



Cultural Values and Sport as Negentropy for Living Functional System

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- Honored Worker of science of Azerbaijan, 2007
- Academic title of Professor, 1990
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- Awards of Azerbaijan Republic - the Order of "Glory", 2001, the Order "For Service to the Motherland" of the 3rd degree, 2012, the Olympic Order of the National Olympic Committee, 2013
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- Lecturer of AzPI, 1966-1967
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- Academic Degree of Candidate of Technical Sciences, 1970
- Senior Lecturer of the Electrical Engineering Department of the Lipetsk branch of MISA, 1971-1973
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- Academic title of Associate Professor, 1974
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XXI century appeared to be very transient in information sense, and the man was influenced by many problems, which demand timely decision. Today a recurring problem grows day by day and the man is practically on edge due to surfeit of information problem.

Considering the fact that today duplication of quantity of information happens within one year (such duplication in 1950 took ten years), people have more and more problems with time, and, as a result, more stress situations.

Non-drug treatment of a man for stress situation is possible in two ways:

- Physical training and sports

- Cultural values (music, visual art, theater etc.)

And they relate to each other.

A famous German physiologist Selye said: 'Life is dead without stress'. Yes, the man needs negative emotions, it is necessary to master them and temper your excitatory system. But there should be a limit of stress. This must not lead to a disease.

Physical work, physical activity is the best way to distress. As I. Pavlov said, physical activity gives 'muscle happiness' to people.

Notions entropy and negentropy haven't been met in the theory of physical culture and sports earlier, but, taking into account non-reversible physical, chemical and neuro-bioelectrical processes in the human organism, we can apply those notions for appraisal and control of condition of human functional system.

Notion entropy (energie tropy), meaning conversion of energy, was introduced by Austrian scientist Ludwig Boltzmann in 1872 in the course of investigation of law of degradation of energy as

$$dS = \frac{dQ}{T}$$

Where dS is change of entropy;

dQ is change of heat in the system;

T is absolute temperature.

Further Boltzmann defined that entropy in non-reversible processes grew in course of time. As a result the system gets disordered. A system with maximum entropy is uncontrolled and close to destruction.

Claude Shannon in his investigations on transfer of information via communication channel 'America – Europe', which was influenced by electric interference, also turned to entropy as an indicator of order in communication line.

And in the middle of XX century, in 75 years, Claude Shannon, creator of information theory and famous American scientist, again turned to notion entropy, taking into account statistical and probable nature of information.

That is why in the theory of information, like in thermodynamics, from which Shannon borrowed term entropy, this notion is an indicator of rate of disorder and chaos also in information communication system, where a part of information gets lost. Therefore, the quantity of information corresponds with rate of order in the system.

The more ordered the system is, the more information you can get.

That is why, in order to regulate the system and decrease system entropy, it is necessary to feed the system with negative entropy.

In our case physical activities, i.e. physical culture and sports are negative entropy. They can improve our functional system.

Unsuspecting of it, Claude Shannon in XX century armed science with a universal measure, suitable for appraisal of rate of order of all existing systems. The simplest biosystem is more complicated than any information system, created by human. In many multi-cellular organisms, apart from information system of heredity, there are special organs of processing, storage and usage of information.

And a man, as a great miracle of Creator, is double entropic:

He is entropic according to Boltzmann – thermodynamically (biophysics), and according to Shannon (theory of information).

Let us consider human entropy according to Boltzmann.

Entropy grows in the result of non-reversible processes, but in specific situations non-reversibility can become a source of order during self-organization and self-regulation.

In such a way the human organism becomes entropic. It becomes thermodynamic and biochemical due to continuous work of more than 130 billion of cells, where the mitochondrion creates necessary components for life-sustaining activity – warmth and energy (ATP hydrolysis evolves 30.5 kJ/mole of warmth). It is not for nothing that mitochondrion is called batteries of energy, and, therefore, life. Hundreds of billions cells create this small amount of warmth – conditions for life activity. At the same time this warmth increases entropy of system. Disorder happens due to this. It can be seen when a man is sedentary and doesn't do any physical activities and physical labor. According to Boltzmann, this man is maximum entropic and he can do nothing reasonable in his life. Only small amount of warmth and energy, produced by cells, is used for work of internals (for vermicular movement, heart, lungs etc.); the main part of it was produced for muscles for a very important purpose. Firstly, the energy, produced by billions of mitochondria, is necessary for work of muscles, application of

which decreases energy and creates good conditions for transfer of information signals in nervimuscular medium via line 'center – periphery'. It appears that work of mitochondrion on the one side increases entropy, from the other side – with help of this warmth-energy the organism cleans communication line from disturbances, from entropy, i.e., muscles use heat energy and decrease entropy in thermodynamic and biochemical system of organism, from the other side muscular work and physical activity improves nervimuscular line of transfer of information, according to Shannon.

In such a way, muscular work, physical culture and sports play a role of negative energy in a living organism.

XXI century can be called a beginning of application of thermodynamic and information entropy and negentropy in biological and sports science.

Physical culture and sports play a role of negentropy for human organism, which has an impact on living functional system, creating a complete order in nervimuscular medium for transfer of signal via channel 'brain – organs'.

That is why morning physical training is necessary for people of all ages for the purpose of waste of this cell warmth of organism, produced during 7-8 hours of motionless sleep. That is why it is necessary to spend 30-40 minutes for morning exercises or jogging in order to ensure qualitative work during the whole day.

Just imagine your organism after sleep, which seems to be calm from outside, but there is a complete chaos inside due to energy, produced during the night. A complete turbulence on the line of connection between CNS and all other organs. And after a good training your organism feels well, everything is all right, is ordered, minimum turbulence and, thus, entropy, a complete laminarity on the line 'center – periphery', no loss of information and all tasks are solved precisely and managed qualitatively.

In 1943 Irving Schrodinger came to a conclusion that a biological system, in order to continue its existence, must take negative entropy from the environment in order to compensate inner production of entropy.

That is the process of self-organization and self-regulation in a human organism.

Culture, physical trainings and sports have very much in common, they complement each other and solve one and the same task – improvement of quality of life of people.

Now let's consider how cultural values (music, visual art, poetry) influence the quality of life of people. A man, as a part of universal structure, has a harmonic essence. In IV century BC a famous mathematician Pythagor said that everything in universe was in vibration, i.e., fluctuates. In human organism all organs, beginning from each cell, vibrate with their own frequency. On the basis of this an assumption can be made that information (external effects) must have a frequency characteristic for recognition of images. It really happens in such a way. Sound (music), colourful (visual art) etc. really have harmonic nature. They have vibrations with frequencies, corresponding with frequencies of internals, which they always need.

A man conceives any cultural value through audio or visual sensors; conceived information divides into separate harmonics, present in this signal. There is a spectral analysis of received sound or colorful information, and then these frequencies go to organs through hypothalamus-hypophysis, especially to organs of internal secretion, the frequencies of which correspond with frequencies of spectrum of musical composition.

But for undisturbed and precise transfer of this cultural value, the communication line 'brain – organs' must be clear. It is possible only in a cultural body, where afferent and efferent communication lines do not lose information, the communication line is ordered, and entropy is minimal.

When you find out the principles of perception of cultural values and understand that for our good we and all peoples must use cultural values of other peoples of the world. This helps a man to be spiritually rich. This is the way to sustainable growth of humanity in XXI century. At the age of multiculturalism we are doomed, in the finest sense of this word, to be together in a globalized world. The God created us in such a way.

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