

The Study of Musical Instruments and The Development of Cognitive and Emotional Intelligence

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Abstract: In an era of automation and artificial intelligence that tends toward accelerated evolution, where the environment becomes more than necessary accessorized and equipped with various increasingly high-tech devices, human intelligence, whether cognitive or emotional, is faced with an enemy as it can only be fought through harmonious and sustainable development, and music, in particular by studying musical instruments, is as healthy as it is beneficial to development, emotional and cognitive of the preschool child, which can have a positive influence on the social life and personality development of the future adolescent and even the mature individual.

Keywords: Cognitive intelligence; emotional intelligence; brain hemispheres; neurons; nerve centers; language; creativity; coherent thinking; memory; discipline

Human being as a divine creation is a perfect masterpiece, the unique combination of the DNA and the physical-psychic configuration specific to each one of us make us unique in the entire universe. Of course, the raw material is the same, but the combination is miraculous from one individual to another. Each of us is born with a potential, a genetic dowry, a hidden treasure in our DNA waiting to be explored, as we reveal our being towards a harmonious development throughout our existence.

Human development is a complex process, a combination of simultaneous physical and mental development on various stages, a coherent dance that strives for perfection, which we call a miracle of nature. Biological development, through the morphological and biochemical changes produced in the body, only prepares the

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context and environment conducive to a psychic development with the help of the psychic functions exercised by the human brain.

The human brain has fascinated the whole science, and the current context of the high-tech era is in fact favorable to microscopic research, which tries to penetrate, timidly what is right, as deep as in the mysterious universe of the human brain.

What is music? Where does it come from and how is it that certain sequences of sounds overwhelm us emotionally and others remain indifferent, all these are questions that have laid the basis of many scientific researches in the field of neuroscience. From a neuropsychological perspective, music has a spectacular influence on brain development, both morphologically and functionally, by configuring the mind, the way of thinking and not only.

The fundamental elements of music, namely the intensity of the sound, the height, the contour, the duration, the tempo, the timbre, the reverberation, etc. all these characteristics are organized and analyzed by our brain to give meaning and to perceive the acoustic dimension.

Music is not just a random sequence of sounds, but rather a very coherent, even complex one, which makes all these attributes, such as timbre, sound intensity ... etc. to combine and realize certain causal and semantic relations between them, subsequently generating higher concepts such as measure, harmony, melody.

In all this game the brain plays an important role, it is the one who by measure extracts information about the rhythm and intensity of the sound, thus generating various coherent groups of tones.

Most children, from the age of five, assimilate and integrate the rules of the musical arrangements from different songs specific to the cultural context, and can detect certain errors or deviations from the standard sequences. In this sense, neural networks automatically form certain abstract representations of the musical piece as well as the musical rules. It is remarkable here, the receptivity of the brain that reaches maximum levels at the age of youth, a consistent absorption of sounds that are incorporated into the structure of the neural network. This quality, or brain function, loses its effectiveness with aging, as the neural circuits become less flexible, which causes difficulty in integrating musical sounds at the deep neuronal level.

Scientific research has shown that the brain reacts to harmonic sounds by synchronously triggering neuronal impulses, namely neurons in the auditory cortex that react to each of the components of the sound, synchronizing between them the rate of impulse triggering, which determines the configuration of a neural basis that reflects coherence of the respective sounds.

Musical instruments such as a flute, a violin, a trumpet can play the same tone, which means that when we have a note on the handset each instrument will sing a tone with an identical fundamental frequency, and we usually hear the same pitch height. The reality is that these instruments have very different sounds, a difference that is given by the timbre, and the ability to distinguish the timbre is so fine in people, a fantastic feature if we think that most of us can recognize hundreds of voices.

Musical activity involves almost all brain regions and almost all neural subsystems. Listening to music begins with the subcortical structures - the cochlear nuclei, the brainstem and the cerebellum, then ascending to the auditory cortices on both sides of the brain.

On a deep level, the emotions we feel as a reaction to music involve deep structures from the primitive regions, from the level of the reptilian brain, from the cerebellar vermis and even from the amygdala - which is the center of the emotional processing in the cortex. The human brain is a machine that works on parallel systems, in which operations are distributed everywhere.

We cannot say that there is only one computing center, another one of speech and so on, it is a complex system, whose computing power comes from the interconnection capacity.

Neuroscience is the one that supports the arguments discovered by specialists through practice: beyond the artistic and cultural initiation, music brings certain benefits in the development of the brain. Speech, language, motor skills, concentration cognitive benefits are multiple and lasting. Music is the creator of important social and emotional connections: in the family environment, between mother and child, in a class or in a group of children.

Musical awareness can start at any age. Some experts believe that it is better sooner than later, as is the case of musicologist and teacher Paulo Lameiro, which encourages early musical initiation to take advantage of babies' hypersensitivity to

the sound universe. However, the age of 5 is the key age at which most conservatories offer music initiation courses. In general, the first year of study is dedicated to singing, dancing, bodily expression and discovering the first musical notions.

Music helps children better understand basic school subjects and its effects can be observed in other aspects of their development. The positive impact it has on self-esteem and the level of social interaction is crucial. When students are involved in music programs, a bond is formed based on a common interest. This connection helps them to form their character.

A lot of studies have shown that students involved in music, art have better grades at school than those who do not get involved. At the developmental level, music enhances intellectual growth through a wide range of psychomotor channels. Studying an instrument and practicing it implies the existence of a cycle. As this cycle repeats, different parts of the brain are required. The child suddenly begins to hear what is on the page.

What attracts us to music is the emotional experience, by capturing sensations and feelings, which determines an interplay between the cognitive and emotional systems at the brain level.

The development of memory is another benefit of music, and the technique used is that of grouping. It is a way of organizing information, which is the process of linking the units of information into groups and memorizing the group as a whole, not the individual parts.

Information gathering is important because our brain has a limited capacity in terms of the amount of information it can actively track. Through music we use the method of grouping the information, respectively by coding in memory an entire agreement and not the individual notes of the respective agreement, that is, the musician memorizes “do major 7”, not the individual do-mi-sol-si “tunes, remembering the rule of chords building, which helps him to build on the spot the 4 tones of a single information entered in the memory. This process develops not only memory but also creativity.

According to psychologists, musical intelligence is just as important in life as mathematics or interpersonal intelligence. It is shown that music has a positive influence on children's cognitive development. Music lessons or studying an

instrument stimulate attention and memory first and foremost, making a significant contribution to intelligence development. Experts say that music lessons can determine brain sensitivity and help improve communication. The study of an instrument involves effort, patience and perseverance, thus developing the spirit of competition.

Another advantage for the development of the child is the level of motor skills: for example, piano study helps children to develop their coordination and dexterity, requesting different actions simultaneously. Children who learn to play the piano are **more creative**, more coherent in thinking and can concentrate more easily, become **more disciplined and responsible**. It has been shown that studying a musical instrument stimulates the intelligence and helps to **better understand and interpret one's emotions** as well as those of others.

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