in complete silence and sometimes with a fanfare of menacing instruments, creating as much noise and mayhem as they could to terrify their victims. By attacking at that hour, they had the element of surprise. By bringing their own torches, they controlled the source of light. By the time the sun came up, they could survey the destruction and collect the spoils.

This is a study of evolution and natural selection in situ. Those bands of early humans who were unable to develop a strategy for fending off such attacks were killed; their genes did not endure in the population. But a few clever humans did develop countertactics—no doubt as a direct consequence of the increased size of their prefrontal cortex, conferred as an advantage by random mutation. These countertactics may well have involved staying awake at night and singing as a way to broadcast, "We're awake, and we're here."

Consider the Mekranoti people of the Brazilian Amazon. They are a small group of hunter-gatherers, indigenous to southern Pará, who have had relatively little contact with modern humans and thus are living their lives in ways that, anthropologists believe, have probably changed very little over the last several thousand years. One of the most remarkable things about the Mekranoti is the amount of time they spend singing—women sing for one or two hours every day and men sing for two hours or more each night. Given their subsistence lifestyle, this represents an enormous investment of time that might be more productively spent gathering food or sleeping. As David Huron writes:

> The men sing every night starting typically around 4:30 in the morning. When singing, the Mekranoti men ... swing their arms vigorously. The men endeavor to sing in their deepest bass voices, and heavily accent the first beats of a pervasive quadruple meter with glottal stops that make their stomachs convulse in rhythm. Anthropologist Dennis Werner (1984) describes their singing as a "masculine roar." When gathering in the middle of the night, the men are obviously sleepy, and some men will linger in their lean-tos well after the singing has started. These malingerers are often taunted with shouted insults.
>
> Werner reports that "Hounding the men still in their lean-tos [is] one of the favorite diversions of the singers. 'Get out of bed! The Kreen Akrore Indians have already attacked and you're still sleeping,' they [shout] as loudly as they [can] .... Sometimes the harassment [is] personal as the singers [yell] out insults at specific men who rarely [show] up." ...
>
> Like most native societies, the greatest danger facing the Mekranoti Indians is the possibility of being attacked by another human group. The best strategic time to attack is in the very early morning while people are asleep. Recall the insult shouted at men who continued to sleep in their lean-tos: "Get out of bed! The Kreen Akrore Indians have already attacked and you're still sleeping."
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> The implication is obvious. It appears that the nightly singing by the men constitutes a defensive vigil. The singing maintains arousal levels and keeps the


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