

## Modern Music Therapy – Between Art and Science

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**Abstract:** *During time, music found its way not only as art, but as science as well. From the great composers to modern electronic music, the science behind it affects us neurological. Therefore, music becomes involved in therapy successfully. As music therapy it was continuously diversifying its techniques and methods of application it became itself seen both as an art and as a science. But although practicing music therapy showed effects, these were hard to be quantified through quantitative methods. The new research directions in the field of music therapy brought up apart from the medical instruments nuclear technology for diagnosis, and recording and measuring equipment of the body's reactions to music. It was found out in which way music affects different areas of the brain, what happens in the body during an audition or a playing session, what reactions we have to a certain type of music and to a musician, and the importance of analyzing the vibrational frequencies of sounds.*

Keywords: *art, music therapy, science, technology*

### 1. Introduction

Undoubtedly, music therapy has gained recognition and global development. Results obtained from various scientific research both quantitative and qualitative have demonstrated its usefulness in medicine, psychology or education. This paper, far from being complete and pretentious is an overview of the elements that place music therapy between science and art. Starting with the definition and usefulness of music therapy, continuing with the research and application worldwide, music therapy is proved to be part of science, the artistic part is just bringing up the emotion. Music therapy uses various methods to investigate the brain activity, the reaction of a person's body while listening to music, thus to measure the effects of music.

### 2. Is music therapy art or science?

Music, and then its use for therapeutic purposes, has grown important in time. From the nineteenth century religious groups and musicians playing music in the hospitals after the World War II we have at present the profession of music therapist – a music therapist educated, fully accepted and licensed. Music therapy involves

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music, involves psychology and, also, involves medicine and a scientific knowledge about physical laws of sounds and their effects on living organisms. For example, the Romanian scientist George Constantinescu foresaw the therapeutic properties of sounds on the structure of the human body demonstrating that sounds first act on mind and then they have a relaxing and stimulating effect on the whole body.

Other studies prove the influence of music's elements: rhythm, harmony and sound characteristics: height, duration, timbre at the intellectual, affective and instinctual levels (Iamandescu, 2004). It has been shown that at cognitive level, classical music, chamber and opera music affects people with high intelligence levels that have developed logical-mathematical thinking and spatial views, and not necessarily of a strong musical culture, since intellect is influenced by harmony and orchestration. At emotional and instinctual levels we are more influenced by melody and driven by rhythm.

Music not only positively influence the mental status of patients by reducing stress, but also help curing diseases by treating physical pain. Dr. Daniel Levitin has studied the bond between music and neuroscience and discovered that music improves the immune system functions and often has a stronger effect than the prescribed medication in reducing anxiety before an operation. He showed that listening or playing an instrument increases the body's production of immunoglobulin and antibody cells and enhances the effectiveness of the immune system. Music also reduce the level of the stress hormone cortisol, which makes it associated with relaxation, helps coordinate movements, stimulate memory, regaining self-confidence and social adaptability. "Music influences the brain, mind, thoughts and spirit," he says (Levitin 2006, 19).

Music can be seen as a bridge between science (mechanical sound waves), medicine (medication) and art (creation). Therefore, research studies are made in psychiatry and neurology, in psychology and music. The results converge to recognize the influence of music. Each brain hemisphere is responsible for an action, if the left side is responsible for the orientation in space, coordination and it takes "musical sense," the right side of the brain is related to emotion, musical expression, tone, improvisation and creation (Atanasiu, 2003).

So, what is more important in music therapy the scientific part or the art one? My honest answer is both. If the science of music include techniques of "writing" music, techniques of performing music (e.g. Schenkerian analysis), musical acoustics, physics of sound, the "math" of music, the artistic part involves the individual contribution in performing, the form of self-expression, creativity, feeling, vision, and expressivity. The therapeutic effect of music comes from all characteristics. For example, minor-major alternation directly builds tension and relaxation, although major tone is bright, vibrant, energetic, optimistic and minor tonality is sad and depressed, but the interpretation arouses more or less strong feelings. (idem) Music therapy is definitely a creative, expressive therapy using music and all of its facets - physical, emotional, mental, social, aesthetic, and spiritual.

Researchers from the University of Kansas were developing a system to measuring values of emotions produced as a result of listening to music. It was called GEMS (Geneva Emotional Music Scale) which includes 36 characterization

in terms of emotions. The final result of research concluded that, in general, people enjoy melodious music, pleasant and less noisy. (Anderson et al., 2011) It was nothing said about the quality of interpretation, but I can really find it important. No doubt, two works can sound totally different, they have a different sound timbre due to interpretation. In other words, a musical work is identical to another if the two works are in essence, in terms of “sound”, indistinguishable. There are several versions of the “work,” either instrumental music or a song, and we do not mean variations in composition, but of interpretation. All interpretation could be correct, though some of them are more expressive than others and touch the listener creating more emotion (Stock, 2010). Thus, music has an effect not only in changing the mood or in bringing up emotions, but in healing as well. In case of serious illnesses, such as cancer, music therapy have become a tool that induce a state of peace and inner calm. I only mention here the therapy called “magic” practiced with a good sounded guitar. Is a method that really works and the explanation lies in the way the sounds are perceived. To each chakra corresponds a certain sound/ frequency. In a hold position, comfortably lying down, place the guitar on the affected area and pinch the rope playing the note connected with the disease for 15 minutes - for the abdomen area it should be pinched E, for vitality C, for sexual energy D, for the heart F, for dynamics G, for a strong mental A, and for spirituality B. No matter how simple it may seem this music therapy that could be applied to one self, it was shown to be effective (Achim, 2001).

### 3. New directions of research

The new research directions in the field of music therapy include new diagnostic technologies at the neuronal level and I refer to nuclear technology for diagnosis and to recording and measuring equipment. It is one more proof of the scientific part of music therapy. First category includes:

- *Computed tomography* (CT) equipment that uses X-rays to create detailed pictures of structures inside the body. During the test the patient is lying on a flat surface attached to a scanner that sends pulses of X-rays to the part of the body that wants to be investigated.
- *Functional magnetic resonance imaging* (fMRI) to study the brain. With the help of fMRI equipment it is showed the effect of music on different interneuronal connections.
- *PET scan* (positron emission tomography) is used for diagnosis, early location, staging and evaluating the effectiveness of the therapeutic management of neurological disorders such as Alzheimer's disease, Parkinson's disease and epilepsy.
- *A single proton emission computed tomography* (SPECT) brain scanning is an imaging test similar to an X-ray showing a three-dimensional image. By injecting a substance called radiopharmaceutical (or a radioactive tracer) are emphasized certain brain areas whose images will be taken. These images show blood fluency in parts of the brain and the areas that are more or less active.

As recording and measuring equipment used in music therapy there are:

- *BioRadio* - a wearable medical device (low weight and cordless) with programmable recording and transmission of different combinations of signals.
- *EEG Crystal* and *Crystal-Sleep* are medical devices still in testing and accreditation that record the heart rate during sleep. Human physiological configured data can be transmitted to a computer via Bluetooth or stored in memory. It is used in music therapy where the changes recorded after a music therapy sessions active or receptive.
- *MindWave* offered by NeuroSky. It's a professional set with an EEG headset that can be used at home and includes the "neuro-feedback" software which allows the measurement of concentration and relaxation. Quality and reliable sensor (chipset TGAM) of helmet measures the electrical activity of the brain by receiving read brainwaves and transfers the data via Bluetooth to a computer, smartphone, tablet or laptop. After hearing a fragment / piece of music recorded average value of frequency is being made a qualitative estimation of the test. (Low frequency - relaxation, high-frequency - concentration, attention). All these values can be refined in LabVIEW to get an accurate result.

#### 4. Conclusion

In conclusion, music therapy is certainly a subject of research in medicine, in psychology or music and new discoveries will follow. One thing is certain: music act on us through its art. It is proven in a scientific way. We just have to be perceptive, to be opened to the sounds of music;s vibrational frequencies. And even the given fact is that music therapy is a subject of scientific research, in the middle we have the *man* - creative and bright, the *creator* and the *performer*, the *scientist* and the *artist* – *heart, brain* and *soul* all together.

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