

Rhythm and its implications in science and arts

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Abstract: *The notion of rhythm is a concept and also a complex phenomenon that over time, from antiquity to the present, has preoccupied many experts in diverse areas as art, aesthetics, philosophy, literature, science and even economy.*

The various definitions of rhythm assign its multiple meanings that reflect, beyond general explanations of the phenomenon, thinkers concerns and more importantly, its affiliation as principle or determining element in a certain domain such as artistic, technical or medical. In general, the rhythm is defined as the phenomenon of time succession of identifiable events.

The aim of this paper is to compare the image of this process in various fields of activity to outline, by similarities or differences, a picture of the phenomenon interdisciplinary collecting for this purpose some characteristic features from different branches of science or art.

Keywords: *rhythm, movement, music, poetry, arts.*

Introduction

The etymology of the word rhythm comes from the ancient Greek (where *reo* means to flow, to go). It is thus presumed the idea of movement, as well time succession of some phenomena or events. In ancient Greece, Heraclitus (576-480 BCE) believes that the rhythm is motion. *Everything is motion*, he said *motion in space or change in time*¹ and in Plato's Laws (665 A) we find that *the order of motion is called rhythm*.² To consider motion as rhythm, it must have an organized form that is to be made by certain laws and not by chance.

Rhythm in sciences

The ideas that come from the exact sciences such as mathematics, physics or astronomy highlights rhythm as an integrated element mechanical motion. It is seen as a *gradual progress of an action faster or slower development of an activity conditional upon the certain factors*. This involves the idea of periodicity or cyclicity and exists in almost any natural phenomenon such as the movements of the stars, the seasons, day and night. Based on such models, technical mechanisms are they are tributary to the periodic motions from the pendulum clock or metronome beat to the organization of public transport or daily rhythm of a society in general.

In general, the movement is understood as the ability of an object to emerge from the state of immobility by changing place or position in time.

Depending on certain factors, the motion is divided into several types such as: *simple harmonic motion* (pendulum), *periodic motion*, *linear motion*, *reciprocal motion*, *circular motion*, *oscillation*, etc.

A special form of motion is Brownian motion, which is a spontaneous movement, chaotic and completely dependent on the ambient temperature, of particles or molecules suspended in a fluid or gas. Robert Brown observed the phenomenon of when he tried to

¹ Victor Giuleanu, *Tratat de teoria muzicii*, Editura muzicala Grafoart, Bucuresti, 2013, p. 555

² Victor Giuleanu, p. 556

study pollen particles in a microscopic field (1827). At absolute zero (0 Kelvin), thermal values determined by movement cease.

Medicine

Cardiac rhythm or pulse indicates the number of heart beats per minute of a person. This is different for each individual and depends on age, body size, physical condition or medication. The emotions also have an impact on heart rate, pulse rate being increased when the person is subjected to stress factors. For adults, resting heart rate is between 60-100 beats per minute, but children generally have a higher cardiac rhythm. In medical terms *arrhythmia* it is defined as a series of irregular heart rate, registering values higher or lower than the national average.

Other areas

In areas such as philosophy and psychology, the ideas of rhythm assign a character of periodicity. It conferring organic unity the component parts of a work and because of this is considered as the basic layer of an artwork. The philosopher Jean Jacques Rousseau (1772-1778) known for its concerns didactics on music and didactics describes the rhythm as the difference the motion difference resulting from *speed, from the length or shortness of time...*³

In rhetoric, rhythm and tempo of speech are often the defining elements for the art of communication. Demosthenes, Plato, Aristotle believed that the rhythm of speech accompanied by an appropriate intonation can affect the text message. The tempo or rhythmic frequencies of specific speech elements of language are different from one language to another. For example, Italian and French language has an accelerated fluency to German or Russian.

From the physiological perspective rhythm can be defined as a motion periodicity, a process, an activity thus being a regulator factor of the most economical energy consumption possessing all activities of the human body⁴.

It is considering various actions, such as raising and lowering, tension and relaxation, insertion and extraction. Moreover, walking, talking, even yawning correspond to the individual's own rhythm⁵, and every human being has a rhythm of its own, a personal rhythmic profile that can be developed individually.⁶

Rhythm in arts

Regarding the arts, the periodic organization of elements that occur in a certain period of time, often seen as the rhythm, must determine the effects on superior coordinates and produce: affective states, to impress and to enthuse the human being.⁷

In poetry rhythm is organized as a symmetrical and regular succession of accented and unaccented syllables of a verse. Their alternation may establish a specific rhythmic pattern. The rhythmic structure of a verse is given by the metric. The rhythmic structure in ancient prosody, indicate several types of rhythm grouped according to the number of syllables and accents.

³ V. Giuleanu, p. 557

⁴ In V. Giuleanu, p. 558

⁵ Boris Luban-Plozza, Ioan Bradu Iamandescu, *Dimensiunile psihologice ale muzicii – Introducere în muzicoterapie*, Editura Romcartexim, București, 1997, p. 34

⁶ Boris Luban-Plozza, Ioan Bradu Iamandescu, p. 32

⁷ V. Giuleanu, p. 562

Syllables	Pattern	Name	Syllables	Pattern	Name
Bisyllabic	/ -	<i>Troheu</i>	Four syllables	/ - - /	<i>Horiamb</i>
	- /	<i>Iamb</i>		- / / -	<i>Antispast</i>
	/ /	<i>Spondeu</i>		/ / - -	<i>Ionic major</i>
	- -	<i>Pir</i>		- - / /	<i>Ionic minor</i>
Trisyllabic	/ - -	<i>Dactil</i>		- / / /	<i>Epitrit 1</i>
	- - /	<i>Anapest</i>		/ - / /	<i>Epitrit 2</i>
	- / -	<i>Amfibrah</i>		/ / - /	<i>Epitrit 3</i>
	- - -	<i>Tribrah</i>		/ / / -	<i>Epitrit 4</i>
	/ / /	<i>Molos</i>		/ - - -	<i>Peon 1</i>
	- / /	<i>Bah</i>		- / - -	<i>Peon 2</i>
	/ - /	<i>Eretic (Cret)</i>		- - / -	<i>Peon 3</i>
	/ / -	<i>Antibah</i>		- - - /	<i>Peon 4</i>
		Five syllables	/ - - / -	<i>Adonic</i>	

Rhythm in music

Musical rhythm is the result of two physical properties of sound. Directly, it is determined by the duration of sound and indirectly by intensity, which organize through accents the successions of durations. Rhythmic accents (of duration or division) are the ones that hold the key to individualization of rhythmic structures thus identifying several categories grouped according to the number of items in bisyllabic, trisyllabic, or according to their type in binary, ternary or mixed.

From musical perspective, Aristide Quintilian (sec. I - II) defines the rhythm starting from ancient Greek considerations as consisting of beats arranged in a certain order to form an organized evolution of phenomena and processes in time. Hugo Riemann (1849 - 1919), important German musicologist, treated rhythm as a combination of three distinct elements: *proper rhythm, meter and tempo*. Vincent d'Indy (1851-1931) suggests another interesting definition of the rhythm being considered the *order and proportion in space and time*.⁸ Friedrich Schelling (1775-1854) assign more valences to the musical rhythm and believes that *everything can be called truly beautiful in music or dance, is primarily due to rhythm and that it is "music in music"*.⁹ Jean Jacques Rousseau goes further integrating metric succession periodicity in defining musical rhythm considering that the rhythm associated of sound values is called today as musical measure¹⁰. Thus appears a new approach that metric the developments are seen as a defining element of rhythm. Rhythmic events are organized in his point of view, based on constant pulses that regulate the evolution of discourse elements.

In our country, Victor Giuleanu (1914 - 2007) one of the most respected theoreticians in the musical field, starting from the definition of rhythm in arts, he believes that musical rhythm is: *the evolution in time and organized succession on higher plane - creative, aesthetic, emotional – of sounds* in the musical artwork.¹¹

Musical pedagogy is considering the links that exist between musicality and sense of rhythm. In this area, Emile Jaques-Dalcroze did pioneering work, creating a rhythmic gymnastics which aims to make his students to live intensely the music, giving them the opportunity to improvise.¹²

⁸ V. Giuleanu p. 559

⁹ V. Giuleanu p. 557

¹⁰ V. Giuleanu p. 560

¹¹ V. Giuleanu p. 566

¹² Boris Luban-Plozza, Ioan Bradu Iamandescu, p. 33

Rhythm in dance

Music and sports are not the only experiences that our body takes the opportunity to live some specific sensations. In dance, for example, there are certain rhythmic and harmonious movements that give us the sensation of floating or flying.¹³ The area most interested in this aspect is gymnastics whose objectives are clearly expressed through a series of exercises that aim to educate the corporal esthetics, rhythm and musicality. It is considered the widespread use of musical accompaniment for developing a sense of rhythm and expressiveness of motion.¹⁴

A special discipline of gymnastics especially interested in this aspect is *Rhythmic Gymnastics* - a sport branch exclusively feminine. This became Olympic discipline in 1984, includes individual and team exercises with portable apparatus (ribbon, ball, rope) performed with musical accompaniment. In gymnastics, rhythm is *the alternation of parts or phrases of motion* and tempo indicates *the number or quantity of movements performed per time unit*.¹⁵

Music appears as support for various forms of dance, cooperating in the formation of rhythmic skills of those who have accessed this art. It is a always present element in the performance of rhythmic gymnastics exercises exploiting the relationship between music and body motions.

Rhythm and its psychosomatic implications

Psychologically is possible to establish a close relationship between the number of musical elements and rhythmic principles. The rhythm can serve in this way to make a very intense climate of tension.¹⁶

Professor Ioan Bradu Iamandescu made the first studies of music therapy in Romania in the Department of Medical and Psychosomatic Psychology at "Carol Davila" University and has worked with various prestigious institutions in the country and abroad. He believes that listening to music has generally only beneficial effects because music touches spheres of the unconscious inaccessible to normal education, but *the preference for quality music not only considers education, but also of intelligence*.¹⁷

Regarding the influence of music in general, some studies show that *rhythm awakens the instincts, melody – the emotion, and harmony - the intelligence*.¹⁸ It has also demonstrated that joyful music pieces with fast tempo have a mobilizing character and have a positive emotional impact due to their stimulant effect.

Among the psychosomatic implications of rhythm can be distinguished besides influences on the fetus and infant, or the joy of motion, even some evidence of increased psychomotor performance. Become justified the intentions to introduce rhythmic music in American industry to increase efficiency in the assembly spaces. In addition, the rhythm, either alone or supported by noise pushed to the extreme, it is able to provoke states close to drunkenness and collective ecstasy.¹⁹

Music with frequent changes of rhythm can cause frequent extrasystoles and acceleration of musical passages can lead to rhythm disturbances in the sense of a

¹³ Boris Luban-Plozza, Ioan Bradu Iamandescu, p. 33

¹⁴ Georgeta Niculescu, *Gimnastica de bază - Curs în tehnologie IFR*, Editura Fundației România de Măine, București, 2012, p. 24

¹⁵ Georgeta Niculescu, p. 33

¹⁶ Boris Luban-Plozza, Ioan Bradu Iamandescu, p. 32

¹⁷ Ioan Brad Iamandescu, interview la: <http://www.parohia-waldkraiburg.de/files/documente/muzica-prof-iamandescu.pdf>

¹⁸ Ioan Brad Iamandescu, interview

¹⁹ Boris Luban-Plozza, Ioan Bradu Iamandescu, p. 32

extrasystole ventricular or tachycardia.²⁰ Often variations in heart rate and respiratory rate were correlated with tempo music.

In some experiments, the researchers found that when hearing a relaxed musical piece with slow tempo the physiological parameters like blood pressure or heart rate and breathing may decrease. Slow music with a nostalgic or endearing character, may induce states of calm, relaxation and tranquility, building predominantly positive experiences by reducing the emotional impact and psychosomatic symptoms. Moments with dense musical events, with abrupt changes of intensity, rhythm and timbre may cause negative emotions and psychosomatic symptoms like: tension, sweating, headache, tingling sensations. On the other hand, symphonic music with harmonic character has favorable effects in subjects with depression or anxiety, changing mood and inducing a positive affective state.²¹

From the psychological point of view we can say that there is a match between the character or personality traits of people and the type of music they prefer to listen. Thus, people vigorous, full of vitality prefer music with a fast rhythm dynamic and mobilizing. People with a volcanic temperament love music with fast rhythm with ample harmonic structures, rich orchestration and frequent changes of intensity and timbre.

Conclusion

Rhythm is a part of the motion. It was the subject of several investigations in various fields of activity, from observation of natural phenomena, science or arts, medicine, philosophy or psychology.

The rhythm broadly defined as the *organization of specific elements of expression* is found mainly in the temporal arts like music, dance, and poetry. In poetry, it is found in alternating the accented syllables with the unaccented; in music appears in rhythmic formulas profile; and in dance is manifested by physical exercises or body gestures. In these arts which have a specific temporal character, the idea of a rhythm characterized by periodic events is replaced by the appearance of meter (in music and poetry). Here, the rhythm itself will actually be defined by sub divisional rhythmic formulas of constant pulse of meter. The rhythm can be seen in spatial arts such as painting, sculpture, architecture. Here the idea of rhythm is rather induced by some periodisation of the components of the artwork.

All these manifestations of rhythm in arts are echoed on the psyche that responds directly to the organization rhythmic influences. Several researches have revealed that music has a number of psychosomatic effects on the listeners. This was demonstrated by observing the changes in state of the subjects after listening to slow music or improving production results in the assembly spaces after subjects heard a rhythmic music.

Rhythm is an integral part of our lives, from the natural physiological, which is in the form of breathing or heartbeat to psychological factor influenced by listening to a certain type of music or performing rhythmic exercises or the look of a fine art object. The presence of rhythm defined as a motion it is undeniable in the real world and that ultimately means life.

References:

GIULEANU, Victor, *Tratat de teoria muzicii*, Editura muzicala Grafoart, Bucuresti, 2013.
IAMANDESCU, Ioan Brad, interview la: <http://www.parohia-waldkraiburg.de/files/documente/muzica-prof-iamandescu.pdf>

²⁰ Carmen Răpițeanu, *Impactul emoțional și psihosomatic al muzicii simfonice la pacienții hipertensivi în Practica Medicală – Vol. V, Nr. 2(18), An 2010 p.102 la http://pm.medica.ro/articles/2010.2/PM_Nr-2_2010_Art-6.pdf*

²¹ Carmen Răpițeanu, *Practica Medicală*, p.109

LUBAN-PLOZZA Boris, **Iamandescu** Ioan Bradu, *Dimensiunile psihologice ale muzicii – Introducere în muzicoterapie*, Editura Romcartexim, București, 1997.

NICULESCU Georgeta, *Gimnastica de bază - Curs în tehnologie IFR*, Editura Fundației România de Mâine, București, 2012.

RĂPIȚEANU, Carmen, *Impactul emoțional și psihosomatic al muzicii simfonice la pacienții hipertensivi* în *Practica Medicală – Vol. V, Nr. 2(18), An 2010 p.102* la http://pm.medica.ro/articles /2010.2/PM_Nr-2_2010_Art-6.pdf

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