# Music, Emotion, and Physiology

Tears roll, shivers shoot up your spine, laughter fills an auditorium, and intense emotional suspense grips tightly as you listen to a wide variety of music. What causes these effects: Is it the music structure itself, or a higher cognitive function that independently creates a feeling of emotion? What about music even makes us feel this way? Why, when scientists like Pinker believe music to be a very near useless evolutionary adaptation or "auditory cheesecake", would music have such an effect on a multitude of levels of our cognition?

Metrical structures, tempo, contour, chord progression, harmony, melody, and rhythm shape and transform simple dots, lines, and symbols into the sounds that the auditory system relays to the brain for processing. Composers have spent an eternity of time and effort into making the audience "feel" their work. Emotional responses caused by the music, are combined with various physiological responses: change in temperature, skin conductance, cardio-vascular and respiratory responses. How does music do this and why is it important?

Reasons for studying music and emotion include increasing one's knowledge in music, psychology, and emotion. These fields have advanced science, medical, and therapeutic fields which are all found in music therapy. Although a variety of effort goes into music therapy, the simple idea of shaping emotions and feelings with music is a fundamental part of its basis. This field alone is enough worth to validate the study of music and emotion, but music research is also validated in study alone.

Music fills our mind with images, memories, and emotions as described above. From the long connected melodies of classical composers such as Tchaikovsky, Beethoven, and Bach, to the heavy distortion of heavy metal bands and the bluegrass twang of southern country music,

music can bring someone to tears, or even by association invoke a powerful memory of a strong emotion that can remind someone of love, death, and every happy moment they've had in their life. This phenomenon is very limited to humans (but could possibly occur in other species) and it raises many questions of its evolution and its purpose. In studying how music makes emotion happen and understanding of its evolutionary purpose may arise. There are two main theories of music and emotion: The Emotivist view, and the Cognitivist View. The Emotivist theory suggests that it is the music itself which creates the emotion, whereas the Cognitivist view holds that the emotion is created by more of a top down processing mechanism that gives us the feeling of emotion, almost independent of the music. The research analyzed is a hope to give a supportive measure for on theory over the other. Is it the Cognitivists who are accurate, or do the Emotivists propose a more probable theory?

Thompson, W. F. (2009). *Music, thought and feeling: Understanding the psychology of music.* New York: Oxford University Press.

Chapter six of this book was very useful. Describing not only different theories of processing for emotion and music, but provides a plethora or examples. Thompson himself is a Professor of Psychology at Macquaire University and currently holds a Ph.D in Psychology from Queens University.

This book chapter breaks down not only evolutionary and cultural examples of music's role in emotion processing, but separates the emotivist view and the cognitivist view into seven sub-segments which are vital for background information. It splits the emotivists into Melodic Cues, and Contour and Convention theories, and the cognitivists into Morphology of Feeling, Embodied Meaning, Adaptive Arousal, ITPRA, and Multiple Mechanisms Theory.

This basic presentation of the theories are the backbone to the other research presented in the debate between emotivisim and cognitivism. These theories are useful to find further research and further adaptations of music and emotion work and study. It also provided a good neurological basis and anthropological basis.

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Garvin, L. (1958). Emotivism, expression, and symbolic meaning. *The Journal of Philosophy*, 55(3), 111-118.

Dr. Lucius Garvin of the University of Maryland provides a philosophical approach to emotivism in the arts. He talks not only of music but of visual and communicative arts. Assembling the different forms of expression and forms of presentation and assembly Garvin analyzes the difference in symbolic representation and emotional representation and when these two can be used together. This was only a brief work for reference, so there wasn't much other than that needed from this source, but it provided a good philosophical basis to emotivism and related theories.

when?

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Fritz, T., Friederici, A. D., Jentshke, S., Gosselin, N., Sammler, D., Peretz, I., et al. (2009). Universal recognition of three basic emotions in music. *Current Biology,* 19(7), 573-6. Available from http://ncbi.nlm.nih.gov/pubmed/19303300

Another article for background information was provided by these researchers on how cultural familiarities are affected by music. It has been studied in the Mafa culture along with Western participants whether or not people of different culture would recognize three basic emotions (happy, sad, scared) in music they had, in theory never heard before. The Mafa proved to be able to recognize

these emotions in works done by unfamiliar artists and composers. This suggests a universality of an aspect of music that supports the emotivist view that something in the music's structure itself that causes an emotional response.

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Rickard, N. S. (2004). Intense emotional responses to music: A test of the physiological arousal hypothesis. *Psychology of Music,* 32, 371-388

This first study analyzed both physiological responses and emotional responses to deeply emotional music. The theory being that intense emotions are often accompanied by increases in physiological levels. So their study was designed to see how music and emotion tied into this, and whether the results were Top-Down (cognitivists) or emotivists.

Their method involved twenty-one undergraduate students (12 males, and 9 female) who completed demographic questionnaires before the first session. Then they entered four sessions that lasted approximately 45 minutes each, around the same time to avoid time variability. The students were exposed to repeated measures of counter-balanced order across the sessions and had to complete a questionnaire prior to each session to evaluate the A-state. Then saliva was taken from each student, and the EEG electrodes were placed. Temperature, EMG, HR, and SC were measured as well as a personal reflection (by hitting a button) of chills/thrills while listening to the sound segments in the 45 minutes. Then another questionnaire and saliva sample was taken.

The results of this study supported an emotivist theory of music emotion processing. The emotionally powerful music elicited more physiological responses and higher levels of emotions. It heavily affected skin conductance and significantly affected chills.

what result would have supported the cognitivist view?

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Krumhansl, C. L. (1997). An Exploratory study of musical emotions and psychophysiology. *Canadian Journal of Experimental Psychology*, 51(4), 336-352.

The second study discussed in my presentation provides further evidence for an emotivist perspective on music and emotion. Dr. Krumhansl of Cornell studied the relative effects of music, emotion, and physiology as well. Her first initiative was taken after noticing a gap between musicological and psychological works between emotion. Musicians believe that music "can invoke a wide range of powerful and highly specific emotional states", where as psychologists rarely look at emotion and music.

Methods included forty university students who were tested with six musical excerpts (Two Sad, Two Happy, and Two to invoke fear) They then indicated which emotion(s) they felt on a level of thirteen different emotions by personal report. The results were significant for the emotivist view.

The results showed that not only the emotions matched with the correct response, but physiological measures also taken supported the same as Rickards.

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Sloboda, J. A. (1991). Music structure and emotional response: Some empirical findings. *Psychology of Music*, 19, 110-120.

Another study done, but this supported an arousal based theory, which then in turn supports the cognitivist theory. Providing counter-evidence to the emotivist point of view was essential for providing another argument for music and emotion. Sloboda constructed an experiment with eighty-three music listeners to analyze how they reacted to music of varying

degrees of emotion and familiarity. Self-report was again utilized in this study. This questionnaire asked them to view a list of physical responses often compared to music and then rate the frequency of which each response has occurred in music. The participants nominated most emotional music. The results showed that shivers, and laughter occurred the most frequency eventually running through tears, heart racing, yawning, and sweating among other responses. Samples for some chill invoking work (predominately classical) were provided and it analyzes why the subjects found the same response in different forms of music. This study shows that people are easily able to recall "peak" emotional states in classical music which are accompanied by a physiological response and since they are able to pinpoint which area of the music, and judging that the "thrills" all came from different structures of music Sloboda rules out emotovist theory for an adaptive arousal like hypothesis.

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Schwartz, H. (1985). Music and emotion. *Perspectives of New Music*, 24(1), 98-101.

More background information in the variety of different aspects of music and emotion. He varies between theories and goes into depth on rationality of emotion which is more psychological and then the technical parts of both emotion and of music. His main focus is to combine the "Layman" and the musician into a common thought when it comes to music and emotion. He also discusses the linguistic aspects of music. In the very few pages he provides classical pieces as examples for a variety of music from Mozart to Beethoven to support his ideas.

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Krumhansl, C. (1995). Music psychology and music theory: problems and prospects. *Music Theory Spectrum*, 17(1), 53-80.

Another background source of information—this work provided a fundamental basis to both common aspects of music theory, and common aspects of music psychology. She provides various connections between music structure, syntax, composition, and performance and different levels of psychology from emotions, the processing, to perception, and even touches on music therapy. This provided crucial background knowledge prior to researching or presenting.

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Cohen, A. J. *Music as a source of emotion in film* [Ch. 11 pp. 249-272]. Retrieved from http://www.upei.ca/~musicog/research/docs/musicrcemotionfilm.pdf

Cohen ignores some of the differences in theories that separate scientists and thinkers when it comes to music and emotion and bulldozes right into cinema. He describes its historical aspects, and when music first originated in the 'silent' films. Then he accounts for several of the first film composers, giving details of their work.

An argument he makes very thorough is that music does not always show congruence with film and it very easily creates the audience to lose focus. He lists many functions of film music including: controlling precedence, concern, mood, situational meaning, apparent reality, change, emotion, and closure. He also explains how all of these impact memory and how it is the music that gives us such a rich film experience, which brings me to my final source.

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Eschrich, S., Munte, T. F., & Altenmuller, E. O. (2008). Unforgettable film music: The role of emotion in episodic long-term memory for music. *BMC Neuroscience*, 9(48).

Going off of Cohen's research these scientists tested Long term and emotional memory with film music. Their study is done because of music's omnipresence and its emotional richness that it adds to the lives of almost everyone. Their study found that music in film increased both forms of memory for that particular instant. This study was used primarily to correlate with Cohen's work in my presentation.

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In conclusion, one can see that music and emotion is now a heavily researched field, or at least more predominate in research than it was twenty or thirty years ago. Emotion grips us into music and is an anchor that keeps listeners coming back over and over again to hear it. After presenting two main arguments (Emotivist, Cognitivist) as well as their off-branching theories discussed by Thompson, one can see that research has been done to support both theories.

The emotivist theory is more dominate in its support and has overwhelming evidence that it is indeed the music structure itself that causes our emotional responses, but we cannot cast aside all of the cognitivst view—especially not its predominant arousal hypotheses.

Music and film also supports the emotivist view claiming that it is the music in the film, in conjunction with the plot etc. that causes our emotional responses (tears, chills, laughter) in movies.

Music and Psychology are two very distinct fields, but they do present a great deal of overlapping when it comes to processing, auditory function, perception, and emotion. Emotion

being key for different levels of processing and connecting the two separate fields, there is a basis to study. Though the results are predominately inconclusive a proposition of an intermediate hypothesis should be done. Perhaps music and emotion are neither emotivist or cognitivist, but a combination of the two that heavily depends on situation and context.