Neuroaesthetics of Music

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Neuroaesthetics describes the neurobiological study of art (Magsamen, 2019). It explores the idea that the brain influences aesthetic experiences and is influenced by them. This is a recent area of research that has provided insight into how different types of aesthetics, such as music, are sensed and perceived by the brain. Current neuroscience research has been implementing these findings to find nuanced ways to treat diseases and learn more about the overall brain network. Music, specifically, has been a hot topic for research due to its influence on neuroplasticity and its potential to mediate certain drug effects such as psilocybin (Messell et. al, 2022). Music is found in nearly all cultures and throughout human evolution (Gottlieb, 2019), thus, allowing for more diversity and inclusion for scientific research within this field. It continues to hold potential in many areas of scientific research. These areas include topics such as therapy and medicine, child development, and evolution. The pleasure we find in music is a result of the complex connectivity of our brains' cognitive, sensory, and emotional responses (Izadifar, 2024). Overall, the neuroaesthetics of music shed light on this intricate relationship, highlighting the neural mechanisms that underlie our musical experiences.

Despite the brain being highly active during musical aesthetic experience, current research has found certain regions of the brain that are more specific to different aspects of a musical experience. Aesthetic judgment, for example, is mainly found to activate areas in the prefrontal cortex (Izadifar, 2024). There are many other regions also active during a judgment of pleasantness. This could be due to several factors such as the consonance or dissonance of a musical excerpt (Popescu, 2019). In addition, there has been a discussion of lateralization in the brain during musical experiences. For instance, studies on musicians have found that there is more activity on the left side of the brain compared to higher activity on the right side of the brain in non-musicians (Andrade & Bhattacharya, 2003). One potential explanation for this is that musicians process music in a much more analytical way. Generally, most processes in the brain, in response to music, occur bilaterally. There are only certain tasks such as pitch recognition and rhythm that have resulted in asymmetric brain activity (Andrade & Bhattacharya, 2003). These studies allow us to understand more about human perception and the brain's underlying neural network.

Music also has a large influence on emotion and memory. Research has found some neurotransmitters significantly linked with musical experiences. There is evidence of music modulating the mesolimbic reward system, resulting in feelings of pleasure and reward. One study experimented to determine the extent to which the dopaminergic system influences pleasantness found in music. They found that dopamine plays a critical role in the pleasure found in music (Ferreri et. al, 2019). Another study focused on the distinction between induced and perceived emotion when listening to music. Induced refers to the way music makes an individual feel and what emotion the individual thought the music conveyed. This study highlighted the different types of emotional judgment using music as their experimental variable (Song et. al, 2016). Other studies have investigated the different types of memory concerning music and emotions. There is strong evidence suggesting that music plays a large role in memory storage and recollection. This is due to the high involvement of the auditory cortex in both memory processes and musical experiences. Emotions also play a large role due to the amygdala being so close in proximity to the regions involved in music and memory (Brattico & Peace, 2013; Jäncke, 2008). Many research studies have also found a positive correlation in children's development in aspects of working memory and reasoning with exposure to music (Nutley et. al, 2014; Roden et. al, 2013). This high involvement of different cognitive processes and music demonstrates the importance of music in scientific research and its ability to lead to an increased understanding of the underlying mechanism of disorders that are a result of emotion, attention, or memory deficits.

In all, studying the neuroaesthetics of music can lead to an overall advancement in our understanding of the brain's complex network. Furthermore, studies on musical experiences and the underlying neural mechanisms shed light on the many individual differences at a cultural and individual level. Humans have a variety of differences in the way they sense and perceive music. This can be due to factors such as their musical expertise and familiarity or their cultural background. Despite all the research being done, this aspect of individuality is one of the many reasons why the almost magical nature of music may forever remain elusive to rational explanation.

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