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TORCH

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“The Hills Are Alive: This is Your Brain on Music” (thanks to Daniel Levitin for the subtitle!)

Full disclosure: I’m a musician, was a church organist for a couple of decades, played oboe in the Fox Valley Symphony for 15 years, and performed in a woodwind quintet and recorder consort at various times. However, I won’t sing for you — neck surgery last year took a toll on the vocal cords and I only have about 5 notes left! My musical taste runs from pre-baroque to zydeco, with nearly every possible type in between. I do listen to all kinds, except heavy metal and rap.

My husband Howard has put up with my musical family since day one of our 20 year marriage. We went to borrow a rake from daughter’s garage, and he wondered what to do if the garage was closed. I simply said, Beethoven’s Fifth. I punched in da-da-da-dah, (5-5-5-3}, and it opened. A relative came over to visit, and showed up at our door. I asked how he got through the key-punch entryway, and he replied, oh, it’s a final chord sequence, no problem. Yes, it is 2-5-1, as I had told him a couple of years ago. Then at Thanksgiving dinner following the pie, we showed the younger generation how to play the wine glasses by rubbing a finger around the rim to produce a tone. This involved sipping, testing and refilling until we got good harmony.

I know there are friends here who are musicians and have played instruments: French horn, bassoon, saxophone, piano, and of course, our resident Diva soprano, Nancy Bodway. Even if you’re thinking you are not a musician, you will recognize the following.

What happens if you hear these phrases? There might be a mental picture attached to them, and there might be a sound track, too!

Hi Ho, Hi Ho, It’s Off to Work We Go
I’d Like To Teach The World To Sing (Coca Cola, anyone?)
Oh, what a Beautiful Morning
The Hills are Alive
When you Walk Through a Storm
I Believe
76 Trombones
Lemon Tree

What if I say Bing Crosby, Frank Sinatra, or Kate Smith?

The brain is a wonderful thing. Without turning a switch on a radio, tv, or cd player, you can probably hear an automatic sound track of Crosby singing White Christmas, Sinatra belting New York, or Kate Smith invoking God Bless America! Not surprisingly, you will also have amazing brain reactions when you are reminded of pop tunes from your high school dating days, and a host of other connections to music.

How about holiday music? Everyone has favorites and Least Favorites. (Little Drummer Boy, anyone?) (Grandma got run over by a reindeer!) (I want a Hippopotamus for Christmas!)

So you see what I'm getting at. We are surrounded by music: the good, the bad, and the ugly, and mostly, thank goodness, we get to choose which we want to hear.

Alex Ross in *Listen to This*, reports that "More than a century ago, . . . John Philip Sousa warned that technology would destroy music. Testifying before the US Congress in 1906, he said: These talking machines are going to ruin the artistic development of music in this country. When I was a boy . . . in front of every house in the summer evenings you would find young people together singing the songs of the day or the old songs. Today you hear these infernal machines going night and day. We will not have a vocal cord left."

The hills may be alive with the sound of music, but now everything else is alive with the sound of iTunes. Think for a moment of our history of listening. Victrola, anyone? The phonograph played 78s, 45s,, then LPs. mono then stereo. Did you have cassette tapes or 8 tracks? How about the Sony Walkman in 1979 for \$150! CDs were exciting to collect and not nearly as fragile. Now, we have the iPod 2001, advertised to put "1000 songs in your pocket," then subsequent versions which in 2002 became 4000 songs in your pocket! In 2003, iTunes music store sold 1 million songs its first week. The iPod mini came out in 2004, and the iPod shuffle in 2005 — imagine hearing Beethoven, Beatles, Pete Seeger, Kingston trio, Kiss, Rolling Stones, and more, in random order!

Alex Ross, in *Listen to This* tells us "I bought an iPod and began filling it with music from my CD collection. The device . . . had a setting called Shuffle, which skipped randomly from one track to another. The little machine went crashing through barriers of style in ways that changed how I listened. On the iPod, music is freed from all fatuous self-definitions and delusions of significance. There are no record jackets depicting bombastic Alpine scenes or celebrity conductors. . . . As [composer] [Alban] Berg once remarked to Gershwin, music is music."

Younger listeners seem to think the way the iPod thinks. They are no longer so invested in a single genre, one that promises to mold their being or save the world. In 2007 one of the biggest new products in the century so far, the iPhone, was introduced, and iTunes sold 2 billion songs. In 2008 the App store had a debut in which 10 million apps downloaded the first weekend. In 2010 first iPad came out, and recently the iPad Air.

What in the world is going on with all this music?

What happens in your brain when you hear a song you love may provide some crucial insight. According to Robert Zatorre, PhD, professor of neuroscience at the Montreal Neurological Institute and Hospital at McGill University, "Music increases cross talk between brain structures in old reward centers that handle pleasure and newer areas of the cortex that handle prediction and anticipation." Dr. Zatorre found in one study that the brain released dopamine, a chemical linked to pleasure and reward, in anticipation of a subject's favorite part of the song. So it may be that music fuels your brain's innate desire to detect patterns and solve problems.

In August, when this paper was roiling around in my brain in several permutations, I heard WPR's Norman Gilliland and his guests talk about Celtic and Irish music, saying that they recognize three kinds of music: laughing music, crying music, and sleeping music. I agree that we could certainly categorize much music into these divisions. Recently published is *The History of Rock 'n' Roll in Ten Songs* by Marcus Greil. I've not had a chance to read it but I'm curious to find out what those 10 songs are in his book.

Daniel Levitin, in his book *The World in Six Songs*, suggests there are, of course, six kinds of songs that are sung everywhere on the globe, and have been since pre-history times. It's surprising how much these six songs might be part of your very own life. The author's subtitle is "*How the Musical Brain Created Human Nature.*" Levitin suggests that the development of our brains made possible music, art, science, and society. He suggests that the way that songs communicate emotion and ideas have built human nature. That is, indeed, a complicated thesis and very interesting for study.

Alex Ross tells us that the neurobiologist Aniruddh Patel, in his book *Music, Language and the Brain*, lays out myriad relationships between music and speech, and yet he allows that "musical sounds can evoke emotions that speech sounds cannot."

Elizabeth Hellmuth Margulis, in her 2013 book *On Repeat: How Music Plays the Mind* asks several questions: What IS it about the music you love that makes you want to hear it again? Why do we crave a "hook" or chorus that returns, again and again, within the same piece? And how does a song end up getting stuck in your head?

Daniel Levitin writes the following description. "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. 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."

I would have suggested he find a few opposites: *You Are My Sunshine*, *Sunshine on my Shoulders*, and *Aquarius/Let the Sun Shine In*.

Of course, Author Levitin in his rainstorm is talking about "earworms," as they are known; songs that get stuck in your head and go round and round, sometimes for days, sometimes for months. For no apparent reason you cannot help yourself from humming or singing a tune by Lady Gaga or Coldplay, or horror upon horrors, the latest American Idol reject.

To a psychologist the most interesting thing about earworms is that they show a part of our mind that is clearly outside of our control. Earworms arrive without permission and refuse to leave when we tell them to! They are parasites, living in a part of our minds that rehearses sounds.

We all get these musical memories, and people appear to have different ones, according to a team at Goldsmiths University in London, who collected a database of over 5,000 earworms. True, the songs that we get stuck with tend to be simple and repetitive, but we are not all singing the same number one song at the same time.

People say that Disney's "It's a Small World" is one of the most irritating earworms in the universe. Some people use it to get rid of another earworm: just think of "It's a Small World After All" and you don't even need to hum it! However, I find that song too annoying to risk trying this method.

A word about earworms.

<http://www.bbc.com/future/story/20120411-why-do-songs-stick-in-our-heads>

Tom Stafford, Science and Environment)

Neurologist Oliver Sacks wrote in his book (*Musicophilia*) that earworms are a clear sign of "the overwhelming, and at times, helpless, sensitivity of our brains to music." Music is defined by repetition, just like earworms, and this might make earworms so hard to shake – they are musical memories that loop, say a particular verse or a hook, forever repeating rather than running to completion. Some people report that singing an earworm to the end can help get rid of it; others report in frustration that this does not work at all. Last May I was listening to a Pete Seeger tribute on public radio, and they insisted on playing The Lion Sleeps Tonight (Weem-a wip, etc.), which I suspect caused an earworm among many if not most of the listeners.

As well as containing repetition, music is also unusual among the things we regularly encounter, for being so similar each time we hear it. Put a CD on and the sound comes out virtually identical each time. Remembering is powerfully affected by repetition, so maybe the similarity of music engraves deep grooves in our mind. Grooves in which earworms can thrive.

Another fact about earworms is that they often seem to have something interesting or unusual about them. Although they will often be simple and repetitive bits of music, tunes that become earworms have a little twist or peculiarity, something that makes them "catchy", and perhaps this is a clue as to why they can take hold in our memory system. What about the commercials that take over a spot in our memory? Plop, plop, Fizz, fizz, Oh what a relief it is. . . And how about Rinso White? My husband can replicate the entire Rinso White commercial jingle, including the whistle in it! More recently, in 1988, Bobby McFerrin's "Don't Worry, Be Happy" irritated many folks.

If you have a particularly persistent earworm, you can suffer an attack of it merely by someone mentioning the tune, without needing to hear it. This proves that earworms are a brain phenomenon of long-term memory, rather than merely being ... temporary... .

Rather than letting our brain rehearse our plans for the day, idle thoughts, or lists of things to remember, the inner ear gets stuck on a few short bars of music or a couple of phrases from a song. Some part of us that we normally do not have to think about, that should just do what we ask, has been turned against us, tormenting us with a jukebox request that we never asked for.

The mind is an inner world of which we do not have complete knowledge, or have control over. Why do some people have synesthesia — seeing certain colors associated with the playing of music? Oliver Sacks has a chapter in *Musicophilia* called “The Key of Clear Green.” Personally, the key of D-flat has been purple to me ever since I was ten years old.

A 2006 study in the UK is described by Daniel Levitin as finding that, a year after they are born, children recognize and prefer music they were exposed to in the womb. This has a relationship to the popular Suzuki method of music instruction: Surround children with music, Dr. Suzuki thought, and learning music will be as natural as learning the native language. There is research showing that what was called the “Mozart Effect” a few years ago is actually not real; the study contained many scientific flaws.

Whether it's a motif repeated throughout a composition, a terrific bouncy dance beat, or an "earworm" burrowing through your mind like a broken record—repetition is nearly as integral to music as the notes themselves. Repetition's importance has been acknowledged by everyone from evolutionary biologist W. Tecumseh Fitch, who has called it a "design feature" of music, to the composer Arnold Schoenberg who admitted that "intelligibility in music seems to be impossible without repetition." And yet, stunningly little is actually understood about repetition and its role in music.

What is all this doing to our brain? For one thing, it's damaging our hearing!

Everybody knows about rock concerts and hearing damage, but until the advent of earbuds, parents of young people only worried about the amplified sound of heavy metal at a rock concert; but now, we have found hearing loss to be increasing among the young. In 2010, the Journal of Pediatrics reported 12.5% of kids between 6-19 suffer from loss of hearing: two factors are earbuds & MP3 players with high volume. The problem has increased substantially in recent years, a new national study has found. They warn that slight hearing loss can cause problems in school and set the stage for hearing aids in later life.

So what's going on in the listening brain of a non-musician, and is it the same as the musician who is producing that sound? Probably so.

Without going into the specific medical terminology, the functional MRI lights up various parts of the brain during the occurrence of listening to, or even just thinking of the

music. The technology can show, for example, the effects when you hear a Glenn Miller Big Band tune, or think of a top-ten pop song from your teenage years, or hear a Bach Prelude and Fugue with the organist playing a four-keyboard console, the complexity of both hands and both feet involved in activating hundreds of organ pipes and literally pulling out all the stops!

Just imagine the brain activity, if we could only watch it, during a wild rock concert production, or a symphony concert with all those brains working simultaneously! Naturally, I think of the unfortunate oboe player who is wondering if he's going to get that particularly elusive plaintive tone quality he wants and expects to produce, from the reed he recently scraped, carved, and adjusted with a specific tool, in order to get the best possible sound from that miserable scrap of a wild plant, the quality of which depends on the weather of the season it was harvested from a marshy area in the south of France. Ah, yes, the brain is working all the time!

Back to Levitin's book *The World in 6 Songs*. The first thing I did when I got it is check out my burning question: what are the six songs? Alas, they are not specific songs, they are categories, and some correspond to the Irish/Celtic laughing, crying, and sleeping contexts. The six categories that the author chooses in his book include Friendship, Joy, Love, Knowledge, Religion, and Comfort. You may feel like I do about this: these are arbitrary categories. They overlap and crowd into one another like an over-caffeinated Venn diagram, so let's just take that as fact; we probably never could agree which songs belong in which categories, but that's not the most important part of this concept.

Let's begin with **friendship**: Did you sing with friends as a youngster, at summer camp? School? At basketball games? Singing around a campfire is one of the greatest memories between friends who have shared it. Did you sing *The More We Get Together* to the old German tune of *Ach Du Lieber* in girl scouts, at camp, bible school, around a campfire?

Songs of **joy** edge over into love, religion, like the hymn Joyful, Joyful, we Adore Thee, and into comfort and patriotism. How about Three Dog Night's version of *Joy to the World*? (You remember, "Jeremiah was a bullfrog")? You might love the upbeat message! Think of Louis Armstrong singing What a Wonderful World.

"I see trees of green..... red roses too,I see 'em bloom..... for me and for you ,And I think to myself.... what a wonderful world. I see skies of blue..... clouds of white, Bright blessed days....dark sacred nights And I think to myselfwhat a wonderful world."

The **Love** category contains many songs personal to us: the theme of our first prom, favorite song popular when you met the special person, and love for family and friends. "Shenandoah" celebrates a Native American Chief and his daughter. Around the campfire again, think of *Down in the Valley* (Down in the valley, valley so low, hang your head over, hear the wind blow. Roses love sunshine, violets love dew, Angels in heaven know I love you.)

Knowledge songs run the gamut from ABCs to science. Many children in our culture learn letters with The Alphabet Song. Here's one for the science buffs, the periodical table called The Elements, by Tom Lehrer.

<https://www.youtube.com/watch?v=DYW50F42ss8>

Religion is full of music, songs, poetry, and hymns. We sing songs at weddings, funerals, baptisms, and Sunday mornings. Christmas carols are a favorite of many. Does Handel's *Messiah* belong in Religion, Joy, or Comfort? How about spirituals, like *Jacob's Ladder* and *Swing Low, Sweet Chariot*, along with the Christmas gospel versions such as *Go, Tell it on the Mountain*.

Music provides **comfort** at times of stress, producing calm, rest, and relaxation. Louis Armstrong's *What a Wonderful World* was mentioned in songs of Joy, and it gives us comfort thinking about nature around us. Lullabies for the little ones comfort the parents, too. Kate Smith and *God Bless America* evoke patriotism and comfort for many, as does *America the Beautiful*.

When public television has a pledge drive, why do you think they bring out the old big band tunes, pop tunes, and other perennial favorites? They bring back memories for a large part of their listener base!

In closing:

With the help of these authors, we've heard about cutting-edge neuroscience, descriptions of hilarious experiences with music, and interviews with experts from pop music icons, conductors, anthropologists, and biologists. There are elegant, prehistoric systems at play when we sing and dance at weddings, cheer at a concert, or tune out privately with an iPod or maybe even an old vinyl recording.

Philip Ball, in his book *The Music Instinct*, said "we do not need any Mozart Effect to validate the importance of music in development, cognition, education or socialization.

It is quite simply a gymnasium for the mind."

Why is this important?

It is part of our common human history and social development.

The next time you sing Happy Birthday for someone, think of the fact that we have something in common with other people, all over the country and all over the world.

I hope you don't go home with an irritating earworm!

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Tom Stafford, Science and Environment

Idk if you know now dude, but Paul is still not doing so well, he's got no job, no girl, hardly ever talks to anyone; I message him every now and then and he just says how he misses 2008 when life was good. I told him to see a shrink, but he says that won't help, he just needs "something new to listen to". I spent the entire following week asking Yahoo Answers, posting on music forums, and commenting on YouTube videos of 2008 pop songs. And if you ever hear the full song out in public, get the hell out of wherever you are hearing it. Like I said, I don't know what you believe, but I for one am damn sure that Symmetry Icon made some sort of deal with a devil, and this song is the punishment for breaking that deal. Please be careful. Best of luck And if you look around yourself, you may start to think that everyone from advertisers to politicians are taking advantage of this foible of human psychology. But a reliable effect in the lab isn't necessarily an important effect on people's real-world beliefs. If you really could make a lie sound true by repetition, there'd be no need for all the other techniques of persuasion. The 'illusion of truth' can be a dangerous weapon in the hands of a propagandist like Joseph Goebbels (Credit: Getty Images). One obstacle is what you already know. Even if a lie sounds plausible, why would you set what you know aside just because you heard the lie repeatedly? Recently, a team led by Lisa Fazio of Vanderbilt University set out to test how the illusion of truth effect interacts with our prior knowledge. Why (you/wear) these sandals? You'll freeze to death in this cold wind! Tim's upset because he twisted his ankle when he (jog) this morning. While I was staring at the monument, someone (steal) my phone from my bag. Look! (you/see) that woman standing in the queue? I'm sure I know her. Tea or coffee? One way or another, "teens want to gossip, complain, compare notes, share passions and joke around," Boyd adds. "They want to be able to talk among themselves" even if that means (10) _ €. Exercise 6 (20 points). Make new words from the words in brackets.