

The Mahler Moment: How does Music Elicit Emotions?

Mahler

1910. The German composer Gustav Mahler begins crafting his 10th Symphony but comes down with a sore throat. This develops into a bacterial heart infection and pneumonia, and he tragically dies an early death before completing his work. Over 100 years later, this unfinished symphony is still regularly performed because it is rife with excruciatingly haunting melodies and chords.

It's difficult to describe in words exactly why Mahler's music is still significant and timeless enough to continue performing. One scholar gives a glimpse of the depth of Mahler's music when he dramatically describes the first fifteen seconds of the 10th Symphony as "starting in...the moment after the death of the soul – the moment before the creation, before the beginning of it all – a static depiction of nothingness – a vacuum. But is this a point of no return?"¹

Nineteen minutes after that initial mysterious opening phrase, Mahler changes musical history. He premieres one of most terrifying and revolutionary chords ever written: a nine-note chord built on the foundation of a screaming "A" note sustained by the brass.² Traditional music historians claim the pain of this infamous chord is his reaction to anguish upon learning his wife was having an affair, or the tangible product of his long discussions about the subconscious with Sigmund Freud, the famed psychologist.³ Evidence of his grief and unstable emotional state is reflected in directions written on the unfinished score such as, "Madness seizes me. Accursed. Destroy me, that I may forget my being, that I may cease to exist!"⁴ Revisionist historians

1. Yoel Gamzou. "Mahler 10." <http://www.yoelgamzou.com/mahler-10/>.

2. See minute 19 for the famous chord progression.

3. Jack Diether. *The Murderous Marriage of Alma and Gustav Mahler*. Vol. 10, 1984, <https://search.lib.byu.edu/byu/record/edsbyu.prf.23198186>.

4. Gamzou, *Mahler 10*.

speculate this chord is the reflection of a poem Mahler wrote a few years previous entitled, “My hesitant thinking and raging feelings flowed together in a single chord.”⁵ Modern historians tend to see the symphony in the context of a farewell to traditions in the 19th century, and describe the chord as a metaphysical representation of the concept of destruction.⁶ To these historians, Mahler’s music is an omen of the future. As the conductor and composer Leonard Bernstein put it, the “20th century is the century of death and...Mahler is its musical prophet.”⁷

April, 2013. I am sitting on an orchestra chair and swinging my feet (the chair is too tall) as I listen to a passionate conductor tell the story of Mahler’s life and introduce his 10th Symphony. He talks about how Mahler was so ahead of his time that people thought he was crazy, how his music and life were one big contradiction. With the stage lights illuminating beads of sweat on his forehead, he lifts his baton and I practice Mahler’s 10th Symphony with an orchestra for the first time. As I think about these intense interpretations of a symphony that wasn’t even finished, I think to myself this is all a bit melodramatic. After all, how can a chord of music fully represent an apocalypse and embody the emotions of a century? Is this the overactive imagination of a group of stuffy scholars? Where does meaning in music even come from? How do we even create or find meaning from music, or from anything at all?

A few weeks later, we perform Mahler 10. It messes with my teenage perception of the world because the piece changes the way I experience seemingly ordinary things like wood and faces and batons and history. As the stage transforms into a soundscape, the wood below my chair trembles; my brain screams for relief from the intensity of the chordal structure; and my conductor’s face wrinkles as his white hair defies gravity. All of this energy converges into a

5. Jens Malte Fischer. *Gustav Mahler* Yale University Press, New Haven, 2011a.

6. Gamzou, *Mahler 10*.

7. Diether, *Murderous Marriage*, 70-81.

climactic moment as he punctures the air with his baton and commands us to sum up the 19th century in thirty seconds.

November, 2017. I've quit playing violin for several years now. I also experience a heartbreak and I don't feel in control of my emotions. It's disconcerting, and I don't know what to do or how to mitigate the pain. Not one to openly discuss my feelings with other people, I confide in my journal:

...Mahler 10 popped up on my playlist the other day, and now all I can do is listen to it on repeat (but not when I'm driving—it's too powerful and distracting). It brings my mind to strange dimensions of thought. Did Mahler know he was going to die? Or was his mind simply fixated on his wife's betrayal? He was probably scared of a lot of things when he wrote the symphony (like bacterial infection of the heart valve, though maybe he felt it simply as 'impeding death'). "You cannot play Mahler correctly or watch Greek tragedies," the guest conductor had said in passing during a rehearsal, "unless you have truly loved someone then lost someone."

...healing comes when all of a sudden a memory of breathing as one with an orchestra and intently playing Mahler comes back with perfect clarity. As you do so, the idea of dissonance and a nine note chord suddenly makes sense and elicits a tear as you sit on your bed and the confused best friend worries because she's never seen you like this before, and the only thing you can choke out about how you feel is that the answer to the state of your soul is Mahler 10. Somehow,

Mahler is the answer. I play the Mahler for the roommate on YouTube and she says the chords sound like the soundtrack to a herd of cows being slaughtered.

The depth of my emotional experience with the nine-note chord surprises me—it had been years since I listened to or even thought about Mahler. Why did my mind (seemingly) randomly decide that Mahler was the answer to that specific type of pain? How does music evoke emotion?

My journey to figure this out starts with looking at the *why* of music: why does music exist and why do I feel when I hear it? I ask the people around me, and go to the “emotion” shelf at the library. Everyone from Plato to my mother seems to have an opinion, but no one really seems to have an answer. On one end of the spectrum, some think that the primary function of music is to arouse emotion,⁸ while others are puzzled music exists at all, because music has no demonstrated biological value—it does not have a clear role in our survival.⁹

This hasn't stopped scientists from trying to figure out what the role of music in our survival might be. Darwin thought music might come from primitive male courting behavior. Still others think music united mother-infant pairs and that's why (at least most music) sounds pleasurable. Some hypothesize music arose from animal territorial signs, which is supposedly

8. David M Bashwiner. "Musical Emotion: Toward a Biologically Grounded Theory." Order No. 3408503, The University of Chicago, 2010.

<https://search.proquest.com/docview/594579482?accountid=4488>.

9. Juslin, Patrik N. and Västfjäll, Daniel. *Emotional Responses to Music: The Need to Consider Underlying Mechanisms*, 2008.; Salimpoor, Valorie N., Mitchel Benovoy, Gregory Longo, Jeremy R. Cooperstock, and Robert J. Zatorre. “The Rewarding Aspects of Music Listening are Related to Degree of Emotional Arousal”. *PLoS ONE*, 2009. 1, <https://search.lib.byu.edu/byu/record/edsbyu.mah.58515394>.

why people like to listen to music while having sex, based on the argument that music reinforces territory, and territory is conducive to sex.¹⁰

Personally, none of these theories resonate with me. When I read about all these arguments, it's easy to disconnect my own "reality" from the "reality" and research found in scientific papers. My experience with music throughout my life, including my 'Mahler moment', has taught me that a primary function of music is to elicit emotions. For some reason, I have trouble reconciling the idea that I find comfort and healing in a glorified mating call or territorial signal.

One rhetorically appealing and popular explanation by Steven Pinker is that music is "auditory cheesecake, an exquisite confection crafted to tickle the sensitive spots of...six of our mental faculties."¹¹ In his estimation, music is the byproduct of language much like cheesecake is the byproduct of our evolutionary preference for fat and sugar, and pornography the byproduct of our sex drive.¹² Similarly, others think that music and language evolved together, and music was the "unified evolution" of language and culture to resolve cognitive dissonance.¹³ This would explain why music taps into our reward circuitry: it is evolutionarily advantageous to make predictions about communication, so auditory communication morphed into music.

10. Hagen, Edward H. and Gregory A. Bryant. Music and Dance as a Coalition Signaling System. *Human Nature*, 2003. 21, <https://search.lib.byu.edu/byu/record/edsbyu.pbh.10841957>.

; Witchel, Harry. *You Are What You Hear* Algora Pub., New York, 2010, <https://search.lib.byu.edu/byu/record/lee.4904032>.

11. These faculties include imagination, intuition, will, perception, memory, and reason

12. Steven Pinker. *How the Mind Works* Norton, New York, 1997.

13. Leonid Perlovsky. Cognitive Function, Origin, and Evolution of Musical Emotions. *Journal of Systemics, Cybernetics and Informatics*, Vol 11, Iss 9, Pp 1-8 (2013), 2013.

1, <https://search.lib.byu.edu/byu/record/edsbyu.edsdoj.edsdoj.604577ce1feb4bdda792f2ececea4bec>.

To make matters more confusing, people don't seem to agree on what "music" or "an emotion" even is. The hormone oxytocin, for example, was most likely released when I was playing the Mahler.¹⁴ Was this rush of oxytocin in my brain simply a biological response, an emotion, or both?

According to traditional views on emotions, my Mahler moment occurred because I heard the Mahler which triggered a set of responses. Feelings like sadness or fear have distinct essences like unique fingerprints in the body, and external factors trigger emotions. In other words, Mahler's music *made* me feel an emotion. This established theory, however, is being reevaluated by modern psychologists. The psychologist Lisa Barrett argues that emotions are actually constructed, meaning that emotions are created by many brain networks working together. In short, emotions are learned through experience.¹⁵ If this is the case, our biological responses triggered by music could simply be learned reactions—it is my musical training and experience that allowed Mahler to trigger emotions. I was the one *letting* the Mahler arouse emotion. In short, it's hard to have a definitive conversation on music and emotions since people can't even agree on what an emotion is, why music exists, how emotions are created or even if music arouses emotions in the first place.

Does it even matter if we agree on any of these things? Take, for instance, the question of whether or not music arouses emotion. Psychophysiological responses to music include effects on muscular tension, zygomaticus movement (the zygomaticus major is a muscle which

14. Keeler, Jason R., Edward A. Roth, Brittany L. Neuser, John M. Spitsbergen, Daniel James Maxwell., and John-Mary eVianney. "The Neurochemistry and Social Flow of Singing: Bonding and Oxytocin." *Frontiers in Human Neuroscience*, Vol 9 (2015) 9, (2015). <https://search.lib.byu.edu/byu/record/edsbyu.edsdoj.edsdoj.04617e880164647931947bdec0d5bd1>.
 15. Barrett, Lisa Feldman. *How Emotions are Made* Houghton Mifflin Harcourt, Boston, 2017., 151

controls facial expression), and changes in pulse and blood volume,¹⁶ all factors we associate with changes in emotion (for instance, in neurological terms, the caudate is involved during the anticipation of music, and endogenous dopamine¹⁷ is released in the striatum¹⁸ at “peak emotional arousal”).¹⁹ In more basic terms, the abstract stimulus of music can arouse feelings similar to tangible rewards.²⁰ As such, it doesn’t matter much to us whether or not music really does arouse emotion, since whatever it is that we are experiencing is extremely close.²¹

In my mind, an emotion in music never exists independently. Music needs to have an architect, communicator, and receiver. This could mean Mahler is the architect writing a symphony, an orchestra the communicator, and the audience the receiver, but other times all of these components could be in a single person, a handful of people, or even a computer. The architect crafts music by manipulating the idea of a sound onto a medium, which could be any number of things, including a piece of paper, keyboard or synthesizer. It is important to note that the architect does not create—one could possibly mistake this word as inferring a type of ex nihilo creation. Rather, an architect designs using materials from his experience and musical knowledge. When a “good” idea and the chosen medium react, vibrations are transferred to the

16. Donald A. Hodges. "Psychophysiological Measures." In *Handbook of Music and Emotion: Theory, Research, Application*, 283.

17. Internally produced hormone which helps regulate our reward center and can help us feel feelings of euphoria.

18. Critical component of the motor and reward systems.

19. Valorie N Salimpoor et al., *Anatomically Distinct*, 257-260.

20. Valorie N Salimpoor et al., *Rewarding Aspects*, 1-5.

21. David Bashwiner, *Musical emotion*, 7.

At the end of Bashwiner’s thesis, however, he concludes that “it is clear that music arouses *real* emotions” (414).

experiencer through the communicator. As the receiver engages in the experience, emotions are constructed, or evoked.²²

The Architect

James Quandt: *the denial of emotion creates emotionally overwhelming works, minimalism becomes plentitude, the withholding of information makes for narrative density, fragmentation evokes a sense of the world's wholeness, and attention to the surface of the work produces inexhaustible depth.*²³

Like many composers in the public's popular imagination, Mahler was a dramatic individual. Not only was he a musical genius, but his inner emotional state was often projected in his works. On the side of his 10th Symphony score, for instance, he dramatically declared: "The Devil is dancing with me...Craziness, touch me, Destruction!"²⁴ Either consciously or unconsciously, Mahler employed artistic techniques in his 10th Symphony to convey such anguished sentiments in his music. These artistic techniques maximize our emotional response as listeners, and manipulate our emotions.²⁵

While these compositional techniques are typically not purposefully rooted in science, there is often a direct effect of the compositional technique on scientific reasoning. The release of dopamine is one such response. Evidence strongly suggests that dopamine is released when listening to music.²⁶ Dopamine is a neurotransmitter associated with pleasurable activities such as eating, sex, gambling and shopping, and is released in anticipation of a reward more than

22. There is no strict distinction between each of these categories and they obviously overlap, but categorizing it in this way allows us to examine them in greater detail.

23. James Quandt. *Robert Bresson*. Toronto, Ont.: Cinémathèque Ontario, 2011.

24. Gamzou, *Mahler 10*.

25. For length and clarity, this essay stays within the limits of instrumental classical music.

26. Salimpoor, Valorie N., Mitchel Benovoy, Kevin Larcher, Alain Dagher, and Robert J. Zatorre. Anatomically Distinct Dopamine Release during Anticipation and Experience of Peak Emotion to Music. *Nature Neuroscience*, 2011. 257, <https://search.lib.byu.edu/byu/record/edsbyu.pbh.57557420>.

when the reward is actually received.²⁷ This helps to explain why gambling and online shopping are so popular—it's the *anticipation* of receiving a package in the mail or the possibility of acquiring a windfall that releases dopamine.

Perhaps it is the expectation of a chordal ending or the disruption of an anticipated pattern that makes music pleasurable to a Western audience. Musical enjoyment begins with mathematical patterns, since classical scales are largely based on equal temperament. Western listeners are conditioned to expect chordal sequences that resolve at the end of passages. The *timing* of when chords occur in music can detract or contribute to the pleasure of the listening experience: listeners have been trained to anticipate certain patterns through conditioning. Mahler's infamous chordal passage doesn't occur in the music until minute 19 in the First Movement. By modern standards, this chord would be long overdue, but by delaying the chord until sufficient context and mood had been created, more dopamine was probably released in my brain due to anticipation.

From this perspective, perhaps composition is not solely about notes positioned to evoke emotion. It is also about conveying an idea in a way that relations to the listener, so that pathways related to certain associations are triggered by notes heard. In 1960, the anthropologist Renato Rosaldo went to the Philippines to work with the Ilongot, a remote tribe known for headhunting. Two events of interest to us occurred. First, he discovered *liget*, a word he couldn't understand because of shifting contexts that didn't make logical sense to him. Locals used the word to describe events ranging from wanting to cut off someone's head, to sadness, to a strong

27. Jakob eLinnet. "Neurobiological Underpinnings of Reward Anticipation and Outcome Evaluation in Gambling Disorder." *Frontiers in Behavioral Neuroscience, Vol 8 (2014)* 8, (2014). <https://search.lib.byu.edu/byu/record/edsbyu.edsoj.edsoj.7bc997d4dae42e0bd44641558871d0e>. ; opioids and endo-cannabinoids, however, are more involved once "peak pleasure" is reached.

rush of energy. The second significant event was when Rosaldo's wife fell off a 65-foot cliff and died. It wasn't until he experienced extreme prolonged emotional grief from his wife's death and all he could do was howl, that he finally understood what *liget* meant. By putting a word to the feeling, Rosaldo was able to "give his emotions form and let them pass through his body."²⁸

What Rosaldo experienced is called "affect labelling." When we are able to attach words to our emotions, it diminishes the amount of work our brain has to do (it decreases responses in the amygdala and other limbic regions and increases activity in the ventrolateral prefrontal cortex²⁹). Perhaps music moves us because it transcends linguistic determinism—the limits and types of associations we make in our minds because of learned language. In my "Mahler moment" after the heartbreak, I was not linguistically equipped to articulate and respond to the increased amounts of cortisol and decreased dopamine and oxytocin levels that caused a confusing combination of hope, fear, love and pain. The Mahler chord, however, somehow embodied my emotions in a way I could understand—a musical type of "affect labelling."

To me, this is why music exists and what music does for us. As Plato put it, music "procure[s] a common pleasure for those who do not know how to reason; and for those who do know, a reasoned joy through the imitation of the divine harmony which they realize in perishable movements."³⁰ This highlights that the architect's job is to connect with their audience by imitating, or drawing upon, emotions and experiences that their audience does understand. An adept architect should do more than simply drawing upon emotions we have

28. Alex Spiegel. *Invisibilia: A Man Finds an Explosive Emotion Locked in A Word* Listen. 7:04 Anonymous 2017. (podcast).

29. The amygdala initiates emotional, autonomic and hormonal responses. Contrary to widespread belief, the amygdala is not simply the "fear center" of the brain, but also plays a role in emotions we see as pleasant. The ventrolateral prefrontal cortex is the "processing" center in the brain—it integrates information throughout the brain. (Hagen and Bryant 2003, 21-51)

30. Xenakis, Iannis. *Formalized Music*. Rev. ed. ed. Pendragon Press, Stuyvesant, NY, 1992

words for such as “happy” or “sad,” but pull deep into complicated areas of emotion where we don’t necessarily have the words to represent those feelings. Construction and composition of music requires the composer to relate directly with the listener so that the proper neuropathways are fired to trigger “emotion.”

The Communicator

Shinichi Suzuki: *Knowledge is not skill. Knowledge plus ten thousand times is skill.*

*What is man's ultimate direction in life? It is to look for love, truth, virtue, and beauty.*³¹

July, 2002. I learn the Seitz Violin concerto. Like most stubborn children, I fight when I am told how to practice. Now, years later, I can still remember my teacher’s exact instructions: each bow stroke in this passage should be the size of your pinky nail, bend your knees on measure 32, make your breath exactly a sixteenth note long, lift your bow and smile with teeth for exactly three counts before you move! My teacher conveys that notes on the page are nothing but blobs of ink and my job as a musician is to make those notes dance and come to life in my imagination—the first two measures a noble declaration by a pompous king, the next two the delicate reply of a timid peasant.

Seitz is actually quite easy to play expressively because the imagery is vivid and easy to pick out. Any good teacher and dedicated parent can teach a child to imitate and develop an understanding of certain pieces of music on what the iconic American composer Copland calls the “sensuous” musical plane—the type of concrete meaning and imagery that “simple minded

31. Shin’ichi Suzuki. *Nurtured by Love* Exposition Press, New York, 1969. He was the founder of the popular Suzuki music program.

souls”³² attach to musical listening found in single dimensioned music. On this plane of understanding, any connection to concrete objects and feelings makes the music seem more “expressive.”³³ I am trained to anticipate where slight fermatas should be placed.

While Seitz is easy to play on a plane that “simple minded souls” can understand, other composers, such as Bach, are much more complicated and dense. Bach wrote six “Sonatas and Partitas,” all of which are core repertoire for violinists. These famed Sonatas and Partitas are full of rich nuances and beautifully-crafted long lines and multiple voices, which makes them difficult to execute well.

As a child, I had a very romantic view of music. My teacher taught that if I was completely lost in the world of music—unaware of anything but the notes and what they meant—the audience, regardless of their training or background, would come to this alternate world with me and *feel* something. This was my responsibility as a musician. I took this job seriously: I would imagine my family had died and this would make the melody sound more melancholy. I understood CPE Bach (the son of the more famous JS Bach) who taught that a “musician cannot move the listener if he himself is not moved.”³⁴ When I performed unaware of listeners and completely aware of the music, the message to the audience became easy to convey (as long as the technique was also correct).

As a teenager, I transitioned to different teachers who “corrected” this idea and instead of fueling my fantasy of crafting a world, taught me how to play each individual note of a concerto a specific way. These teachers were focused on competition and perfection. No more elaborate

32. Aaron Copland. *What to Listen for in Music*. McGraw Hill, New York, 1957

33. Aaron Copland, *What to listen*.

34. Bach, Carl Philipp Emanuel. *Essay on the True Art of Playing Keyboard Instruments*. Edited by William J. Mitchell. W.W. Norton, New York, 1949.

plots or characters—Bach was meant to sound how Oistrakh (one of the most renowned violinists of the twentieth century) said it should. Every time someone new critiqued my playing, they contradicted the interpretation the teacher before me had given. As a teenager, the learning process where everything needed to follow a certain formula sometimes felt robotic.

I came to discover that their strict style and analyzing the theories behind the compositions were a tool for me to facilitate emotion in a different way. As a teenager, I had a German teacher who showed me a green book full of mathematical formulas and intricate symbols in Bach's Sonatas and Partitas.³⁵ In his thick German accent, he taught me the theory behind how Bach embedded his signature within the Fugue, encompassed symbolism of Christ's crucifixion and resurrection in the themes of the Partita, and used math to formulate his Chaconne.³⁶ As we picked Bach's G Minor Fugue apart (well, my teacher picked it apart while I listened), he showed me that a certain multi-dimensional complexity of emotion, in both concrete and abstract forms, was already interwoven in the chordal structures.

My job as a musician was to deeply understand and love the music, then craft my own interpretation based on what Bach had already conveyed. I had to "balance very carefully [my] obligations to the composer and to [my] audience and to myself...[to] infuse the work with [my] own life blood."³⁷ The quest to find this balance between obligations to the composer, the

35. I don't remember what the book was called (since it was in German) and cannot find it online. A good source that details some of these theories, however, is *Godel, Escher, Bach: an Eternal Golden Braid*, by Douglas Hofstadter.

36. Chaconne, Fugue and Partita are all simply types of pieces that Bach composed.

37. The overarching idea of architect, communicator and experiencer is not limited to performing arts. This quote is actually from an interview with a renowned translator who was comparing interpreting a piece of music as a pianist and a translator working within the original text to portray the meaning of a text in a way their audience could understand.

"More Light — Translation as Performance Art." Interview by Clement Paligaru. China Heritage. <http://chinaheritage.net/journal/more-light-translation-as-performance-art/>.

audience and myself was what made Bach’s music timeless. As the violinist Hilary Hahn eloquently put it in an interview about Bach’s Sonatas and Partitas, “sometimes the most mathematical music is the most liberating to play because you have certain structures...and you have to be creative...invent your own interpretation.”³⁸ In other words, there is freedom in the mastery of the musical structure of a piece. Once that structure is mastered, then you have greater control over what emotions are conveyed.

As my childhood violin teacher put it, effectively portraying emotion in music is all about confidence, and confidence is knowing something and having evidence. A musician must know they have the “magic” and technical ability to convert black dots into meaningful vibrations on a medium, and have the evidence of exploring theory and developing accurate intonation, well-informed style, and practiced, personal flair. When musicians refine the details of a piece of music throughout days and years, this solidifies the evidence that the musician can convey and evoke emotion.

The Experiencer

Oscar Wilde: *Music makes one feel so romantic – at least it always gets on one’s nerves – which is the same thing nowadays.*³⁹

Winter break, 2017. I’m having lunch with an old friend. We learned the same violin pieces growing up—we struggled through the Seitz Concerto together as children and memorized the same pieces together in high school. Together, we laugh and reminiscent about fighting during chamber groups and my difficulty effectively communicating with his Russian

38. *Bach and Friends*. Directed by Michael Lawrence. Performed by Hilary Hahn. USA, 2010. DVD.

39. Oscar Wilde. *A Woman of No Importance*, edited by Ian Small, Oscar Wilde. 2nd ed. / edited by Ian Small. ed. A. and C. Black, London, 2004. <https://search.lib.byu.edu/byu/record/elee.EDZ0000104940>.

family. There's a slight pause in the conversation, as if to remind us that we've grown up. We aren't bickering children anymore and life is happening to us. He studies violin at Juilliard with a famous teacher and has the music world at his fingertips. I've given violin up completely.

Secretly, I'm slightly jealous when he tells me about the famous people he works with and the opportunities he has. But as he talks, I can tell by the way his skin is wrinkling on his forehead that he's harboring deep thoughts. Slowly, as he is reminded of how deep our relationship once was, the conversation turns from lighthearted anecdotes to much darker topics. The "violin rat race" and backstabbing artists. The pressure to constantly produce perfection. Scars from physical and emotional abuse, lingering from his childhood. Lies about his family and past he's believed his whole life. Suicide attempts.

Many years ago after an orchestra rehearsal, my friend offhandedly commented that his home was like the orchestral epic we had just practiced, *Symphonie Fantastique*. Throughout the piece, the composer leaves section headings that tell the story of a man who dreams that he has killed his beloved and is witnessing his own execution. As a child, I had naively interpreted this seemingly casual comment from my friend as meaning he didn't want to go home to his highly dramatic and always slightly drunk parents who yelled a lot. My ignorance and sheltered construct of the world—a place where I always felt loved and easily gave love—kept me from understanding the extent of the physical and emotional pain my friend was undergoing at home. We heard the same music and words but drew an entirely different meaning.

The flashback ends. "I did the paperwork to drop out of Juilliard last week," I suddenly hear the Russian friend say. "If I want to stay alive, I have to leave. I'm numb to the music. I don't want it to be a part of me anymore."

Can music elicit emotion from everybody, or is this all just a naive construction I've made up because this is how I experience music and the world? Our realities of what the music means are personal—we create our own perception of what the music represents, just like Rosaldo the anthropologist understood *liget* through his own experience. Yes, I can study the chordal structure and melody lines of a Fugue, but I am learning to understand Mahler, Seitz and Bach through what I see as the beautiful confusion of growing up. My Russian friend experienced Mahler, Seitz and Bach by my side, but life interpreted those pieces differently for him. I will never experience Mahler exactly the way the composer intended it to be because my experiences in “real life” are contributing to my interpretation. As a listener, I can't always articulate why I feel, I can only articulate that I am feeling *something*.

Sometime in the summer, 2001. My violin teacher has my mom post a sign on the outside of the bathroom door with letter “A.” Every time I walk past it, I am to sing an “A” (Hz 440) to my one-year-old sister. All of my teacher's students who use this method effectively learn perfect pitch. Now, 17 years later, my sister's enjoyment of music is strongly influenced by this construction of pitch. If we turn on the radio and Adele sings an interval slightly flat or for some reason a band is tuned to 438 Hz or 443 Hz, this factors into her level of appreciation for the music.⁴⁰ We are conditioned to appreciate what we have been taught is “correct,” even though what is “correct” changes with time and location.⁴¹

Expectations are important in music because they can be broken. Disruptions to what we expect cause us to react, or even to feel emotion. One such instance of a musical construct we

40. Unless she has been conditioned to expect something different. For instance, baroque music is often tuned lower.

41. Bruce Haynes. *A History of Performing Pitch* Scarecrow Press, Lanham, Md., 2002.

have is related to the statistical idea of *regression to the mean*. This phenomenon states that if a variable is extreme on the first measurement, the second measurement will tend to be closer to the average, and vice versa.⁴² For instance, if we walk past an unusually thin person on the street, the next person is likely to be substantially fatter. Likewise, Western listeners mentally expect large leaps in the pitch of notes to be followed by a change in direction.⁴³ We have come to expect this is an “imperfect approximation of the pattern evident in real music.”⁴⁴ Unfamiliarity in patterns or expectations typically force us to listen more carefully because it is not what we anticipate. The Mahler chord pattern elicited more attentive listening because it was unusual and somewhat unexpected—there was a long build-up of conventional chords which morphed into the unexpected. Even though the idea of *regression to the mean* would promote the idea that the extreme dissonance in Mahler’s chords would resolve early in the passage, the tension kept building until it reached an unprecedented climax.

How do we construct reality, then, and come to expect certain patterns of behavior? Aristotle, the Stoics, Locke and Hume based their philosophies on the idea that man is born without preexisting innate ideas. Instead, they believed identity is developed through experience and sensory control.⁴⁵ Modern science seems to back this up. In babies, developmental neuroplasticity occurs as neurons rapidly grow and form thousands of connections. When babies

42. "Regression to the Mean." Social Research Methods - Knowledge Base - Regression to the Mean. Accessed March 27, 2018. <https://socialresearchmethods.net/kb/regrmean.php>.

43. Paul von Hippel. "Questioning a Melodic Archetype: Do Listeners use Gap-Fill to Classify Melodies?" *Music Perception: An Interdisciplinary Journal* 18, no. 2 (2000): NaN. <https://search.lib.byu.edu/byu/record/edsbyu.edsjsr.edsjsr.10.2307.40285906>.

44. Patrik N. Juslin and Västfjäll, Daniel. *Emotional Responses to Music: The Need to Consider Underlying Mechanisms*, 2008.

45. Amy M Schmitter. *17th and 18th Century Theories of Emotions* Metaphysics Research Lab, Stanford University, 2016.

are born, each neuron has around 2,500 synapses but within two or three years, the baby has double the synapses of an adult, around 15,000 for each neuron. Unenforced connections weaken, and reinforced connections are honed and strengthened with experience.⁴⁶

To filter the amount of stimulus we are bombarded with, we use statistical learning to extract patterns and regularities in the world around us. Statistical learning helps us take the plethora of information from the “speech stream” we hear and distill the data into concrete sounds and associations. This method of learning is typically associated with infant language acquisition.⁴⁷ For instance, my sister was constantly exposed to the sound of me singing an “A” to her as a baby. As such, she could filter the sound of my voice singing that to her and categorize it in her mind as what “A” should sound like.

As our brain filters through this data, we begin to make predictions. For instance, when we pick out the sound *takeabath* from the bombardment of noises hitting us, we come to expect a bath. Because the brain is constantly updating its concepts as it processes new information, it needs to transfer information efficiently. It does so by representing information that has previously been processed as patterns of firing neurons with as few neurons as possible. Once it has learned a concept, it can create a prediction since it has enough information to try and anticipate what will happen next.⁴⁸ As time passes and we encounter even more data, our predictions increase in accuracy. For instance, my sister as a baby came to understand that when she went past the spot on the wall with the “A” note and I was in the apartment, I would sing it to

46. Rugnetta, Michael. *Encyclopaedia Britannica*, 8th ed., s.v. “Neuroplasticity.” Chicago: Encyclopaedia Britannica Inc, 2017.

47. Vasuki, Pragati Rao Mandikal, Mridula Sharma, Ronny Ibrahim, and Joanne Arciuli. *Statistical Learning and Auditory Processing in Children with Music Training: An ERP Study*. 2017.; there is research to suggest that musical training enhances auditory statistical learning.

48. Barrett, *How Emotions*, 151.

her and she would imitate it. By the time she was two, she would wobble past the “A” sign and sing the note, seemingly instinctively. The concept of “A” at 440Hz was a mental construct in her mind.

The power I felt in Mahler’s “A” chord might also have been a result of this type of mental training. It makes me wonder: would a member of the Ilongot tribe hear “the impulse to cut off a head with other people, and a sudden rush of energy and sadness” in the work of Mahler, the slightly unstable but brilliant early modern composer? Or would a member from the isolated tribe simply hear a garble of notes, or something else entirely?

September, 2015. I find myself in a sleepy town in a tropical Muslim country where the music scale is *pelong* and *slendro*—strange, metallic sounding scales to the Western listener. On a street corner, I pull out a violin and start playing the Brahms Violin Concerto. People are excited since many of them have never seen a violin before. Kids crowd around, and adults watch as they wait for the bus. Brahms starts to speak. Together, my inquisitive audience and I observe the beauty of the chordal structure and the arpeggios, and we are enchanted by the dance floor of the fingerboard. My fingers transition to the soaring main theme, and I notice the shirtless bus driver has turned off the engine, put down his cigarette, and started crying.

What makes music move one person more than another? Musicologists seem to agree that appreciation of music is a construct of culture, which connects to the theory that our emotions are learned by experience. The landmark musicologist, Leonard Meyer, explains that “because expectation is largely a product of stylistic experience, music in a style with which we are totally unfamiliar [with] is meaningless,”⁴⁹ showing his belief that expectations only come from experience. Other musicologists concede that “emotion is communicated in music through

49. Leonard B. Meyer. *Emotion and Meaning in Music*. Chicago: University of Chicago Press, 1961.

a combination of both universal and cultural cues.” In other words, if you don’t have the universal or cultural cue, you can’t communicate the emotion. Some studies even go so far as to argue that listeners from one culture should be unable to appreciate the natural connections between music and the emotive life of an unfamiliar culture.⁵⁰ From this, it would seem that music is only the universal language if you’re from the same culture. If that was the case, then music wouldn’t be universal at all.

Perhaps music isn’t the universal language that elicits the same emotions in everyone. After all, my roommate heard the Mahler and thought it sounded like a dying cow, I had to spend years training to appreciate the sound of Bach, and my Russian friend was repulsed by the music we grew up with. The only “universal” aspect of our experiences was that we would probably all agree that what we were listening to was, in fact, music.

On the other hand, it’s interesting that even though we would perceive the culture of the bus driver from the tropical Muslim country as vastly different to our own American culture, there was enough in common to emotionally evoke a response. All listeners have at least two things in common: they are on earth and they are human. The bus driver who cried at the sound of Brahms on a dusty street corner had enough in common with Brahms (and me) to be moved, and the same pathways in the bus driver’s brain that fired when he made love or smoked were probably firing as he listened to the Brahms. Maybe Brahms or the sound of a violin reminded him of his late wife whose voice sounded like a violin. Perhaps it was his interceptive sense and he was particularly emotional because he missed lunch and a nap. The listener is the product of

50. Laura-Lee Balkwill and Thompson, William Forde. A Cross-Cultural Investigation of the Perception of Emotion in Music: Psychophysical and Cultural Cues. *Music Perception: An Interdisciplinary Journal*, 1999., <https://search.lib.byu.edu/byu/record/edsbyu.edsjsr.edsjsr.40285811>.

the world he is from and the identity he has created, which informs and shapes the listening experience.

A Paradox

January, 2018. I'm driving down the highway trying to make sense of life—thinking about the past, who I am now, and who I want to become. A plethora of memories that include my Russian friend and *Symphonie Fantastique*, and my recent heartbreak and Mahler are still fresh in my mind. The music playing in my car changes from an indie pop piece to the Brahms Violin Concerto—the same piece that made the shirtless bus driver on the dusty street corner cry, the same piece that I memorized with my Russian friend back in high school. I haven't heard the concerto in years and can almost feel the dopamine and serotonin start to fire in my brain as my fingers tap the steering wheel and I hum along. The concerto is embedded in my DNA—it is a part of me.

A week later, I find myself at the Symphony. I absentmindedly ask myself *if* I was to play violin again, who I would want to teach me. I pick a Korean violinist whose tone and poise I like. I scribble a list on the back of the program notes entitled “pros and cons of playing violin again.” The “cons” side dominates for a number of reasons—music is expensive, painful, time consuming, and irrelevant to my future career. The “pros” list is short: I want to experience and feel Brahms and Mahler and Bach again. I decide to skew the results, and I give each reason on the “pros” section weighted scores so that in the end, the “pros” side wins more points.

After the concert, I work up the courage to email the Korean violinist that I liked, and schedule a trial lesson. After hearing me play and making me squirm by staring deeply at me as if he was evaluating my potential, the Korean violinist takes me as a student. Honestly, I don't

know why, I truly sound terrible after not practicing for years. He hands me painful finger stretching chords and a Bach Fugue I can barely squeak through. I don't have enough time to practice, so one night before a lesson, I find a practice room and try to learn and memorize an entire movement of a concerto in one night. I stumble into my teacher's apartment the next afternoon, exhausted. "Try making it beautiful," he (very helpfully) advises. He can sense that I'm impatient. Frustrated. Fighting the violin. Fighting myself.

The story is still developing. I wish I could say that after hours of being locked up in a practice room, the concerto magically sounds the way I hear it in my head, the way my upbringing tells me it should sound. I wish I could say my hands are comfortable playing those chord exercises and I could make a sappy comment about how I've fallen back in love with the violin and everything it represents in my life. But I don't think I'll really ever be able to say that because music is a paradox: I search, but I don't always know what I am searching for. I know it's all worth it when there are times in my life like my 'Mahler moment,' or I emotionally connect with someone else through music, but what exactly is the destination? Meaning? Emotion? Connection? Music contains specific emotions because it taps into our constructed reality, yet the feelings it gives are so ephemeral and vague that no one else will ever know exactly what we are experiencing.

I suppose that is part of the beauty and appeal of music—our senses never stop being bombarded with life experiences even after our brains are technically fully developed. Constructing meaning from music is really all about the human experience—whatever that means with our tangled mesh of hormones and appetites and questions and dreams. We never really stop growing up, so our music and emotions never stop evolving. Instead, we use this

creation by flawed people called music to imperfectly try to organize an emotional world that never quite makes sense.

Bibliography

- Bach and Friends*. Directed by Michael Lawrence. Performed by Hilary Hahn. USA, 2010. DVD.
- Bach, Carl Philipp Emanuel. *Essay on the True Art of Playing Keyboard Instruments*. Edited by William J. Mitchell. W.W. Norton, New York, 1949.
- Baharloo, Siamak, Paul A. Johnston, Susan K. Service, Jane Gitschier, and Nelson B. Freimer. Absolute Pitch: An Approach for Identification of Genetic and Nongenetic Components. *American Journal of Human Genetics*, 1998. 224, <https://search.lib.byu.edu/byu/record/edsbyu.edsglw.edsgcl.53710542>.
- Balkwill Laura-Lee and Thompson, William Forde. A Cross-Cultural Investigation of the Perception of Emotion in Music: Psychophysical and Cultural Cues. *Music Perception: An Interdisciplinary Journal*, 1999. , <https://search.lib.byu.edu/byu/record/edsbyu.edsjr.edsjr.40285811>.
- Barrett, Lisa Feldman. *How Emotions are Made* Houghton Mifflin Harcourt, Boston, 2017.
- ¹ Bashwiner, David Michael. "Musical Emotion: Toward a Biologically Grounded Theory." Order No. 3408503, The University of Chicago, 2010. <https://search.proquest.com/docview/594579482?accountid=4488>.
- Copland, Aaron. *What to Listen for in Music*. McGraw Hill, New York, 1957
- Hodges, Donald A. "Psychophysiological Measures." In *Handbook of Music and Emotion: Theory, Research, Application*, 283.
- Diether, Jack. *The Murderous Marriage of Alma and Gustav Mahler*. Vol. 10, 1984, <https://search.lib.byu.edu/byu/record/edsbyu.pf.23198186>.
- Fischer, Jens Malte. *Gustav Mahler* Yale University Press, New Haven, 2011a.
———. *Gustav Mahler* 2011b, <https://search.lib.byu.edu/byu/record/edsbyu.nlebk.389285>.
- Gamzou, Yoel. "Mahler 10." <http://www.yoelgamzou.com/mahler-10/>.
Gustav Mahler-Symphony no. 10 "Adagio" Directed by Bernstein Leonard. , <https://www.youtube.com/watch?v=vHyV8noUXC0>.
- Hagen, Edward H. and Gregory A. Bryant. Music and Dance as a Coalition Signaling System. *Human Nature*, 2003. 21, <https://search.lib.byu.edu/byu/record/edsbyu.pbh.10841957>.
- Handbook of Music and Emotion*, edited by Juslin, Patrik N., John A. Sloboda Oxford University Press, Oxford, 2010.
- Haynes, Bruce. *A History of Performing Pitch* Scarecrow Press, Lanham, Md., 2002.

- Hippel, Paul von. "Questioning a Melodic Archetype: Do Listeners use Gap-Fill to Classify Melodies?" *Music Perception: An Interdisciplinary Journal* 18, no. 2 (2000): NaN. <https://search.lib.byu.edu/byu/record/edsbyu.edsjsr.edsjsr.10.2307.40285906>.
- Jakob eLinnet. "Neurobiological Underpinnings of Reward Anticipation and Outcome Evaluation in Gambling Disorder." *Frontiers in Behavioral Neuroscience, Vol 8 (2014)* 8, (2014). <https://search.lib.byu.edu/byu/record/edsbyu.edsdoj.edsdoj.7bc997d4dae42e0bd44641558871d0e>.
- Juslin, Patrik N. and Västfjäll, Daniel. *Emotional Responses to Music: The Need to Consider Underlying Mechanisms*, 2008.
- Keeler, Jason R., Edward A. Roth, Brittany L. Neuser, John M. Spitsbergen, Daniel James Maxwell., and John-Mary eVianney. "The Neurochemistry and Social Flow of Singing: Bonding and Oxytocin." *Frontiers in Human Neuroscience, Vol 9 (2015)* 9, (2015). <https://search.lib.byu.edu/byu/record/edsbyu.edsdoj.edsdoj.04617e880164647931947bdec0d5bd1>.
- Mahler, Gustav. *Symphony no. 10* Associated Music, New York, 1951.
- "More Light — Translation as Performance Art." Interview by Clement Paligaru. China Heritage. <http://chinaheritage.net/journal/more-light-translation-as-performance-art/>.
- Meyer, Leonard B. *Emotion and Meaning in Music*. Chicago: University of Chicago Press, 1961.
- Patel, Aniruddh D. "The Evolutionary Biology of Musical Rhythm: Was Darwin Wrong?" *PLoS Biology*, Vol 12, Iss 3, P e1001821 (2014), 2014. , <https://search.lib.byu.edu/byu/record/edsbyu.edsdoj.edsdoj.42cb41a6a0ec46208623e9c2762e269a>.
- Perlovsky, Leonid. Cognitive Function, Origin, and Evolution of Musical Emotions. *Journal of Systemics, Cybernetics and Informatics, Vol 11, Iss 9, Pp 1-8 (2013)*, 2013. 1, <https://search.lib.byu.edu/byu/record/edsbyu.edsdoj.edsdoj.604577ce1feb4bdda792f2ecec44bec>.
- Pinker, Steven. *How the Mind Works* Norton, New York, 1997.
- Quandt, James. *Robert Bresson*. Toronto, Ont.: Cinémathèque Ontario, 2011.
- "Regression to the Mean." Social Research Methods - Knowledge Base - Regression to the Mean. Accessed March 27, 2018. <https://socialresearchmethods.net/kb/regrmean.php>.
- Rugnetta, Michael. *Encyclopaedia Britannica*, 8th ed., s.v. "Neuroplasticity." Chicago: Encyclopaedia Britannica Inc, 2017.
- Salimpoor, Valorie N., Mitchel Benovoy, Gregory Longo, Jeremy R. Cooperstock, and Robert J. Zatorre. "The Rewarding Aspects of Music Listening are Related to Degree of Emotional Arousal". *PLoS ONE*, 2009. 1, <https://search.lib.byu.edu/byu/record/edsbyu.mah.58515394>.

- Mitchel Benovoy, Kevin Larcher, Alain Dagher, and Robert J. Zatorre. Anatomically Distinct Dopamine Release during Anticipation and Experience of Peak Emotion to Music. *Nature Neuroscience*, 2011. 257, <https://search.lib.byu.edu/byu/record/edsbyu.pbh.57557420>.
- Schmitter, Amy M. *17th and 18th Century Theories of Emotions* Metaphysics Research Lab, Stanford University, 2016.
- Speigel, Alex. *Invisibilia: A Man Finds an Explosive Emotion Locked in A Word Listen· 7:04* Anonymous 2017. (podcast).
- Suzuki, Shin'ichi. *Nurtured by Love* Exposition Press, New York, 1969.
- Vasuki, Pragati Rao Mandikal, Mridula Sharma, Ronny Ibrahim, and Joanne Arciuli. *Statistical Learning and Auditory Processing in Children with Music Training: An ERP Study* . 2017.
- Wilde, Oscar. *A Woman of No Importance*, edited by Ian Small, Oscar Wilde. 2nd ed. / edited by Ian Small. ed. A. and C. Black, London, 2004. <https://search.lib.byu.edu/byu/record/elee.EDZ0000104940>.
- Witchel, Harry. *You Are What You Hear* Algora Pub., New York, 2010, <https://search.lib.byu.edu/byu/record/lee.4904032>.
- Xenakis, Iannis. *Formalized Music*. Rev. ed. ed. Pendragon Press, Stuyvesant, NY, 1992