I have a deep emotional connection to music. Realizing this passion I wanted to learn more about it. How do we absorb and recognize music within our brains and what can science show us about music's ability to effect our emotions?

Through contemporary research, I discovered that we subconsciously find specific elements in a song that cause us to react to the music in different ways emotionally. These elements include temperature, location, brightness, shape, etc. An upbeat pop track may feel warmer, while a somber ballad may make the listener feel colder. Music can act as a powerful artistic force, which has psychological control over the listener. I found that many of these elements possess related visual symbols. In order to capture this relationship between music and its listener, I chose to create a film accompanied by an original soundtrack. The film features two separate songs meant to juxtapose the way different musical pieces make us feel.

The first segment of the video and musical piece is meant to saturate the brain through the utilization of excessive melodic layers and heavy, distorted drums. The setting is a barren post-apocalyptic wasteland, and then as the scene changes life sprouts, fresh water flows, flowers bloom, the sky becomes blue. The music shifts into an ecstatic hypnotic rhythm. This drastic transition in sound and imagery illustrates the ability music has to directly change our state of mind. Music is so much more than a simple source of entertainment it can become a powerful psychic force.

Zack B.

What is the true identity of music? Why do humans need music and how does it affect us so greatly? In order to answer this, I will break up music into its different components, compare and contrast music to language, and discuss the emotional effect that it has on humans. Finally, I will conclude with the importance of knowing and accepting this information and how it is crucial in our lives.

Music has not always been such an interest of mine. Sure, I danced around to Sting and the Dixie Chicks when I was a kid, but I was never so consumed by music until I got to high school. During Sophomore year, this new kid, Tanner, moved to my school from Portland. After talking to him for a while I learned that he had a really cool, unique, and weird taste in music. It covered a huge array of genres I had never even heard of, like "trip-hop" or "future garage". I started immersing myself in this new internet-based, unorthodox field of songs and artists that I had no previous exposure to. There were tons of songs on online music platforms just waiting to be heard.

I listened, learned, and engrossed myself in all this different music for months. Every day I would discover a new artist who was unlike anything I'd ever heard. Their songs would sound like banging metal beams mixed with an 8-bit video game soundtrack, or the inside of a church that was recently turned into a rap studio.

It wasn't too long before I found out that Tanner made instrumental music on his laptop using special software, like beats that singers would use and compositions like that. Immediately I was interested. I started making slowed down "chopped and screwed" edits of songs in a program called Audacity. I would simply take a pre-existing track, slow it down until the vocals provided a rich, syrupy deep tone, and repeat segments of the song by cutting up vocal segments and duplicating them, hence "chopped". Less than a month later I went on to begin my production career in the well-rounded software Ableton Live. My laptop had now become the most important object in my life. I poured myself into tinkering with and educating myself in Ableton, digging my way into every nook and cranny and finding everything the software had to offer. I put out some tracks[1] on *Soundcloud*, a social media platform for self-releasing artists and labels. All I've done since then is work work work, constantly improving my craft. Along the way, I got into DJing and producing for rap artists. I've performed live, something I'd never EVER thought I'd be doing two years ago. Not only has music taken over my life, but it's helped me make money through playing shows and selling instrumentals. To put it shortly, music has recently become an extreme passion of mine.

What I want to learn more about is WHY I got so into music, from a psychological and physiological standpoint. What clicked in my brain that made me get so into music and where did it happen? I want to explore the emotional impact that listening to music has on us. I have never looked into this before, and I trust that my findings will deepen my passion and even help in my music-making process.

So What exactly is music? The term "music" manifests a vast array of terms, like the words "nature" or "history."As Robert Jourdain States in his book *Music, The Brain, and Ecstasy*, "it is nearly impossible to say that music represents a specific, finite thing" (Jourdain 1998, p. 273). When attempting to define music, it is best to simply state its composition and purpose. Music is the assembling of any organized or patterned sounds, combined and juxtaposed in order to instill emotion in listeners ("Full Definition of Music"). There are an

[1] Now terrible after looking back at them, thank God they were deleted a while ago...

immense amount of different styles of musical composition. Every culture in Earth's history has or has had some sort of musical aspect, "no matter how technologically primitive, [indicating] that music is something that humans come by fairly easily" (Jourdain 1998, p. 305). Music can be anything from tapping your foot while waiting for the bus to Beethoven's Fifth or Young Thug's "Halftime." What is important about music is that it conjures a fascinating and virtually inexplicable range of emotion in a listener: a feeling that truly can't be found in any other form of art on Earth. Music is a multitude of relations within a finite, creative region, reenacting experience within the body and mind (Jourdain 1998, pg. 293). These emotions are brought out through the human brain's exposure to specific elements of a musical piece: pitch, volume, melody, and harmony. These travel through particular sections of the brain in order to give information to it.

There are various components to a musical piece, each one affecting our brains and changing how we process sounds. Our brains recognize these different components, deciding on how they should make us feel depending on the frequencies of tones, the pace of the piece, etc. Arguably the most essential factor of any sound is its pitch. The pitch of a sound is the frequency, measured in Hertz, of the tone, the sound that we hear. Pitch defines the note of a tone, and the usually-patterned variation in pitch is what makes up the melody of a musical piece. Melody is the succession of tones the brain deems most prevalent in a piece (Levitin 2006, pg. 17). So, pitch decides what part of a musical piece resonates the most with the brain. In addition, pitch is "one of the primary means by which musical emotion is conveyed" (Levitin 2006, pg. 26). Obviously the lyrical subject matter of a song is the simplest way to recognize different emotions in music, but what of the instrumental aspect of the musical piece? Melodies are divided into two scales: major and minor. A scale is involves a relationship between three or more tones at a specific pitch, resulting in either a minor or major key. Major scales tend to draw out happier emotions in listeners, while minor scales call on sorrowful riffs and refrains to affect their audience in such a way (Levitin 2006, pg. 38). When we hear a melody with sounds at a pitch in a minor key, we generally tend to label the melody as melancholy or gloomy. In opposition, when a melody at major key enters our ears, we usually become positive or awakened. A combination of specific notes played in succession is a chord, played as a basis of harmony. Chords are also bound by the major and minor keys, played in order to enhance the intended feelings the artist means to capture. This use of combining tones in specific keys is harmony.

The literal volume of a song is also an important, emotionally-defining element of a typical musical piece. Obviously, a louder musical composition will bring out excitement in a listener and vice-versa, but why is it that humans tend to rely on loud music to get them going? Simply put, when a song is loud, the molecules of the sound waves that enter our ears are vibrating at relatively large amounts. This saturates the audio system in our brain, raising our awareness and excitement. This also goes for hard hitting, in-your-face sounds rather than laid back, background music. But what exactly makes up this "sound system in our brain"? Where do these sounds that decide how we feel when listening to music go?

When we listen to a sound, it must reach the auditory cortex in the temporal lobe in order to be recognized and authentically transferred into mental feelings. The auditory cortex is the most crucial part of the brain when detecting sounds. Neurons within the cortex receive and read specific data from the absorbed sound. Different neurons detect different aspects of the sound, such as when it starts and stops or, most importantly for music, the frequency of the tone ("Human Nervous System"). Pitch exists only in the mind, in which the auditory cortex

ultimately shows us if a song is moody, upbeat, calm, etc. The auditory cortex utilizes a tonotopic map in order to process frequencies within the brain (Levitin 2006, pg. 29). This conclusively leads to our emotional perception of a musical piece. In addition to the aforementioned aspects of a musical piece, our brains cognitively find other elements relative to (Levitin 2006, pg. 18). This includes the musical piece's color, brightness, location, shape, texture, temperature etc. These objective qualities are in no way physical properties of the music being listened to, rather they are summoned within the mind. However, there may be a correlation between these factors and the actual musical features present in a piece: energetic songs in a major key may feel lighter, warmer, etc., whereas a moodier song in a minor key may feel darker, cooler, enclosed, etc. Our brains are tailored to collect data from sounds and transform them into feelings, but why is this necessary?

It can be argued that the entire purpose of music is to convey emotion through a unique, nearly undefinable experience. Music does not symbolize, it mimics (Jourdain 1998, pg. 294). It paints landscapes that we can connect to through personal memories and perceptions. Every song is like each listener's own personal snowflake: individual and special. Human emotion relies heavily on social interaction ("Human Nervous System"). When someone listens to music, they are forming an intimate bond and experience with the musical piece. However, music is also known for reenacting a common experience (Jourdain 1998, pg. 293) that is dependent on the aforementioned aspects of a musical piece. Music is like ecstasy to the ears, "[transporting] the brain to a higher than normal level of integration" (Jourdain 1998, pg. 303). Music speaks to us through vivid imagery that occurs only in our minds, allowing us to perceive and transfer the music we hear into whole universes of emotion and meaning. When we experience this, "our brains try to make an association through whatever visual, auditory and other sensory cues accompany it; we try to contextualize the new sounds, and eventually, we create these memory links between a particular set of notes and a particular place, time, or set of events" (Levitin 2006, pg. 39). Our brains pick out segments of a song and attempts to match them to a past personal experience or memory. Personally, I believe that this is the reason people can have favorite songs, artists, albums, and more; they are what we can relate to most that we find the most appealing, moving, and addictive. Music may seem like a rollercoaster of emotions, but is there no link to how we speak to each other? If music is an intimate interaction, how is it different from language?

It can be quite easy to compare music to language, as they are both "long, highly organized, streams of sound" (Jourdain 1998, pg. 275). Music and language are both experienced and learned through exposure, and linguistic and musical skills are developed in the same general area in the brain. Both language and music utilize comprehensible, separate chunks in order to break up long, complex layers of sound (Jourdain 1998, pg. 275), a process known as "phrasing". This similarity in structure is what connects language and music most. However, when speaking about music and language in terms of meaning, definition, translation, and validation, the two are worlds apart. A "language of emotions," (Jourdain 1998, pg. 293), music is like a spoken dialect where every tone uttered has a specific and rich personal meaning to the listener. Songs are like paragraphs, saturating our brains with definable and undefinable emotion. In music, a single note can constitute an entire message with its own significant meaning (Jourdain 1998, pg. 276). This contrasts with the universal aspect of language that every word represents a meaning. Linguistic meaning and recognition is all or nothing, whereas musical meaning and recognition is based on a level of degree. Music has the capacity to establish a virtually infinite amount of different meanings and feelings with the virtually infinite amount of

possible combinations of sounds. The total number of possible five-minute audio files is finite, as there are only a certain number of sound frequencies our ears can detect and recognize. However, this finite number is impossible to comprehend, having almost 800,000 times the amount of digits that the number of hydrogen atoms in the known universe has (Vsauce). It is this omnipotence that makes music such a unique experience and sets it apart from every other art form or human encounter. Every single combination of sounds yields its own significant meaning. Every song is special.

We've explored what music is, what it's made of, how it is absorbed by our brains through our ears, how it makes us feel things, and its relation to language and meaning. But why? Why is understanding and accepting this knowledge crucial to us as humans? It is extremely difficult to pinpoint a reason for the existence and the importance of music, and there are many interpretations of its true value in a global society. Namely, music has held a substantial level of importance across every known civilization in recorded history. Cultures commonly emphasize the importance of music for religious purposes, such as the chants of African tribes or the melodic chanting of Tibetan Buddhists, the beautiful ragas of India, or the hymns of devout Christians. In these terms, music allows cultures to flourish all across the globe. But what else? A case study referenced in Daniel Levitin's *This Is Your Brain On Music* depicts how music transcends fundamental listening into a level of bliss and release from the trauma of old age and bodily deterioration, such as Parkinson's disease and Alzheimer's. The euphoric journey that music takes our brain on has healing abilities that transcends the typical reputation music has: that it is purely something to listen to.

Despite all these definitions of music's true value (that I still find absolutely valid), and like many others, music has a very personal level of importance to me. Music allows me to experience feelings that I can't find in anything else. There are an immense amount of combinations of sounds, resulting in a new emotion and feeling for virtually every single song I listen to. Throughout my research and writing, I've come to realize that there is a boundless significance in the creation and sharing of music. These discoveries led to pure motivation in my own work, as well as a newfound realization of some of music's deeper capabilities. Music allows us to access a memory or past feeling by linking them to certain sounds, creating something truly unique and personal within our minds. More so, music is a prime example of the importance of art in human society and how it creates emotion in us that must be held close and appreciated. Music is unique: it is ever-changing; it is unpredictable; it is safe; it is violent; it is a warm blanket; it is a lightning storm; it is the epitome of creativity; it is an interaction that cannot be experienced with any other form of matter in this universe. Music tells us that not everything has to be pretty or perfect. Music is smart. Music brings people together and keeps us to ourselves. Music is ever-present and all-powerful. Music is the closest thing to God we may ever get.

Bibliography

Darwin, Charles, and Jeff Wallace. *The Origin of Species*. Hertfordshire: Wordsworth Editions, 1998. Print.

"Full Definition of Music." *Merriam-Webster*. Merriam-Webster, n.d. Web. 18 Apr. 2016. <http://www.merriam-webster.com/dictionary/music>.

"human nervous system." Encyclopaedia Britannica. Britannica Academic. Encyclopædia Britannica Inc., 2016. Web. 18 Apr. 2016. <http://academic.eb.com.uprep.idm.oclc.org/EBchecked/topic/409709/human-nervous-system>.

"infant stimulation program." Encyclopaedia Britannica. Britannica Academic. Encyclopædia Britannica Inc., 2016. Web. 18 Apr. 2016. <http://academic.eb.com.uprep.idm.oclc.org/EBchecked/topic/1953799/infant-stimulation-program>.

Jourdain, Robert. *Music, the Brain, and Ecstasy: How Music Captures Our Imagination*. New York: Avon, 1998. Print.

Levitin, Daniel J. *This Is Your Brain on Music: The Science of a Human Obsession*. New York, NY: Dutton, 2006. Print.

Storr, Anthony. *Music and the Mind*. New York: Ballantine, 1993. Print.

Vsauce. "Will We Ever Run Out of New Music?" *YouTube*. YouTube, 20 Nov. 2012. Web. 20 Apr. 2016. <https://www.youtube.com/watch?v=DAcjV60RnRw>.