WHY YOU LOVE MUSIC

From Mozart to Metallica—The Emotional Power of Beautiful Sounds

JOHN POWELL

Author of *How Music Works*

Begin Reading

Table of Contents

Newsletters

Copyright Page

For Kim

CHAPTER 1

What Is Your Taste in Music?

Your musical taste says quite a lot about you. In the hands of a psychologist, a list of your ten favorite pieces of music can reveal details about how extroverted you are, what sort of background you're from, and even how old you are. The age estimate is pretty straightforward because a surprisingly large proportion of your favorite music will have been produced when you were in your late teens and early twenties. The more psychological aspects of your "musical profile" are the result of decades of research into musical taste and our emotional responses to music. Some of the results of this research have been surprising, to say the least. In this book I'll be looking into the ways in which music affects our lives, from how it brings tears to your eyes, to how it can be used to make you buy more drinks in a restaurant. Let's begin by looking at your taste in music.

At last count there were about 7 billion people on the planet, which of course means that there are 7 billion personalities, all with their own musical likes and dislikes. Faced with the huge numbers involved, the early researchers into people's taste in music decided to make things easier for themselves by reducing the number of personality types in the world to just two: the posh and the rabble. They then went on to work out that there were only two types of music: posh and lowbrow. From there it was but a short step to come up with the startling revelation that posh people liked posh music and the rabble liked all the other stuff.

How refreshingly simple life was in the mid-twentieth century.

Thankfully, things have moved on a bit since then.

Since the 1960s a lot of research has concentrated upon the problem of how to assess people's personalities reliably. Everybody's personality is made up of a combination of several traits, and by the early 1990s

psychologists were starting to agree that there were five basic personality traits that can be reliably measured.[1] These are:

Openness (also referred to as Culture or Intellect)
Conscientiousness
Extroversion (or Energy)
Agreeableness
Neuroticism (or Emotional instability)

Recently a sixth trait, a combination of honesty and humility, has been considered for inclusion in the list.

The point of all this is that it's possible to get a rough description of someone's personality by ranking them, on a scale from one to ten, in these five or six characteristics.

In order to match these personality traits to musical tastes, the music psychologists found it useful to divide all the various types of music up into a small number of categories.[2] After a lot of analysis, they found that the musical genres could be grouped together like this:

Reflective and complex music includes classical, jazz, folk, and blues.
Intense and rebellious music includes rock, alternative, and heavy metal.
Upbeat and conventional music includes pop, sound tracks, religious, and country.
Energetic and rhythmic music includes rap, soul, and electronic.

OK, so—who likes what?

It has been found that enthusiasts for *reflective and complex* music tend to score high on openness, are generally poor at sports, good with words, and often politically liberal.
Fans of *intense and rebellious* music also tend to score high on openness and are skilled with words—but they are usually good at sports.
Lovers of *upbeat and conventional* music tend to score high on extroversion, agreeableness, and conscientiousness, are good at sports, and are often politically conservative.

> Party animals who are keen on *energetic and rhythmic* music tend to score high on extroversion and agreeableness and are often politically liberal.

These are, of course, just general trends. I'm sure there are a few right-wing professional sportsmen who are jazz enthusiasts, and we all know a disagreeable, introverted pop fan or two. But these trends, identified by psychologists Peter Rentfrow and Sam Gosling,[3] are real. They are, as the specialists say, clear and robust. Although you might have been able to guess some of these results, they are valuable because they are not based on assumptions or guesswork; they are the outcome of statistical analysis of thousands of listeners from America and Europe. There may be similar groupings in other cultures, but we don't know yet. This is a fairly new area of research that has looked only at Western listening patterns so far.

One other piece of information from these studies that is clear and robust is that the four musical genre groupings, which link, say, rock, alternative, and heavy metal together, or combine rap with soul and electronic music, really do work as taste groupings. So if, for example, you like blues, there is a good chance that you'll enjoy the genres that are grouped with it—jazz, folk, and classical.

The fact that we can divide music up into genres tells us that the link between personality and musical taste can't be purely musical. If an entirely music-based choice were involved, then your taste would be for a particular type of sound, but within each musical genre—even within a single album—the range of musical sound is enormous. When I was seventeen, the fourth Led Zeppelin album was considered the pinnacle of heavy rock by all of us who cared about such things (it's the album with "Stairway to Heaven" on it). If we look back at the album from a distance, however, it's obvious that of the eight tracks involved, only four and a half of them are actually heavy rock. The third track, "The Battle of Evermore," is pure folk rock (complete with mandolins), and the first half of the famous "Stairway to Heaven" is an acoustic ballad that has the temerity to involve a couple of tootling recorders! Back in 1971 my friends and I had to go through a lot of angst and recalibration before we could accept the fact that the recorder was now a cool instrument rather than a wooden joke.

Speaking of angstful teenagers, many researchers have noticed that we form strong and loyal links to the music we listen to during our late

teens and early twenties.[4] As everyone over the age of thirty knows, your early adulthood music preferences are influenced by more than just the sound of the music involved. A lot of important stuff happens to you during late adolescence and early adulthood: you get your first taste of independence, first kiss, first hangover, first this, first that. It's a time of life when you have to work out your likes and dislikes. Psychologists Morris Holbrook and Robert Schindler have shown that during our late teens/early twenties, we consolidate our preferences for a wide range of things, from genres of novels to types of toothpaste.[5] Naturally, our preferences are not created in a vacuum. Most of us deal with this difficult set of choices by aligning ourselves with a group of friends, and eventually we come up with a workable version of who we want to be.

As a young adult, you generally want to have prestige, or at least warm acceptance in your group of friends, and agreeing with them about things you like (clothes, music, etc.) is one way of achieving this acceptance. Certain artists and bands form the backbone of a musical genre—and you and your friends buy into the whole package rather than deciding that this or that track should be excluded from the genre just because it uses recorders. Another important point is that you and your friends can't consider yourselves to be "cool" unless almost everyone else is "uncool." Once you've decided that this or that band is cool, you want it to be your exclusive choice, so it can come as a terrible blow if your favorite band becomes part of the popular mainstream. A survey of thirteen-and fourteen-year-olds has shown that boys are more susceptible to following their friends' cool trends than girls are, as far as music is concerned, but most of us do it to some extent.[6] As music journalist Carl Wilson puts it:

> As much as we avow otherwise, few of us are truly indifferent to cool, not a little anxious about whether we have enough… and that's not being merely shallow: Being uncool has material consequences. Sexual opportunity, career advancement and respect, even elementary security can ride on it.[7]

The distinction between "cool" and "uncool" music becomes less of an issue as we get older, but is so important to a lot of teenagers that it has been used to manipulate their behavior. A number of town councils use "uncool" music to stop groups of young people from hanging around

shopping centers, and anywhere else they don't want them to be. This technique has been known as the "Manilow method" ever since 2006, when Sydney's city council discovered the amazing dispersal effect that *Barry Manilow's Greatest Hits* had on groups of teenagers.

Although most nineteen-year-olds are convinced that the music they and their friends listen to is simply the best music there has ever been, it takes only a few seconds' thought (about ten years later) to realize that this can't be objectively true. So let's look at a few things that *are* true about your taste in music—whatever music it happens to be.

Most of us are pretty unadventurous. One of the first things we do when listening to a new piece of music is classify it.[8] Is it bluegrass banjo? Seventies pop? Classical? Or something else? Then, if the piece fits into one of the musical styles we already enjoy, we give it some attention to decide whether or not we want to add it to the collection of music we like. If a piece doesn't fall into the "Oh, yes, I like this sort of stuff" category, then we don't give it much attention. The result of all this is that we end up gathering an ever-increasing number of similar musical pieces into our "like" categories, and the chances of enjoying a new category of music become pretty small unless we put some effort into it.

As you gather more examples of music you enjoy, you build up a model, or prototype, of a "typical piece I like." The closer any new piece comes to this prototype, the more easily you will accept it. Clearly, you won't be restricted to only one prototype; you'll develop a range of them within your favorite genre—slow/romantic, fast/exciting, etc.—covering various emotional states. And, of course, you can love a number of different genres. Having a wide range like this allows you to choose different types of music depending on what mood you are in and what you are doing.

One of the main things we take into account (consciously or subconsciously) when we are choosing something to listen to is its capacity to stimulate, or arouse, us. ("Arousal" in this context means the opposite of sleepiness.) We tend to be aroused by complex, loud music with a fast beat, and calmed down by simpler, slower, and quieter music. In this context, "complex" doesn't necessarily mean intellectually challenging; it just means that there is a lot going on for your brain to process. For example, fast banjo music is complex, but very few people would say that it was intellectual.

Psychologists Vladimir Konecni and Dianne Sargent-Pollock have

looked into our responses to complexity and arousal in music. They found that people preferred to listen to simple music rather than complex, arousing stuff when they were trying to solve problems.[9] Their perfectly reasonable conclusion from this result is that your brain is acting like a computer, and if you run complex programs in the background, you'll find that the main problem-solving program runs more slowly.

You will know from experience that sometimes we deliberately choose music that amplifies the emotional state we are in, and other times we choose music that does the opposite. If, for example, you are excitedly getting ready to go out to a party, you might put on some stimulating music to build the excitement even further. By contrast, if you've just gotten back from said party and are feeling excited because someone you fancy asked for your phone number, you'll choose to listen to something soothing and relaxing to help you calm down.

Our brain doesn't like to be either over-or under-stimulated, and listening to any sort of music involves the brain doing some work. So if you are on a boring motorway drive, you will find that complex, arousing music will reduce the boredom and help to keep you alert. If you then have to drive through a busy city center, you'll probably find yourself turning the music down, or off, or changing to something less demanding, because your brain is having trouble dealing with the complex music and the traffic at the same time.

When we are not dealing with difficult situations like driving in bad traffic, we have a Goldilocks attitude toward the complexity of the music we enjoy. We like it to be not too complicated, not too simple (boring), but just right—and this brings us to an interesting point about music we hear for the first time.

When we hear a piece of music for the first time, it has an extra layer of complexity as far as we are concerned because it's new to us. We don't know what chords or notes are coming next, and our brain is kept busy assessing what's going on. If we like the piece immediately and listen to it repeatedly, it becomes familiar, and its perceived complexity is reduced.[10] Familiarity can cause certain pieces of music to fall below our "too simple" threshold—one of the reasons why some popular radio singles sound great until we've heard them twenty times, and we suddenly lose interest. The reverse can happen with music we initially rate as being too complicated. After a few listenings, the complexity reduces and the piece might then drop into our "just right" category. This has happened to me on several occasions when two tracks—one of which

was immediately approachable and the other rather complicated—have appeared on the same album. Initially I have played the album to hear the charming, easy track and I've just had to put up with the more difficult one. Then, as I've become familiar with the album, my preference has changed from one track to the other because the pleasant track has become rather boring and the difficult one has become easier and more rewarding to listen to.

As we get older, although we retain a love for the music of our youth, we often get more sophisticated in our tastes. We start taking more pleasure from things that are interesting rather than those that are simply nice. In music, as in most things, your "too simple" threshold rises as your experience grows. Sophistication doesn't automatically imply poshness, but music that is regarded as posh, such as classical and jazz, often provides a fairly high level of mental stimulation compared to pop music, which is why many music fans become attracted to these genres later in life, even if they weren't keen on them when they were under thirty.

Apart from the complexity and arousal level, another factor that influences what we choose to listen to, or how happy we are with someone else's choice, is how appropriate the music is to the situation in which it's being played. I don't think I'm alone in feeling that the "Bridal March" ("Here Comes the Bride") is one of the dullest pieces of music ever written, but we all smile and nod when it's played at weddings because it has become the standard sound track to the bride walking down the aisle.

Richard Wagner wrote this uninspiring dirge as part of his 1850 opera *Lohengrin*, and it would have sunk into the obscurity it deserves had it not been for the fact that Queen Victoria's daughter, who was imaginatively named… Victoria, chose it as her wedding march (maybe the princess wasn't expecting married life to be much fun). Her choice of music for leaving the church (Mendelssohn's "Wedding March") is considerably more upbeat, but it does sound more like the accompaniment to a military victory than a romantic one. Nevertheless, in those days everything the royals did was instantly fashionable, and so everyone who was anyone started using the same music for their weddings.

That's how it all started, but everything should have changed (at least for the church leaving music) when the Duke of Kent married Katharine Worsley in 1961 to the far superior, joyful sound of the

Toccata by Charles-Marie Widor. The royals have been doing their best in this direction ever since: Princess Anne in 1973, and Prince Edward in 1999 both chose the Widor Toccata for their weddings. So why are the rest of us still putting up with tunes that sound as though they could have been written by a six-year-old with a xylophone? Why isn't Widor's Toccata floating out of every church every weekend? Why hasn't a jollier tune replaced the "Bridal March"? I'll tell you why: it's an international conspiracy of lazy organists! The traditional marches are very easy to play, while Widor's Toccata is decidedly tricky. Which is why, when savvy brides ask for it, they get excuses like "We lost the music behind a radiator in nineteen seventy-four" or "I would be delighted to play it but don't you find it a little… vulgar?" So come on, brides—put your foot down and do your bit for music.

Now where were we?… Oh yes, taste…

Professors Adrian North and David Hargreaves have discovered that we are surprisingly sensitive to the appropriateness of a piece of music to a given situation.[11] In fact, appropriateness is as important as the complexity/arousal aspects I was just discussing in shaping our response to music. While we tend to be forgiving of a dull tune if it fits with our idea of what's suitable (as the "Bridal March" demonstrates), we find inappropriate music highly irritating, as shown by our reaction to badly chosen background music in shops and restaurants.

At this point you might think that I'm going to go off the deep end about background music in the same way that I vented my spleen all over the wedding march. But no, it's more complicated than that.

Let me ask you two questions…

1. Do you like background music?
2. Does background music influence your behavior?

Like me, you may well have raised a defiant "No!" in answer to both these questions, and, like me, you are probably wrong. It may be that we are irritated and uninfluenced by *inappropriate* background music—but cleverly chosen background music is generally preferred to silence, and it affects our behavior to a level that is almost laughable.

Professors North and Hargreaves put music speakers on the top shelf of an end-of-aisle wine display in a supermarket to see if different sorts of music could influence the choices we make.[12] The display consisted

of four shelves, each of which had a French wine on one side and a German wine on the other. The wines on each shelf were matched for price and sweetness/dryness, so there was a fair competition between the two countries.

Then all they had to do was change the music occasionally and monitor which wines were bought when each type of music was playing.

The results were astonishing.

When they played German music through the speakers, the German wine sold twice as fast as the French stuff.

When they played French music, the French bottles sold *five* times as fast as the German ones.

This implies that we are as helpless as krill in the path of a blue whale as far as marketing music is concerned. And the effect is subconscious: only one in seven of the wine buyers realized that the music had influenced their choice.

In another wine/music investigation, Charles Areni and David Kim looked at how pop music and classical music affected how much money people spent in a wine cellar.[13] This revealed yet another level of gullibility in us poor shoppers. The pop music didn't have any effect on buying patterns, but the classical music obviously made people feel more sophisticated and affluent. They bought the same number of bottles, but they chose the more expensive wine. And I don't mean slightly more expensive. It was over three times the price!

It has even been shown that background music can influence the perceived flavor of wine. In an investigation into this effect, several groups of people were played one of four different types of background music while they were given a free glass of wine. The mood of the music playing in the background was deliberately chosen to be either powerful and heavy, subtle and refined, zingy and refreshing, or mellow and soft. The psychologists running the test didn't, of course, tell anyone that the background music was important; the drinkers just thought they were at a regular wine tasting. The wine tasters were later asked to rate the wine as to how heavy, refined, zingy, or mellow it tasted. The results showed that people tended to match the flavor of the wine with the mood of the music. For example, people listening to powerful, heavy music (*Carmina Burana*) tended to rate the wine they were sipping as powerful and heavy; zingy, refreshing pop music made the wine taste more zingy and refreshing, and so on. In fact the wine was the same in every case (a cabernet sauvignon), and the wine tasters were barely aware of the

background music—they were too busy enjoying their free wine.[14]

It seems that music can also influence how much you enjoy the wine. At a wine tasting in London the guests were given wines numbered one to five during the course of the session.[15] They were asked to comment on the wine in each case and also to nominate their favorite. Over the next hour or so, the music changed gradually from mellow classical (Debussy's "Clair de Lune") to the outright drama of "The Ride of the Valkyries." What the tasters didn't know was that the final wine of the session (wine number five) was the same as wine number one. Once again they matched the mood of the music to the taste of the wine. Wine number one was rated as mellow and soft, but the same wine, presented as number five, with the powerful, heavy music, was rated as… powerful and heavy. Also, wine number one was no one's favorite, whereas number five was the most popular wine of all.[*]

It's amazing that our perceptions can be influenced this easily, but plenty of other research has confirmed that background music affects us much more strongly than we would like to think.

Another supermarket study found that slow music made people spend over a third more than fast music did.[16] The reason for this was that slow music made people walk more slowly, giving them more time to browse and buy. The designer of this study, Ronald Milliman, then went on to look at how music affects our behavior in restaurants, and, sure enough, he found the same kind of result.[17]

With slow music playing, people spent about an hour over their meal, but with fast music, they wolfed their food down in forty-five minutes. The slow music customers also spent about one and a half times as much on drinks during their meal as the fast music diners. And these results seem to be typical of how we respond to the tempo of background music. The original study was carried out in America in the mid-1980s, but when the experiment was repeated by psychologists in Glasgow fifteen years later, they got precisely the same result.[18] Another study showed that slower music even makes us take fewer bites per minute.[19]

But before all you restaurant owners go dashing out to buy copies of *Leonard Cohen's Greatest Hits*, don't forget that, although the slow music customers spent more, they also stayed around, clogging up the restaurant for longer. In a crowded, popular restaurant, you might find it more worthwhile to play fast music so you serve more people per day.

Our pals Professors North and Hargreaves have also shown that the

type of background music being played influences our behavior.[20] This time they played different sorts of music on different days in a university cafeteria and then asked the customers to rate the feel of the place. The customers had no idea that the type of music playing while they filled in their questionnaires was part of the experiment; they may not even have noticed it consciously, but it did have an effect. According to the customer feedback, easy listening music made the cafeteria feel down-market, pop music made it feel fun and upbeat, and classical music made it feel sophisticated.

The changes in music also altered how much the customers were willing to spend in the place. The prices weren't actually changed, but the diners (who had already bought what they wanted) were given a list of fourteen food and drink items and asked to note down how much they would be prepared to pay for each one. If people filled in these questionnaires when no music was playing, they valued the total list of items at £14.30. If easy-listening music was playing, this rose slightly to £14.51. Pop music pushed this up quite a bit to £16.61, and classical music (as usual) made people come over all posh and sophisticated—and raised the perceived value of the list to £17.23. So the difference between silence and classical music was £2.93, which is about 20 percent.

The overall research result in this area is that, on average, the right sort of background music in a shop or restaurant can increase turnover by about 10 percent.[21] On the flip side, the wrong sort of music (e.g., rap music in a traditional Italian restaurant) can irritate the customers and make the place feel more down-market, or just wrong. One of the worst things a manager can do is allow the staff to bring their own music in. If the staff are of the same age and background as most of the customers, the situation might work out well for all concerned. What usually happens, though, is that the music is inappropriate for the customers, and to add insult to injury, the staff turn the volume up because they are enjoying it, so your favorite wood-paneled restaurant aimed at the over-fifties acquires the ambiance of a bar aimed at the twenty-three-year-old staff. While I do feel sorry for the staff—they must get driven round the bend by "cozy jazz classics for old geezers to eat to"—they'll just have to console themselves with the fact that they are a lot better-looking than the customers, and won't need to be tucked up in bed with a cup of cocoa by 11:30.

One great thing about your musical taste is that it can always be extended to include new genres. Remember the prototypes I mentioned earlier? The more of them you create in your mind, the more types of music you'll enjoy. You'll have to listen to stuff you don't initially like a few times before the new prototype takes root, but I promise it will be worth it, because you'll be increasing the amount of musical pleasure available to you for the rest of your life.

Before we go much further, perhaps now's the time for a few general comments about this book.

The information I will be presenting to you in the following chapters is based on a vast amount of research carried out by specialists from all over the world. If you see something that you want to look into further, just turn to the references section at the back of the book, which contains details about where to find the original research.

A lot of the information comes from psychological experiments, and although most psychologists may be in broad agreement about this or that point, you can always find a bunch of them who disagree. Rather than presenting all the different opinions and producing a book that is full of "ifs" and "buts," I have tried to stick to the majority view—as presented in such magisterial tomes as *The Psychology of Music*, edited by Diana Deutsch, and the *Handbook of Music and Emotion*, edited by Patrik Juslin and John Sloboda.

At the back of the book I've included some "Fiddly Details" sections. These are short essays on specific subjects for readers who might want a bit more information.

Finally, if you would like more clarification about something I've said, please feel free to email me at howmusicworks@yahoo.co.uk or contact me through my website: howmusicworks.info. On the website you'll also find some videos, including one of me fooling around with a musical beer bottle and an oboe made from a drinking straw.

CHAPTER 2

Lyrics, and Meaning in Music

The power of lyrics

Back in the nineteenth century, British foreign policy seems to have consisted mostly of shooting people in large numbers. By 1812 we were at war with the Russians, the Swedes, and, as usual, the French. (I've no idea what the conflict with Sweden was about—but I bet it had something to do with the IKEA home delivery service.) The Americans, understandably, felt a bit left out and decided to join in the excitement by also declaring war on us.

After a slow start, the Americans really started to get into the swing of things, and by 1814 the British decided to punish them for their lack of ex-colonial gratitude by setting fire to their cities. In August they burned Washington and the following month moved on to attack Baltimore from the sea. Over a twenty-five-hour period the Brits shot about 1,800 cannonballs at Baltimore's Fort McHenry, and by dawn the only light in the city (apart from the dawn) came from the exploding shells—which illuminated the American flag still flying above the fort.

Watching this deplorable display of pyrotechnics was the American lawyer and amateur poet Francis Scott Key. Like all poets he had paper and pencil always at the ready, and he sat down to pen (or pencil) the "Defence of Fort McHenry," which describes the flag fluttering in the smoke and flames:

O say can you see, by the dawn's early light,
What so proudly we hail'd at the twilight's last gleaming,
Whose broad stripes and bright stars through the perilous fight
O'er the ramparts we watched were so gallantly streaming?

And the rocket’s red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there,
O say does that star-spangled banner yet wave
O’er the land of the free and the home of the brave?

This—and three more verses—were set to the tune of an old English drinking ditty with the thoroughly unwieldy name of “The Anacreontic Song,” written by another bloke with three names—John Stafford Smith.

And that’s how the American national anthem—“The Star-Spangled Banner”—was born. I’ve no doubt that a lot of modern-day Americans wish that lines three and four were a bit easier to remember—but “the land of the free and the home of the brave” is just the sort of thing you want to hear in a national anthem.

“The Anacreontic Song,” however, which had the tune first, would cause some consternation if it were sung at, for example, an Olympic Games medal ceremony. The words are addressed to the ancient Greek poet Anacreon, who specialized in drinking songs, and the second verse goes like this:

Voice, fiddle, and flute—no longer be mute,
I’ll lend you my name and inspire you to boot.
And, besides, I’ll instruct you like me, to entwine
The myrtle of Venus with Bacchus’s vine.

Featuring the Roman goddess of sex (Venus) and the god of wine (Bacchus), these lyrics are pretty much the eighteenth-century equivalent of the Ian Dury song “Sex & Drugs & Rock & Roll,” which was a hit two hundred years later.

Many Americans feel a surge of emotion when they hear “The Star-Spangled Banner,” and I’m in favor of music having emotional effects. But as you can see, the emotional content of this and just about every other song can be changed completely by applying different words to the tune.

Lyrics add a new dimension to a piece of music. The simple addition of a human voice singing “baby baby baby” can infuse the music with sexy enthusiasm or sadness—depending on the way the voice is being used. Emotion can be conveyed simply by vocal inflection, and we can be moved by lyrics sung in languages we don’t understand. (I wonder

how many Sigur Rós fans speak Icelandic?) There are even examples of emotionally charged songs in made-up languages that no one understands. Enya's beautiful song "Aníron" from the sound track of *Lord of the Rings* is sung in the invented Elvish language of Sindarin.

Of course, most lyrics tell a story as well as relying on emotional vocalization. From the gentle poetry of "Ace of Spades" to the gritty realism of "Puppy Love," we all have our favorites, and of course we all have lyrics we can't stand. For those of you interested in lyrics that are irritating, ludicrous, or simply insane, I'd like to recommend *Dave Barry's Book of Bad Songs*. In this deeply philosophical contribution to human wisdom you'll find more than you might ever have wished to know about songs like "MacArthur Park" (the one about a cake getting rained on) and "Yummy Yummy Yummy" by Ohio Express. There's also a tantalizing mention of a (possibly mythical) country and western song called "The Only Ring You Gave Me Was the One around the Tub."

Sometimes even the finest songwriters have to take liberties with the language in order to make a rhythm or rhyme work. In some cases this just means that the music requires the singer to emphasize the wrong syllable of a word (e.g., apri**cot** at the end of the fourth line of "You're So Vain" by Carly Simon). But it must have been irritating for Neil Diamond when he had to resort to using the nonstandard word "brang" (to rhyme with "sang") in his song "Play Me."

The power of lyrics to alter our response to a tune was demonstrated in an experiment carried out in 1994 by the psychologists Valerie Stratton and Annette Zalanowski, who played the song "Why Was I Born?" (written by Oscar Hammerstein and Jerome Kern in the 1920s) to two groups of listeners.[1] When the tuneful, pleasant music was played by itself, it cheered people up, but when the lyrics (a sad refrain about unrequited love) were included, it had the opposite effect.

Mind you, we don't always listen to lyrics carefully—and even when we do, we often misinterpret them. This is particularly true of young people, who are the target audience of most pop songs. A survey carried out in 1984 offered people four alternative meanings to pop songs.[2] Only one of these interpretations was true and had been verified as such by the songwriter. The songs in question were fairly obvious about the message they were trying to put across. They included, for example, "You Are the Sunshine of My Life" by Stevie Wonder and "Trouble Every Day" by Frank Zappa. The young people (they were all under thirty) who

participated in the study got it wrong on average three times out of four—which is the same success rate as picking answers at random without even hearing the songs. Another experiment found that only one third of the people questioned could correctly identify the fact that Olivia Newton-John's "Let's Get Physical" was about sex; an equal number of people thought it was about sports and exercise.[3]

Happily, we get better at identifying what a song is about as we get older—but that doesn't stop a lot of us from falling into the Mondegreen trap.

The word "Mondegreen" comes from the seventeenth-century ballad "The Bonnie Earl o'Moray." Or rather, it doesn't…

The ballad goes like this (and, by the way, "hae" means "have"):

Ye highlands and ye lowlands,
Oh, where hae ye been?
They hae slain the Earl o'Moray,
And laid him on the green.

In November 1954 Sylvia Wright wrote an article for *Harper's* magazine in which she explained that her mother used to read these words to her when she was a child—but although her mother read the correct words, Sylvia had always thought the final two lines were:

They hae slain the Earl o'Moray,
And Lady Mondegreen.

She went on to suggest that, as there was no name for this sort of mishearing of lyrics, they should be called Mondegreens—which I think is fair enough.

Let's take this opportunity to clear up some long-standing Mondegreen-induced misconceptions:

In the 1969 Creedence Clearwater Revival song "Bad Moon Rising," the message is menacing, "There's a bad moon on the rise," rather than helpful: "There's the bathroom on the right."

In the first line of Desmond Dekker's 1968 hit, he's not eulogizing about the fact that he's going to be having "baked beans for breakfast." Apparently the only thing on the menu is bread. And the song is called "The Israelites," not "Me Ears Are Alight."

At the beginning of our favorite song about flying ruminants, Rudolf is being laughed at by *all of* his reindeer colleagues, not by a single, nasty individual called *Olive.*

Meaning and messages in music without lyrics

The fact that lyrics can tell a story has led some people to believe that music by itself can do so as well. Those of you who listen to classical music will probably be familiar with the idea of "program music," which was very popular in the nineteenth century. This type of music is intended to tell a particular tale the composer had in mind when he wrote the piece. One of the most famous of these is Beethoven's *Pastoral* Symphony, the program of which describes a day trudging around the countryside watching peasants dancing and getting caught in a thunderstorm etc.

I was going to use this as a prime example of a program until I found a much funnier one.

In about 1700 the French composer Marin Marais underwent an operation to remove a stone from his bladder and, being a composer, he thought this would make an excellent subject for a piece of program music—and who are we to disagree?

This is what Marais calls a program:

The appearance of the operating table
A shudder on first seeing it
Resolving to get onto it
Climbing onto it
Sitting on it
Grave thoughts
Tying the arms and legs down with silken cords
Making the incision
Introduction of the tweezers
The stone is removed
Nearly losing your voice
The flow of blood
Removal of the silken cords
Off to bed

All this in a piece lasting two and a half minutes, written for the viola da gamba, a cello-like instrument (with optional keyboard accompaniment).

Clearly, Marais couldn't really expect us to work out that a particular musical sound was meant to convey "Removal of the silken cords." We might stand a chance of guessing that a group of notes communicates "Grave thoughts"—but a group of notes suggesting "Grave thoughts" to one person might conjure up images of Etruscan pottery… or sunrise over Bolton to someone else.

Going back to the slightly less bonkers program of Beethoven's *Pastoral* Symphony—during the bit where Beethoven is depicting peasants dancing, the bass line is ludicrously simple, just a repeated pattern of three long descending notes. Beethoven knew that the person playing the bass instrument in a village band was usually the least skilled member of the group, restricted to playing extremely simple stuff while his more melodic friends showed off on their fiddles and fifes. So to help us follow the story, Beethoven portrayed his peasant band with an appropriate dance tune and a very simple bass line. But unless you are deeply familiar with the antics of nineteenth-century Austrian village musicians (as Beethoven was), then all this would simply pass you by—as it did me until I started reading up on it. The symphony is full of imitations of the sounds of nature such as birdsong and thunder, but Beethoven himself wasn't comfortable with the idea of trying to use music to tell a story. He described the work as an "expression of feelings" rather than a musical "painting."[4]

For an example of music successfully conveying specific messages, let's return to nineteenth-century America—which, you will recall from earlier in the chapter, was a place of strife and difficult-to-remember poetry.

At the time when Baltimore was being (ineffectually) pounded by the British navy, the armies of both sides of the conflict had been using bugle calls as signals for several years. The soldiers had to know what each call meant, and there was a lot of confusion because various branches of the army used similar calls; for example, the cavalry used a call that meant "Water your horses," which could easily be confused with the infantry call that meant "Make camp." In 1867 Major Truman Seymour—who was utterly fed up with being mobbed by thirsty horses whenever his infantry got their tent pegs out—drew up a definitive list of about forty calls and all the soldiers learned them. This is an example of

a working musical language, in which music carries detailed information.

The most famous American bugle call of all, “Taps,” was originally used to tell the soldiers that the beer taps were about to be turned off, and would they please all get off to bed because they had a busy day tomorrow. Over the years its role has changed, and it’s now the tune the American army plays at dusk and at military funerals—which brings us neatly to a discussion of the Woodstock rock festival in 1969.

Woodstock—one of the first and one of the biggest rock festivals—happened at a time when most of the world thought the Vietnam War had been going on for far too long. The war was, naturally, particularly unpopular with the type of long-haired, pot-smoking layabouts who attend rock festivals.

Enter Jimi Hendrix, guitar hero and antiwar protester. As part of his Woodstock set Jimi plays a feedback-ridden, distorted version of “The Star-Spangled Banner,” which goes on for about three and a half minutes. He alternates between a fairly clear rendition of the tune and a virtuoso display of violent noises from his Fender Stratocaster, imitating screams and bombs going off. And just to make his point absolutely clear, toward the end of the solo he plays “Taps,” invoking all those military funerals, all those lives lost.[5] A great antiwar protest, which no doubt helped to end the war while simultaneously providing an enormous boost to the sale of Fender Stratocasters.

So here we have a specific, complex message being sent to a crowd of half a million people using music without words. Of course, the message wouldn’t have come through to a crowd of people who didn’t know the two tunes involved or the political context in which they were played. Music doesn’t carry any messages or stories unless you’ve been taught beforehand that a particular tune or rhythm means this or that. This need for pre-knowledge is a feature of all methods of communication. Sign language, for example, works only if everyone involved in the conversation understands what the signs mean. Except for systems such as bugle calls and rare cases like Jimi’s guitar solo, there is no way of extracting a clear message from purely instrumental music because there is no agreed-upon vocabulary. The visual and literary arts are often used to describe objects, people, and actions, but music isn’t used in this way because there is no dictionary for translating musical statements into specific meanings.

But if music isn’t a method of delivering meaningful statements, what use is it? And why is it so important to us?

It's going to take most of the rest of the book to answer these questions, but we can make a start here by going back to absolute basics.

When I was preparing to write this book, I read an awful lot of definitions of music, and one of my favorites was in one of the old books huddled around the fireplace of a country pub—put there to make the place look cozy and "Olde Worlde" (although I haven't a clue why Olde Worlde props are needed in a pub that was built in 1637). The modestly titled *Universal Knowledge A to Z* defined music as "the sound obtained by combining sequences or groups of notes of different pitch so that they become acceptable or intelligible to the listener."

Intelligible is the important word here. It means that we use our intellect to make sense of what's going on. But if there's no story, what are we trying to understand?

Before we go any further, have a look at this photo:

And this one:

Let me guess what just happened in your head…

First of all you wondered what the first photo was about and tried to make sense out of it—and failed. Then you looked at the second photo and worked out that it was an image of a rock formation. Then you may have noticed that some of the rocks look like human faces. Then you looked back to the first photo and tried to make more sense of it—to see if there was a human face in there as well.

Well, I can't guarantee that you saw faces in either photo, but I'll bet you a free romantic weekend for three in Rochdale that you tried to make sense out of the images. You didn't try to interpret them just because they are in this book. You would have tried to make sense of them even if you'd found them behind the sofa, because that's what humans do. We try to make sense out of everything we experience—including music.

When we hear a new piece, we use the large mental library of music we have already heard to give us some context, and we unconsciously construct a set of expectations—we predict that the tune will rise or fall, get louder or softer—and we are often right. We find it pleasant if our expectations are frustrated occasionally, but we don't expect to be wildly donkey. Rather like the way you didn't expect the word "donkey" just then.

Our memories of all the pieces we have heard in the past don't have to be accurate—and we are not looking for perfect copies. It's a bit like watching social interactions and guessing what's going to happen next because you have seen similar situations develop before—so you can see

that the girl across the street is about to kiss the man she just met, or that the group of people by the bus stop are listening to a joke and waiting for the punch line.

Most of us are surprisingly expert listeners—and if you need confirmation of this, just consider your ability to tell that a piece of music is about to end, even if you've never heard the piece before. (If you can't tell when it's about to end, it's usually because the composer has put a lot of effort into misleading you. In the late 1970s it was considered very sophisticated to stop a piece suddenly, in the middle of a … but, thankfully, the practice largely died out at about the same time people stopped burning joss sticks at rock concerts.)

Obviously we don't begin life with this ability to compare new experiences to old ones. As babies we have to build up our libraries of "what's going on?" from scratch and we accept new things easily because we have nothing to compare them with. In his book *Sophie's World*, the novelist-philosopher Jostein Gaarder points out that if Granddad starts to hover in the air during a family meal, the baby will calmly accept it while everyone else in the family will be reduced to baffled panic.[6] Babies live in a world of contented, if rather smelly, bewilderment until they gradually build up a set of "this is normal; that is peculiar" rules.

To build up a pattern of expectations, we try to match new sights and sounds to ones we are already familiar with. In the case of the photos, many of us can "see" faces in the second image even though there are no faces there. If you measured up the eye and nose positions of the sandstone "faces," you would find they were nothing like real ones.

And for those of you who are losing your equanimity wondering what the first photo is of, it was just there on my phone one morning. I think it's a flash photo of the fluff inside my trouser pocket. My girlfriend and I spent two or three happy minutes trying to work out what it was, and I thought I'd share the thrill with you.

But let's extract ourselves from my trouser pocket and get back to the music.

Some of your muscles, like your heart and lungs, are designed to keep moving without conscious instruction. Other muscles, such as those in your legs, arms, and hands, generally need to be told to act by your brain. But muscles don't like doing nothing. Your legs and arms, and various other parts of you, continue to move, even when you're asleep. The reason muscles keep moving is so they can retain some sort of

fitness and readiness to obey your next instruction—even if it's only to stretch out an arm to turn the alarm clock off. If your muscles allowed you to switch them off completely, the less frequently used ones would wither away, and eventually you would encounter a situation in which they couldn't save your life.

So there you are: involuntary muscle movement helps you and the rest of the human race to survive.

The same thing can be said of human brain activity. The brain is always desperate for stimulation. Turning off isn't an option. The only way it can retain its ability to keep you alive is by keeping itself in shape by thinking about something or other.

But the brain doesn't like being overstimulated either. Overstimulation leads to panic-like states.

So your brain can't be turned off, and it doesn't like being over-or under-stimulated. As Adrian North and David Hargreaves explain, "the brain works most effectively when moderately aroused; for example, it would be hard to write an essay while feeling sleepy or very anxious."[7]

One of the reasons we love music is that it is an excellent way of providing moderate brain stimulation and giving pleasure at the same time. In Philip Ball's excellent phrase, music "is quite simply a gymnasium for the mind."[8]

But there is, of course, much more to music than its capacity to keep your brain in shape. It can, for example, be a powerful emotional stimulant, as we will see in the next chapter.

CHAPTER 3

Music and Your Emotions

While music (without lyrics) is pretty useless at telling a story, it *can* express and evoke emotions. Before we go any further, I'd like to clarify what we mean when we talk about emotions. Emotions are not the same as moods; we are always in one mood or another, but we are not always experiencing an emotion.[1] Emotions are relatively brief and intense, and they are often linked to unconscious physical reactions such as changes in skin temperature. If an emotional response is music-related, it will be synchronized with the music—that is, the music will trigger the emotion.[2]

Perhaps the most important thing to bear in mind about emotions is that they are biologically evolved reactions which are vital to human survival.[3] From a survival point of view, emotions such as disgust and fear help us to avoid, or run away from, potentially dangerous situations. Anger helps energize us to deal with threats, and happiness steers us toward rewarding situations such as eating and sex. So it's a bit odd that something like music, which has no obvious link to survival, can generate emotional responses—but we'll come to that point later.

Music and emotion are linked in two ways. In some cases we simply recognize which emotion the composer intended us to feel, but we don't engage with it. The other response is when we don't just monitor what's going on; we get emotionally involved. When the "fear" music comes on for one of James Bond's enemies, we don't get fearful; we just think "Ha!—eat metal death, you unpleasant cesspit of moral turpitude!" But if the fear music comes on for James's girlfriend, we get frightened along with her. (This is usually a perfectly justifiable fear, as the average life expectancy of a James Bond girlfriend is about thirty-five minutes.)

The early days of research into the emotional content of music

involved a lot of hopeful guesswork as well as some brilliant insights. The pioneering author Deryck Cooke laid a lot of interesting groundwork, but he was over-fond of equating music with language. As we shall see, there *are* some links between speech and music—but they aren't the ones he had in mind. In his book *The Language of Music*, published in 1959, Deryck claimed to have identified sixteen musical devices that had definite meanings. For example, the notes of a major chord, played one after another, from the bottom note upwards, were supposed to convey "an outgoing, active assertion of joy."[4] Unfortunately for the long-term sales of his book, the evidence shows that this type of direct speech–music translation simply doesn't work.

Deryck was particularly keen on the idea that major keys bring happiness and minor keys evoke sadness.[*] As we'll see in a little while, there is some truth in this idea, but Deryck took a fairly hard line on the issue and therefore found it inconvenient that some cultures—the Spanish and Bulgarians, for example—use minor keys for quite a lot of their happy music. His response to this fact was to argue that the Spanish and Bulgarians were so used to a hard life that they hadn't had time to acquire a "belief in the individual's right to progress towards individual happiness."[5] In other words, they were so downtrodden and unhappy that they couldn't be expected to create the right sort of (major key) happy music. Even in the 1960s this sort of thinking was easily identifiable as balderdash, and over the next few decades Deryck fell into the obscurity that befalls all those who don't know how to spell their own name properly.

Faced with the complex problem of how music affects human emotions, modern researchers decided to start from scratch—so they began with the fundamental question…

Does music actually generate emotions?

Everyone agrees that music creates emotional responses, but that isn't proof that it's actually true. The psychologists set to work and soon established that people are pretty good at spotting the *intended* mood of a piece of music, even if it's performed "deadpan" by a computer. In one test, researchers asked five composers to write six pieces of music that were individually meant to portray joy, sorrow, excitement, dullness,

anger, and peace. The pieces were then played by a particularly dispassionate computer, and the different types of emotion were easily identified by listeners.[6] It has since been confirmed that a wide range of listeners generally agree on whether or not a piece of music is intended to be happy or sad and whether it is supposed to be relaxing or arousing. These are four of the basic emotional states, and they are the easiest for humans to spot and project. You usually can tell how relaxed or aroused and how happy or sad people are by their body language—or, on the phone, by their tone of voice, even if they are speaking in a language you have never heard before. But in music, as with body language, although you can spot the basic intended emotion, it's not possible to interpret detailed emotional information. One person might feel a certain piece of music is happy/playful, and another might hear it as happy/proud.

And being able to identify the intended emotion of a piece of music is only half the story. Can music actually produce an emotional response in the listener? In their quest to answer this question, researchers came up with the cunning ruse of simply asking a lot of people about the effect music had on them. Professor Patrik Juslin and his team asked over seven hundred Swedes to tell them about their most recent emotional musical experience.[7] And the results were very encouraging for the music industry.

Everyone questioned claimed to have experienced emotions while listening to music, and more than eight out of ten of them said their most recent emotional response had been pleasurable—with the five most common emotions being happiness, melancholy, contentment, nostalgia, and arousal. But even the opinions of seven hundred Swedes are not proof of the existence of musical emotions; for proof you need to use things that don't have opinions: you need machines.

Psychologists are never happier than when they can plug hapless victims into machines that go beep. Such devices can measure, among other things, your heart rate, skin temperature, the electrical conductance of your skin, and the amount of muscle activity in your face. When you are emotionally aroused, you use your facial muscles to smile or frown, your heartbeat changes pace, and your skin temperature can fall a little. For example, happy music produces greater skin conductance, a lower finger temperature, and, not surprisingly, more smiling than sad music does.[8] It's very difficult to fake these responses (except the smiling), which is why the police in some countries use the same measurements

(via lie-detecting equipment) to detect signs of stress. Lots of experiments have been carried out using this type of equipment, and the results have shown that music can indeed create emotions.[9] Interestingly, if music is calm or happy, we tend to get calmer or happier, but if music is designed to carry a negative emotion like anger, we generally just recognize that it's angry. We don't become angry ourselves, unless the music is playing in a movie, in which case the visual imagery and the music can work together to create a heightened response for both positive and negative emotions.[10]

Brain scanning equipment is the most reassuringly expensive of all the machines that go beep. These devices monitor activity levels in various parts of the brain as we change our thought patterns this way and that. We are not yet at the stage where the medics can look at brain scan images and say, "Oh, look—he's thinking about carrots again," but they can spot whether or not we are emotionally aroused. Ever since such equipment became available, psychologists have been examining the effects of various emotions on activity in different areas of the brain, and the results have been fascinating.

The amygdala, apart from being a very high-scoring word in Scrabble, is one of the most important parts of your brain for processing emotions. It's particularly important in generating fear responses (although that's not all it does), and is sometimes referred to as the "fear center" of the brain. A malfunctioning amygdala can result in mental disorders from depression to pathologic anxiety. In 2001, neuroscientists Anne Blood and Robert Zatorre used brain scanners to monitor blood flow to various areas of the brain while people listened to their favorite music. They found that there was an increase in blood flow to the areas of the brain associated with reward and positive emotions, and a decrease in blood flow to the amygdala.[11] So the pleasure centers were working hard and the fear center was taking the day off. Another study, by Stefan Koelsch and his team, confirmed that listening to joyful dance music increased the blood oxygen levels of various emotion-linked areas of the brain and showed a decrease in oxygen usage in the amygdala. (The amount of blood oxygen in any brain location is an indication of how hard that area is working.)[12] The same project then studied the effects of unpleasant, dissonant music and found that it had the opposite effect of pleasant music: the subjects' blood oxygen levels dropped where they had been high, and rose in the amygdala.[*] Apart from proving that music

actually does generate real emotions, this work indicates that music can be used to manipulate the amygdala in cases where it isn't functioning properly. Music therapy, which we'll be looking at in chapter five, can (and does) use pleasant music to calm down an overactive amygdala to alleviate anxiety and depression.

There have, of course, been lots of other investigations involving various types of brain scanners, and the overall conclusion is that the brain responds to music in a similar way to how it responds to other emotional stimuli.

To summarize all this in very simplistic terms:

Pleasant music stimulates the pleasure centers of the brain and calms down its fear center (the amygdala). Unpleasant music does the reverse.

Which type of music creates which emotion?

The tempo, or speed, of a piece of music is the clearest indicator of its emotional content. If the music is fast, it's unlikely to be sad or tender/romantic. But fast music might be happy or angry, depending on factors such as how warm and consonant the harmonies are. Here is a quick summary of how some of the features of a piece of music are often linked to specific emotions.[13]

Tempo (speed)
Happiness: Fast, steady
Fear: Fast, varied
Anger: Fast, steady
Tenderness: Slow, steady
Sadness: Slow, varied

Key type
Happiness: Major
Fear: Minor
Anger: Minor
Tenderness: Major
Sadness: Minor

Average pitch
Happiness: High

Fear: High
Anger: High
Tenderness: Low
Sadness: Low

Pitch variation
Happiness: High
Fear: High
Anger: Moderate
Tenderness: Low
Sadness: Low

Harmony type
Happiness: Consonant
Fear: Dissonant
Anger: Dissonant
Tenderness: Consonant
Sadness: Dissonant

Loudness
Happiness: Medium to loud, steady
Fear: Quiet but variable
Anger: Loud, steady
Tenderness: Medium to quiet, steady
Sadness: Quiet but variable

Certain combinations of musical characteristics generally give rise to particular emotional effects. As you can see from the table, most of the happy, angry, or fear-inducing music you hear is fast, with high-pitched notes and tunes that jump around in pitch. By contrast, tender (romantic) or sad music is generally slow with low-pitched notes and far less movement in pitch.

If you're a composer following these guidelines, you can make a happy tune more tender and romantic by slowing it down and playing it on low-pitched instruments (such as cellos). Or you can make a sad piece of music fearful by playing it on high-pitched instruments (such as violins) and increasing and varying the speed. Film score composers—who need to adjust the theme tune of a movie to fit a wide variety of situations—often use these techniques to manipulate our emotions.

But it's important to remember that there are no firm rules in music;

these are just generalizations to which there are many exceptions. The *Jaws* music, for example, is low-pitched and terrifying, and I'm sure you can think of plenty of songs that are high-pitched and sad.

The fact that the speed of the music gives the clearest indicator of its mood is the reason why some Spanish and Bulgarian music is cheerful even though it's in a minor key. The music in question is moderately high-speed dance music, and the high tempo removes any sad influence that the minor key might have.

Obviously there are many more emotions than the five main ones listed in the table, and music can evoke more complicated feelings such as nostalgia, pride, and longing. On top of this, there are so many other musical techniques you can use to influence the emotional content that you can't reliably forecast the emotional effect of a piece of music just by looking at how it's put together.

One of the major variables involved is you, the listener. A wide range of factors can influence your emotional response to music, including your age, personality, musical preferences, familiarity with the music, and the mood you are in. My own response to a piece of music turned from moderate joy to speechless irritation in just twenty seconds a few weeks ago. My girlfriend, Kim, was driving us both back from Southampton to Nottingham the day after a friend's annual barbeque. I was sitting in the passenger seat looking at the sky and enjoying the jolly banjo music on the stereo when suddenly a motorway junction appeared out of nowhere, and we were at the head of the queue at the roundabout. We had to join the motorway immediately—but should we be heading east or west on it? In the time-honored tradition of couples dealing with this sort of emergency, Kim raised the point that, as she was driving and I had the map open on my lap, it seemed logical to her that I might have prepared myself for this decision a little earlier, and spent less time staring gormlessly out of the window.

At least that was the gist of what she said.

I stared at the map. I stared at the road signs. I stared at the map again—and found that I just couldn't think clearly with that dreadful jangly bloody banjo music playing. I turned it off and my head cleared immediately. "West," I said—and we headed off into the sunset. Within a few minutes we were back in the correct frame of mind for jolly jangling and turned the music back on. If there's one thing life has taught me it's that banjos and map reading don't mix. This, of course, fits in well with the research by Vladimir Konecni and Dianne Sargent-Pollock

I mentioned in chapter one, which found that we don't like complex music when we are trying to solve a problem.

Everyday musical experiences

In the Western world, about one third of the things we do every day are accompanied by music, and for around half of that time the music has some sort of emotional effect.[14] In 2008 our friend Professor Juslin and his team carried out a detailed study on the effect of music on our everyday lives.[15] They asked thirty-two Swedish students to carry around handheld computers that were programmed to beep seven times a day at random intervals. Whenever they heard the beep, the students had to answer a list of questions about what they were doing at that point, how they felt emotionally, and whether or not they could hear music. If they could hear music, there were further questions about the music itself and what effect they thought it might be having on their emotional state.

As I'm sure you'll be delighted to hear, they found that, whether music was involved or not, calm contentment and happiness were the most commonly felt emotions, while negative feelings like guilt and disgust were quite rare. Some listeners experienced music-induced emotions far more often than others, but the addition of music to any situation tended to boost the number of happy or elated experiences and minimize the incidence of anger or boredom.

On top of this, whenever there was a mood change caused by the addition of music to a situation, it was almost always a change for the better, with the person becoming happier and more relaxed. This is partly, of course, because most music is designed to be pleasant and relaxing.

Now, if the subjects of this study had been from a population predisposed to giddiness—the sort of "carry me to the next bar, when does the carnival start?" party animals you might find in Brazil or Wales—we might be suspicious of the results. But this was a group of Swedes—the inventors of the ultra-safe Volvo, the vegetarian meatball, that most unhappy of all fictional detectives, Wallander,* and his even more miserable father. If music is capable of cheering up the compatriots of Wallander's dad, we can be sure we're on to a good thing.

So now it's official: music *is* good for you. It generally cheers you

of the last section, we associate minor keys with sadness and major keys with happiness—but why?

One of the main reasons is cultural. In northern Europe and the United States, most of the sad lyrics you hear are set in minor keys (e.g., the jazz song "Cry Me a River") and happy lyrics tend to be presented in major keys (e.g., the Beatles' "Here Comes the Sun"). So people who grow up in these societies expect these links. But as usual with music, it's not a hard-and-fast rule even in these societies. It's possible to write happy music in minor keys (like Purcell's Round O in D Minor*) and sad music in major keys (like Leonard Cohen's "Hallelujah").

And as we saw earlier, some societies (Spain, the Balkan countries, and India, for example) use minor keys for joyful *and* sad music. So is there any objective reason why minor keys should sound sad?

Well, there are a couple of technical reasons why minor keys might be considered more suitable than major ones for expressing complex emotions like sadness and longing—but these shouldn't be thought of as rigid laws; they are more like gentle persuaders.

The first reason why minor keys express sadder emotions so well is that they really are more complicated than major keys. To understand this idea, let's take a quick look at how the strings on a harp are tuned to produce a major key.

A harp string produces a musical note by vibrating backwards and forwards at a certain *frequency*. A string might, for example, be traveling from left to right and back again 110 times every second, causing the pressure of the air near our eardrums to go up and down 110 times a second. This fluctuating pressure pushes our eardrums in and out at the same rate—so we hear a note of that frequency. (This is the frequency of the note A_2—the note produced by the A string of a guitar.)

If we make the other strings on the harp vibrate at frequencies that have a simple mathematical relationship to that first note, they will sound good together.* For example, a string vibrating 165 times a second will work well because 165 is one and a half times 110.

For a major scale, you start with a note of a certain frequency and then add notes whose frequencies equal the first note's frequency multiplied by 1⅛, 1¼, 1⅓, 1½, 1⅔, and 1⅞. These simple relationships mean we have put together a strong, closely related "team" called a major key.

Let's stick with the sports analogy for a minute. A minor key is basically a major key with three team members replaced by rookie