The mozart effect: a review of literature essay

Art & Culture, Music

The mozart effect: a review of literatureThe 1990s were given the name, “ the decade of the brain” due to the numerous widespread advances made in understanding neuroanatomical and neurophysiological mechanisms. One particular topic that has received much attention is the effect of music on a person’s cognitive abilities. Several articles and news segments have focused on the relationship between students with formal musical training (having previously sung or played a musical instrument) and improved performance on standardized exams such as the SAT’s[1]. Such claims have been an impetus for many researchers to investigate the link between music and intellectual capacities. Shaw suggested that listening to or learning to play a musical instrument enhances how humans process information[2]. Whether it is surgeons who carry out their procedures while listening to music or pregnant mothers who place headphones on their stomach and play music to a fetus, researchers have explored the relationship between the context in which one listens to music and cognitive abilities. It has been suggested that playing a musical instrument and listening to music are as cognitively complex as speaking and reading since both require perceptual processing and quick sequencing of enormous amounts of information. In 1991 when French Researcher Dr.

Alfred A. Tomatis coined the term Mozart Effect to describe the influence of Mozart’s compositions to an individual’s cognitive abilities. But this term was popularized by Don Campbell in his 1997 book The Mozart Effect. The Mozart Effect soon became media hype due to everyone’s desire to become smarter and Mozart effect promises to make you one[3].

However, the Mozart Effect theory was first heard about in a more detailed fashion in 1993, when Rauscher, Shaw, and Ky demonstrated a relationship between listening to complexly composed music (that is, limited number of musical motives that appear in symmetry) and cognitive processing in the brain. They found that after college students listened to a particular musical piece (Mozart's Sonata for Two Pianos in D Major; K. 448) for 10 minutes, it led to enhanced spatial reasoning lasting for about 10-15 minutes compared to controls. Their findings engendered local and international interest seen in various ads suggesting that listening to Mozart CDs would make on smarter.

The aforementioned results led to the development of in state-sponsored programs in Georgia and Florida that encouraged " parents to have their very young children listen to classical music in order to improve their thinking abilities"[4]. Talk about the huge market of this phenomenon, Campbell is not the only one exploiting it. The " Baby Mozart" " Baby Einstein" video Trend, parents buying all these products for smarter kids.

In their groundbreaking study illustrating how listening to sophisticatedly composed music such as Mozart's Sonata for Two Pianos in D Major (K. 448) could enhance spatial reasoning, Rauscher, Shaw, and Ky needed to demonstrate that the subject's arousal rates were not solely responsible for this effect. Though there are several denotations of arousal, for their paper, it has been defined as a condition that results to extreme effort or intense excitement. Rauscher, Shaw, and Ky wondered whether the simple introduction of noise (the classical musical selection) might have acted as a catalyst in augmenting one's arousal. Manipulations of somatosensory input

such as noise and light have been shown to increase arousal[5]. This question was particularly important to Rauscher, Shaw, and Ky's findings because the data in the current literature suggested that arousal itself may have been beneficial effects upon the detection, storage, and utilization of information. Arousal is frequently assessed through recording physiological measurements such as heart rate, EEG, and skin conductance. In Rauscher, Shaw, and Ky's 1993 study, the subjects' pulse rates were taken before and after each listening condition.

An absence of significant alterations in the subjects' pulse allowed Rauscher, Shaw, and Ky to exclude arousal as an obvious cause of any memory effects. It appears that the particular piece of Mozart mentioned earlier does not act as causative agent of arousal as supported by Rauscher, Shaw, and Ky (1993, 1995) in their preeminent study and follow-up investigations. Rauscher, Robinson, and Jens demonstrated that arousal characterized as enjoyment and musical appreciation were unlikely the basis of beneficial outcomes whether it was a decrease in epileptiform activity in a comatose patient when Mozart's sonata was played or improved performance with rats navigating through a maze after repeated exposure to Mozart's sonata, these results cannot be attributed to emotional stimulation[6]. In an effort to understand higher brain function, Vernon Mountcastle proposed a neuronal paradigm of the cerebral cortex that is based upon what he recognized as the columnar organizational principle[7]. Each minicolumn has three firing states, which Shaw called a trion and held is the source of higher brain functioning. These spatial-temporal firing-patterns are triggered by volitional

and innate mechanisms which occur in families related by various symmetries and evolve in natural time sequences such as circadian rhythms.

The development of these inherent patterns into specific temporal sequences allows for the more complex spatial-temporal reasoning as they have the built-in ability to recognize, compare and find relationship among objects using symmetry operations to perform spatial recognition. Building on this paradigm, Leng and Shaw suggested that music acts as a catalyst stimulating these inherent firing patterns associated with memory[8]. Shaw conjectured that higher brain functioning evolves from both learned and innate capabilities that can be remarkably refined when exposed to complexly written music. Since neuronal development is significantly impressionable during early childhood, recent research concerning the Mozart Effect has targeted this stage of development.

Krumhansl and Jusczyk further supported the influence of the Mozart Effect in infants as they demonstrated that four-month-old infants have a remarkable preference for hearing Mozart sonatas as they were written as compared to ‘ unnatural’ versions[9]. Specifically, these infants listened significantly longer to the natural version of the Mozart minuets as compared to the unnatural versions. Shaw indicated that the infants’ predilection toward the unadulterated Mozart selection provided support for the claim that this music mimics an inherent neural language common throughout the mammalian cortex. If Shaw’s postulates hold true, then that active involvement with music at an early age fosters development of long-term

neural circuitry and, in-part improves other higher order neurological capabilities.

Therefore, the introduction of music at such a critical point in development may actually enhance the physiochemical through which leaning takes place and in essence increase one’s capacity to retain information. With this line of reasoning in mind, it would seem quite plausible to suggest that the Mozart Effect may indeed improve memory function, particularly in early childhood. Although the scientific evidence is clearly supportive, there has been considerable debate regarding the preeminent findings of Rauscher, Shaw and Ky that suggest a causal enhancement of reasoning by music. The widespread challenge of their conclusions prompted further investigation that not only focused on replicating the findings of their initial study, but broadening the scope of their claims as well. Subsequent investigations included further variation of subject age, length of exposure to this Mozart selection, and the level of involvement with music.

This re-parametrization allowed for an examination of the impact on younger participants as well as assessment of any relationship among exposure time, musical activity, and the resultant duration of the Mozart Effect. Rauscher designed a study that involved providing piano keyboard lessons to preschool children since the playing of this instrument relies heavily on spatial-temporal abilities (the group of skills theoretically enhanced by the Mozart’s music)[10]. These abilities would be assessed and compared to other conditions after a set period of time. Results from the preschool study demonstrated that children receiving six months of piano keyboard training

improved on spatial-temporal reasoning by 30% more than children in [other conditions. Recognizing the significance of these findings, it may be argued that the duration of the Mozart Effect is not exclusively short-term.

Furthermore, enhancements in cognitive abilities are not restricted to those who learn to play a musical instrument and additional evidence supports such a claim. That is, Rauscher, Robinson, and Jens demonstrated that long-term listening to the Mozart Sonata (K. 448) by rats led to improved learning performance in a spatial maze relative to the other listening conditions and that this enhancement was present after a four hour period had elapsed[11].

Results of this study were fourfold. First, it lent support that one does not need to be proactive (that is, learn to play a musical instrument) in order to benefit from the Mozart Sonata as there are benefits to be reaped by simply listening to this music. In addition, the other auditory conditions did not prove to be advantageous for the rats in those settings. Thus, it provided evidence that the beneficial residual effects are exclusive to the Mozart Sonata. Moreover, these significant effects were unlikely due to elevations in arousal since other similar stimuli were used.

That is, as stated earlier, it is unlikely that the augmented spatial-temporal skills seen with those rats in the Mozart condition were a result of a sense of pleasure and admiration for the selected musical piece. Finally, the influence of listening to this music continued beyond what is deemed as short-term. Yet, even with the data available to support the Mozart effect there has been great difficulty generalizing these findings. In their effort to replicate the Rauscher et al. 1993 study, Kenealy and Monsef found no

significant difference in spatial task performance for those participants who listened to the identical Mozart musical selection using the same dependent measure (Stanford Binet's Paper Folding and Cutting exercise)[12]. In addition, Cartens, Huskins, and Hounshell work through the use of a different dependent variable (the Revised Minnesota Paper Form Board Test). Cartens et al. randomly assigned subjects to two conditions, listening to Mozart's K.

448 sonata and a silent condition[13]. However, they found no statistically significant difference in the performance between the two conditions. The lack of consistency in replicating the Mozart effect by other scientists has limited the external validity of Rauscher et al.'s widely published study in 1993 and consequently resulted in some doubts.

The clear lack of ubiquitous empirical support has caused some to view their findings as highly questionable. Despite these inconsistent findings, further investigation of this relationship is warranted because of the potential practical and clinical applications of the utilization of music as a therapeutic intervention in a diversity of settings[14]. Based on empirical data prior to Rauscher et al.

, Wolfe and Horn commented that the adjustment for children entering an academic environment might be difficult due to their lack of exposure to the structure activities needed for apprehending new skills[15]. For this reason, the accompaniment of music during a school activity may assist children in focusing on scholastic tasks. These findings suggest that children with short-term memory difficulties, whether due to hypoarousal, anxiety or personality

may benefit from exposure to music prior to certain tasks that require memory.

In addition to the educational arena, on-going research is examining the impact of the Mozart Effect as a medicinal intervention. One such area that has been investigated is its application with persons who have epilepsy[16]. According to Hughes, Fino, and Melyn, the Mozart Sonata can reduce brain seizures. The Mozart effect may also have some efficacy in treating people who have Alzheimer's disease.

According to Johnson, Cotman, Tasaki, and Shaw given that Alzheimer's disease is recognized as a neurodegenerative disorder that impairs memory, spatial orientation, and language, the aforementioned study provides empirical data indicating that listening to the identified Mozart selection may have a positive residual effect on higher-order brain processes[17]. Yet, it is important to note that Johnson's study provides limited external validity since its sample size was so small (one individual). All things considered, if information processing may be enhanced by complexly composed music, then there is clearly a potential strategic role for music in educational and therapeutic settings. The value of a music-enhanced memory capacity is obvious and it is natural to remain hopeful.

The prevailing literature has demonstrated that learning is a joint relationship between biochemical reactions and one's environment. It is postulated within the scientific community that when our brain is challenged we learn more and such claims find support from many studies as shown here. Accordingly, listening to complexly written music may enrich our

immediate environment and serve as a catalyst in fostering development of our neural circuitry. The Mozart Sonata has been shown to prime cortical regions of the brain and has been implicated in activating specific structures with memory. Based upon theoretical paradigms along with empirical data, researchers purport that the benefits of the Mozart effect art an increase in the ability to concentrate and focus one's attention, improvement in the ability to follow directions and increase in the ability to listen attentively. If you give your children the gift of music, you are giving them an activity, hobby, avocation, or vocation that involves the greatest accomplishments of mankind. The works of beauty created by composers throughout the centuries elevate a person's spirits to a plane similar to deep meditation or prayer. Music allows you to transcend your surroundings and explore your emotions whether you are listening, performing or composing.

Scientists will debate the existence of the Mozart Effect without resolution, but that seems entirely appropriate given the many other mysteries that surround the life of Wolfgang Amadeus Mozart. BIBLIOGRAPHYAzar, B. " Music Is Instrument for Research on Cognition." APA Monitor 23 (1996). Campbell, D. The Mozart Effect. Toronto: Avon Publishing, 1997. Cartens, C.

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