

Biomusical Engineering and Music

Alexander J. Graur*

University of Torino, Italy

*Corresponding author: Alexander J. Graur, University of Torino, Italy, Tel: +39 011 670 6111; E-mail: granimus@yahoo.com

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Opinion

In further presenting the mission of our journal to the colleagues interested to collaborate I think it is useful to stress the principle and the importance of teaming, when it comes to biomusical engineering.

An encyclopedically knowledge like that of Pico della Mirandola was possible only in Renaissance times. In today's world the knowledge implies far much more notions and methods regarding every aspect of our life; one cannot be a professional figure in more than one specialty. Hence the need to collaborate with other professionals specializing in different sectors of science. A common basic knowledge of all the disciplines implied is logical; but each team member should bring the personal contribution mostly in her/his own main field of research. We need scientists and technicians specializing in biology, neuroscience, medicine, psychiatry, physics, along with sound engineers, audio lab technicians, psychoacoustic specialists and many more alike.

The common field for all it is always the Music, obviously at different levels of knowledge of it. Playing an instrument (whatever instrument) or possessing a huge collection of musical recordings it is a very good starting point; but it is anyway just this: a starting point. The knowledge of the Science of Music starts with this, but it is by far much more complex and implies a deep theoretical specialization, practice and experience. The problem is that Music it is not anymore considered a science as it really is. This is the reason why the real contribution Music can bring to the research and applications it is still almost unknown by the scientists. The most common definition of Music disseminated in today's world- and the most approximate and misleading, is illustrated by the sentence; "Music is an Art", period. It appeared toward the end of the eighteenth century and the beginning of the nineteenth with the philosophic and cultural stream called The Romanticism.

Romanticism intended the term "Art" as the result of a not-so-well defined concept called "inspiration" in composing the music; what we could call today the unconscious of the composer. The romanticism considers the uniqueness of the composer's unconsciousness as the sole creative force in the art. It is not totally wrong; it is just largely incomplete and deceptive. Reality is, since the dawn of human civilization until the beginning of the nineteenth century the music was considered, taught and used as a science. It was part of what the Ancient Romans called "quadrivium", the curriculum of studies which included, in order: Arithmetic; Geometry; Music and Astronomy. A logical order, one cannot understand and apply Geometry without knowing the Arithmetic, and so on. This logical curriculum of studies is common to all the cultures, Western or Eastern, because formed the students' minds to the logical thinking and its applications in the real world.

Music is an interdisciplinary science. It is governed by laws belonging to various disciplines as: physics, mathematics, physiology; to the specific laws of the phenomenon called Music and, above all, to

the laws of what we call Logic, any type of logic. The musical composition, as the creation of music is called, follows both the rules of the general musical architectures and those rules specific to various cultures and musical systems. The same laws applied in Western and Eastern, Northern or Southern cultures of the world, in exactly the same way the laws of physics or mathematics are universal. That is because these laws are created by, and deducted from, the reality itself; they are not invented ad hoc. The human beings have the same peculiarities all over the world; the human organism and its physiology are the same for all. The musical creation is a product of the human intelligence; in the same way the affirmation that one quantity plus one equal quantity gives two equal quantities, in equal conditions.

One plus one equals two even in the Universe, at least from the current point of view of the average human Logic. The Music is working with this type of laws. That's why concepts such as "inspiration", "special talent" and alike are responsible of the final work in a very restricted sense. In order to be able to express his/her ideas in the musical language the composer must patronize the specific music compositional techniques. These techniques are based on the laws of the interdisciplinary Science of Music.

Here a comparison table regarding the basic curriculum of studies in Music and Mathematics (Table 1):

Table:

Study of Music	Study of Math
1.Theory	Arithmetic
2.Harmony	Geometry (plane/solid/trigonometry)
3.Counterpoint	Algebra
4.Instrumentation and Voice Types	Calculus
5.Orchestration/choral arrangements	Analysis I and II
6.Analysis I and II	Logic
7.Composition	Probability
8.Ethnomusicology	Topology
9.Paleography	Math History (evolution of the concepts)
10.Musicology	
11.Practical skills (instrument/voice/conducting)	
12. Music History (evolution of the concepts and styles)	

Table 1: Study of Music and Math

As you can see in this example the Counterpoint stays to Music as the Algebra stays to Mathematics: it is the third elementary discipline, the link between the concrete and abstract thinking. The most evident difference consists in this: in the day by day life all of us are using a half a dozen math operations. The fourth basic (addition/subtraction/multiply/divide); the rules of three simples to calculate the percentage of tax on a product; and (the most fortunate ones) the composed interest on a fix deposit (so we know if in a Friday night we can feast or hang ourselves, according to the stock market results). But in Music... well, a person with only some elementary notions thinks that he/she knows all about music. This is obviously far by being the truth. Unfortunately this is also the majority of people; and some persons from this majority is talking seriously about Music and (medicine, neuroscience, brain, mind; you name it they're talking about. This lack of real professionalism it is very dangerous for the final results of the research.

With the wide spread of the computer assisted musical composition the situation becomes even more complex; with the right software whosoever could put together some music, without knowing why and what for; like children playing with Lego pieces. More often than not rediscovering the marvelous properties of the warm water, as saying goes. A professional composer knows how to write the Music in order to address determined targets, not only psychological but also

physiological targets. For biomusical engineering an ideal team should be composed of scientists AND professional musicians, each of them responsible for his/her part of the common project. Only in this way the research could be a real scientific one and produce valid results and applications. Let's hope for the better, and for the COLLABORATION between professionals, more and more tied in a real research team.

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