The Magical Power of Music

Enrico de Divitiis

Music and rhythm find their way into secret places of the soul

—Plato

Music, the “art of combining tones in a manner to please the ear,” is a fundamental and characteristic human activity, and can be considered as a universal language variously perceived by all of people. In this special and very interesting article, the author provides an overview of the cognitive neuroscience literature concerning auditory, somatic, and sensory domains, and the interactions between these systems in a musical context. Thus, the neural mechanism that may mediate their interaction is highlighted, and recent interest in understanding plastic cerebral alterations in response to musical practice is focused.

Musicians, because of their traditional and rich associations between auditory, somatic, and sensorial systems, are an excellent model to investigate this question. Indeed, they have been shown to have specific anatomic adaptations that correlate with their long years of practice and training. Quick advancement of various measurement tools, among them the modern technique of imaging, allowed for discussing music in the context of representative brain cortex of music production and perception. Research has shown that musical training is associated with functional modifications in both auditory and motor areas in professional musicians. In the auditory domain, it has shown a greater volume of auditory cortex, as well as a greater gray matter concentration in motor cortex, compared with non-musicians. The resemblance between music and the brain is striking; their interaction comes into play when a musical pathway transmutes thought to action, gesture, language. In this regard, Montinaro smartly gives us suggestive images of the athlete’s body during a high jump, the pianist’s fingers inflaming the keyboard, the organist’s feet and hands acting in harmony on the keyboard and pedals, and finally the neurosurgeon’s hands dissecting the neck of an aneurysm to insert the clip. Cerebral areas when activated in response to musical stimulus have revealed the way the different cerebral regions allow the perception of music and evoke emotions.

To speak the language of the emotions is one of the most remarkable aspects of music. Strong feelings can involve both the performer while playing, and the audience while listening. The latter will also experience different types of emotions depending on the music itself, and/or the artist’s performance. Quoted by Beethoven as a “mediator between the spiritual and the sensual life,” music can elicit not only emotional responses, but also physiological responses. Listening to music, particularly Brahms’ Concerto for violin & cello in re major, 2. Andante, Mozart’s piano concerto K467 in C major, 2. Andante, or Beethoven’s Symphony no 9 in re minor, 3. Adagio molto e Cantabile, this reviewer often experiences, shivers, a lump in his throat, and watery eyes. Thus, confirming that music clearly exercises a sort of unaware, fascinating power over all of us. Several authors took a look at how music interacts with the brain during performance and/or listening, ending with the emotional or physiologic aspects. The relation of musical sound and its influence on the people’s emotion is well known, yet mechanisms in which emotion is encoded and mediated by sound structures are still unknown. Current research has been devoted to identify a possible anatomic and physiologic substrate of so-called musical talent, its connection with hemispheric dominance, and how individual differences in “native ability” can be explained.

Progress has been made in the domain of interactions between genetic and environmental factors. For instance, is music a special culturally and partially dependent domain, reserved only

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So, the King asked G.F. Haendel to write "took an harp and played with his hand, so music healer?) that problems by using special music provided by David (the first (like himself) of loss memory and depression overcame his (WORLD NEUROSURGERY 73 [5]: 454-455, MAY 2010 www.WORLDNEUROSURGERY.org Book of Samuel reading the improve or maintain their health. King George I of England, people suffering both physical and emotional problems, and to because of its physical, emotional and social facets, to help another important issue raised by the article is the therapeutic use of music. Music is not only for entertainment and pleasure, but has been used for a wide range of purposes due to its social, emotional, and physiologic effects. Despite the fact that even now we lack a scientific description of the mechanisms underlying the effects that music has, the therapeutic use of music can be seen to date back to ancient times: "music tunes that strange harp that is the human body and restoring its harmony" (Francis Bacon). The idea that music has a healing influence was already recognized that King Saul suffering (like himself) of loss memory and depression overcame his problems by using special music provided by David (the first music healer?) that "took an harp and played with his hand, so Saul was refreshed." So, the King asked G.F. Haendel to write music for him. The great baroque composer wrote "Water Music in Three Suites" for this purpose, but the result is not known. The influence of music on modern history is even reported. When Thomas Jefferson could not figure out the right wording for a certain part of the "Declaration of Independence," playing the violin helped him get the right words. Music was the key that helped Albert Einstein become one of the smartest men who has ever lived. Einstein did extremely poorly in school. His teachers told his parents to take him out of school because he was "too stupid to learn," and suggested to them instead learning an easy, manual labor job. Einstein’s parents bought him a violin and he soon became good at playing it. Einstein himself said that he figured out his problems and equations by improvising on the violin. More recently, music has been used as a means to improve lower secondary school pupils’ reading abilities. Used as a complement of other pedagogic treatment systems, it has been demonstrated that there is an increase of 9 points on an intelligence quotient test when listening to Mozart’s Sonata for Two Pianos in D Major, K. 448. This surprising result, well-known as the "Mozart effect," on one hand has renewed interest in classical music education, but on the other has produced a sort of excessive and commercial speculations, associated with very deceptive slogans (e.g., "Mozart makes you smarter"). After reading this article nothing will feel better than sitting down, comfortably to quietly listen to classical, minimalist, or relaxation music, or whatever we prefer, as long as it is great music. I believe that articles such as this will encourage a more widespread adoption of educative measures to stimulate interest on this fascinating subject that is music and its intriguing relations to brain activity. The author is clearly an enthusiast with considerable experience and musical culture; his sustained and focused efforts will certainly foster much more musicality of all of us, and stimulate many readers to further expand and enhance the reach of "great music" in a world overwhelmed by amazing diversity of styles and genres, afforded by the growing economic accessible use of synthesizers and computer music. I believe that this article is a very sound analysis of the interesting and magic world of music and the brain’s response to it, therefore I have been very happy to prepare a commentary on this article.

If music be the food of love, play on
—William Shakespeare

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