

On Music

by Sarah Quan

Introduction

1910. The German composer Gustav Mahler begins crafting his Tenth Symphony but dies before he completes his work. Mahler is known in the music world for his complex chords which have rich layering and can overwhelm (read: put to sleep) the untrained listener. Finding meaning within Mahler isn't as simple as choosing a single emotion. Just in the first phrase of Mahler's 10th Unfinished Symphony, scholars describe as "starting in a universe of no tonality, no centre, no direction, no gravity – no tension, no resistance, no meaning – 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

Later in the first movement, Mahler 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 chord is his reaction to his personal 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 speculate this chord is the reflection of a poem he wrote a few years previous entitled "My hesitant thinking and raging feelings flowed together in a single chord."⁵ Modern historians tend to

¹(Gamzou)

² (Leonard), See minute 19 for the famous chord progression.

³ (Diether 1984, 70-81)

⁴ (Gamzou)

⁵ (Fischer 2011)

see the symphony in the context of a farewell to traditions in the 19th century and describe the chord as a metaphysical representation of destruction.⁶ 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 practice Mahler 10 for the first time. As I learn 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?⁸

A few weeks later, I 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 fierce look as his white hair defies gravity all converge into a 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. Not one to openly discuss my feelings with other people, I don't really understand how to cope with this type of pain. I write in my journal:

⁶ (Gamzou)

⁷ (Diether 1984, 70-81)

⁸ Note: most of this essay assumes that music does arouse emotion. There is substantial empirical evidence to suggest that music does arouse music emotion. Psychophysiological responses to music that are similar to responses to emotions, such as effects on muscular tension, zygomaticus activity, pulse and blood volume, suggests that the physical effects of music are very similar to the effects of an emotion (Hodges, 283; Juslin and Slabada, 2010).

...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," Leonard Slatkin⁹ 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 (as a child questioning: what does it mean to love?) comes back with perfect clarity and 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.

I play the Mahler for my 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. Why does music matter? I wonder. I conclude that we need to understand *why* music came to be in order to understand the mechanics of the *how*. Yet this is more complicated than it may seem on the surface.

⁹ The guest conductor.

Music is part of the human experience and seems to be a global phenomenon—every known culture has a form of music. Yet, to an evolutionary biologist, this is puzzling because music seems to have no demonstrated biological value.¹⁰

There seems to be no consensus as to why music came to be so appealing to humans. In 1873 Darwin speculated that music originated through courting behaviors of primitive males. In more contemporary literature, Dissanayake argues that music was the basis for cultural specific uniting groups such as mother-infant pairs. Still others hypothesize music arose from animal territorial signs (which is supposedly why people like to listen to music while having sex).¹¹ One popular explanation by Steven Pinker is that music is “auditory cheesecake, an exquisite confection crafted to tickle the sensitive spots of at least six of our mental faculties.” Music was the byproduct of language much like cheesecake was the byproduct of our evolutionary preference for fat and sugar and pornography the byproduct of our sex drive.¹²

Similarly, some argue 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 was tuned and rewarded.

Which of these theories we choose to believe changes how we view the “how” behind music and emotions. For instance, hormones, such as oxytocin, are released when listening to music.¹⁴ Is the rush of oxytocin in my brain when I listen to Mahler even an emotion, or are certain biological responses in all people identical to emotions? If we believe that all of this arose from courting

¹⁰ (Juslin and Västfjäll 2008); Salimpoor, et al.

¹¹ (Hagen and Bryant 2003, 21-51); (Witchel 2010)

¹² (Pinker 1997)

¹³ (Perlovsky 2010)

¹⁴ (Keeler et al. 2015)

behaviors or animal territorial signs, is this all simply a biological response? Is there a difference between a biological response and an emotion?

What I can conclude is this: to different degrees, the roles of an architect, communicator, and receiver—whether all of those components are contained in a single person, a body of hundreds, or a computer—all contribute to music and the emotional experience. Creating music begins with an idea. This idea then gets transferred to a medium, which could be any number of things, such as a piece of paper, keyboard or synthesizer. When a “good” idea and the chosen medium react, vibrations are transferred to the experiencer and emotions are constructed, or evoked.

The Architect

Mahler did not write listener-focused comments such as, “a painful manipulation of the amygdala” in the margins of his 10th Symphony score. Rather, his directions were dark, inner thoughts that probably reflected his emotional state: “The Devil is dancing with me...Craziness, touch me, Destruction!”¹⁵ When emotions are formed there is a physiological response that teaches us the relationship between certain types of vibrations and the psychological response associated.¹⁶

The release of dopamine is one such response. Evidence strongly suggests that dopamine is released when listening to music.¹⁷ 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 when the reward is actually received¹⁸ (opioids and endo-cannabinoids, however, are more involved once “peak pleasure” is reached).¹⁹ This helps to explain why gambling and online

¹⁵ (Gamzou)

¹⁶ For length and clarity, this essay stays within the limits of instrumental classical music.

¹⁷ (Salimpoor, etal. 2015)

¹⁸ (Jakob eLinnet 2014)

¹⁹ (Salimpoor, etal. 2015)

shopping is 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. Musical enjoyment begins with mathematical patterns, since Western classical scales are largely based on equal temperament, and Western listeners are conditioned to expect chord resolutions 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 massage doesn't occur in the music until the minute 19 in the First Movement. By modern standards, this chord would be long overdue (who has patience to fully concentrate on piece of music for that long?) but by delaying the chord until sufficient context and mood had been created, more dopamine was probably released in my brain.

From this perspective, perhaps composition is less about notes positioned to evoke emotion and more about conveying a psychological construction in a way that relates to the listener so that pathways related to certain associations are triggered by the notes heard. In 1960, the anthropologist Renato Rosaldo goes to the Philippines to work with the Ilongot, a remote tribe known for headhunting. Two events of interest to us occur. First, he discovers they have a word for an emotion he doesn't have the psychological construction for, called *liget*. Locals use the word to describe wanting to cut someone's head off with other people, sadness, and a strong rush of energy. The second significant event occurs when his wife falls off a 65-foot cliff and dies. It isn't until he experiences extreme prolonged emotional grief from his wife's death and all he can do is howl that

he finally understands what *liget* means. By putting a word to the feeling, Rosaldo is able to “give his emotions form and let them pass through his body.”²⁰

What Rosaldo experienced is called “affect labelling.” When we are able to attach words to our emotions, it diminishes the response of the amygdala and other limbic regions and increases activity in the ventrolateral prefrontal cortex.²¹ 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.”

The Communicator

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.

²⁰ (Speigel 2017)

²¹ 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)

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 souls” attach to musical listening found in single dimensioned music.²² On this plane of understanding, any connection to concrete objects and feelings makes the music seem more “expressive.”²³ I am trained where to anticipate slight fermatas and where plagal cadences²⁴ should be placed.

While Seitz is easy to play for on a plane that “simple minded souls”²⁵ could 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 was my responsibility as a musician. I took this responsibility seriously: I would imagine my family had died and this would make the melody sound more melancholy. I understood CPE Bach²⁶, who taught that a “musician cannot move the listener if he himself is not moved.”²⁷ 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).

²² (Suzuki 1969)

²³ (Copland 1957)

²⁴ A type of chord ending.

²⁵ (Copland 1957)

²⁶ The son of the more famous JS Bach

²⁷ (Bach 1949)

As a teenager, I transitioned to different teachers who ‘corrected’ this idea and instead of fueling my fantasy of crafting a world, taught how to play each individual note of a concerto a specific way. These teachers were focused on competition and perfection. No more elaborate plots or characters—Bach was meant to sound how Oistrakh said it should.²⁸ Every time someone new critiqued my playing, they contradicted the interpretation the teacher before me had given. The learning process felt robotic.

I came to discover that their strict style and discovering the theory 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.²⁹ In his thick German accent, he taught me the theory behind how Bach embedded his signature within the Fugue, how Bach encompassed symbolism of Christ’s crucifixion and resurrection in the themes of the Partita, the formula behind how his Chaconne was composed.³⁰ 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, then craft my own interpretation based on what Bach had already conveyed. This was what made Bach timeless. As the violinist Hilary Hahn said 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.”³¹

²⁸ One of the most renowned violinists of the twentieth century.

²⁹ I don’t remember what the book was called (since it was in German) and cannot find it online.

³⁰ Chaconne, Fugue and Partita are all simply types of pieces that Bach composed.

³¹ (Bach 2010)

Confidence is knowing something and having evidence. A musician must know they have the “magic” to convert black dots into meaningful vibrations and have the evidence of exploring theory and developing accurate intonation, well-informed style, and practiced, personal flair. When a musician finds himself obsessed with a piece of music and mentally refining the details of its portrayal throughout the day, this solidifies the evidence that the musician can convey and evoke emotion.

The Experiencer

Listeners act to discover emotion in music and are acted upon by environment and experience. After the composer creates the potential gradient for musical enjoyment and the performer projects their emotions onto the notes they are playing, the listener must be prepared to have their emotions evoked through biological conditioning and cultural constructs to interpret the music.

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. 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 of the music.³² We are conditioned to appreciate what we have been taught is “correct,” even though what is “correct” changes with time and location.³³

³² Unless she has been conditioned to expect something different. For instance, baroque music is often tuned lower.

³³ (Haynes 2002)

Expectations are important because they can be broken. Disruptions to what we expect causes us to react, even feel emotion. One such instance of a musical construct we 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.³⁴ If we walk past an unusually thin person on the street, the next person is likely to be fatter. Western listeners mentally expect large leaps in the pitch of notes to be followed by a change in direction.³⁵ We have come to the expectation that this is an “imperfect approximation of the pattern evident in real music.”³⁶ 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. Even though the idea of *regression to the mean* would promote the idea that the extreme dissonance in the Mahler chords would resolve early in the passage, the tension kept building until it reached an unexpected climax.

How do we construct reality, then, and come to expect certain patterns of behavior? To a large extent, identity is developed through experience and sensory control.³⁷ As babies, we cannot process all of the information thrown at us at once and have to learn how to filter the stimulus we are bombarded with. To sort through this enormous amount of data, 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.³⁸ For instance, my sister was constantly exposed to the sound of me singing an “A” to her as a baby. As

³⁴ (Regression)

³⁵ (Paul von Hippel 2000, NaN)

³⁶ (Anonymous 2010, 256)

³⁷ (Schmitter 2016)

³⁸ (Vasuki et al. 2017) there is research to suggest that musical training enhances auditory statistical learning.

such, she was able to filter the sound of my voice singing that to her and categorize it in her mind as what “A” should sound like. Many scholars concur that language gives us a “culturally evolved means to differentiate reality in great detail.”³⁹

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 Jewish composer? Or would a member from the isolated tribe simply hear a garble of notes or something else entirely?

Musicologists seem to agree that appreciation of music is a construct of culture. The landmark musicologist, Leonard Meyer, agrees that “a stimulus or gesture which does not point to or arouse expectations of a subsequent musical event or consequent is meaningless. Because expectation is largely a product of stylistic experience, music in a style with which we are totally unfamiliar is meaningless.” Other musicologists concede that “emotion is communicated in music through 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 as far to say that “listeners from one culture should be unable to appreciate the natural connections between music and the emotive life of an unfamiliar culture.”⁴⁰

The same pathways in our minds that fired when we made love or go shopping are probably firing as we listen to music. In neurological terms, the caudate is involved during the anticipation of music, and endogenous dopamine⁴¹ is released in the striatum⁴² at “peak emotional arousal.”⁴³ In

³⁹ (Leonid Perlovsky 2013, 1-8)

⁴⁰ (Laura-Lee Balkwill and William Forde Thompson 1999, NaN)

⁴¹ Internally produced hormone which helps regulate our reward center and can help us feel feelings of euphoria.

⁴² Critical component of the motor and reward systems.

⁴³ (Salimpoor et al. 2011, 257-262)

other words, the abstract stimulus of music can arouse feelings similar to tangible rewards.⁴⁴ From this perspective, emotion is evoked because the same hormones are released and neuropathways light up when the music is experienced. The emotion that arises from music is an empirical, biological response that comes from connections to experience.

Conclusion

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 Brahms at the same time in high school. Together, we laugh and reminiscent about fighting during chamber groups and my difficulty effectively communicating with his Russian parents. 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 Julliard 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 friendship 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.

"I did the paperwork to drop out of Julliard last week," I suddenly hear him 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."

⁴⁴ (Salimpoor et al. 2009, 1-14)

He wants to spend time discovering: Who am I without the music?

Years ago after an orchestra rehearsal, he offhandedly commented that his home was like the orchestral epic we had just practiced, *Symphonie Fantastique*. At the end of the Symphony, the composer (who allegedly was on drugs) tells 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 as meaning he didn't want to go home to his highly dramatic, slightly drunk Russian musician parents who yelled a lot. My innocent construct of the world—a place where people easily gave love and received love—kept me from understanding the message he was trying to convey. Same music, different meaning.

How does music elicit emotion? *Can* music elicit emotion from everybody, or is this all just a naive construction I've made up because this is how I experience the world? Our realities of what the music means are personal—we create our own perception of what the music means, 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, Brahms and Bach through the beautiful confusion of growing up. I will never portray Brahms exactly the way the composer intended it to be because the experiences in “real life” are contributing to my interpretation.

Perhaps Brahms or Bach never had a set way that he wanted his Concerto to be played. Perhaps Mahler wasn't even concerned about the performance of his Symphony, he simply wanted to work through his emotions. As a performer, sometimes I don't know exactly what I'm trying to convey to my audience because I don't understand my own feelings. As a listener, I can't always articulate why I feel, I can only articulate that I am feeling *something*.

January, 2018. I'm driving down the highway, thinking about what I want to change in the world, who I am. The memories of the Russian friend and *Symphonie Fantastique* and my recent

heartbreak and Mahler are still fresh in my mind. The music playing in my car changes to the Brahms Violin Concerto—the same piece that made the shirtless bus driver 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 I hum along. The concerto is embedded in my DNA—it is a part of me. Those note sequences are part of who I am.

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 win for number of reasons it's a bad idea, but I go backstage to find a teacher anyways.

For some reason, the Korean violinist takes me as a student. I don't know why, I truly sound terrible after years of not practicing. He hands me painful finger stretching chords I haven't touched in years 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 sounding 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. Music contains specific emotions because it taps into our constructed reality, yet the feelings it gives are so ephemeral and vague that no one 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 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. The struggle to match the jumble of hormones and perceptions in our heads with some sort of concrete reality will never truly be achieved as long as we keep experiencing life. Instead, we use this creation by flawed people called music to imperfectly try to organize an emotional world that doesn't quite make sense.

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