

Study of Music Influence on Psychophysiological State of a Person Using Vibraimage Technology

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Abstract: *The study of various musical genres influence on the psychophysiological state (PPS) of a person using of vibraimage technology was investigated. Developed music videos contain selected works that can positively influence on psychophysiological state of people with different types of temperament.*

Keywords: *research, vibraimage technology, music, psychophysiology.*

The medicinal use of music has a long history. In the most ancient testimonies and documents that have come down to us, music appears as a remedy. The luminaries of ancient civilization Pythagoras, Aristotle, Plato drew the attention of contemporaries to the healing power of the influence of music, which, in their opinion, establishes proportional order and harmony in the entire Universe, including disturbed harmony in the human body (Losev, 1960). One of the most important concepts in the ethics of Pythagoras (VI century BC) was “eurythmy” — the ability of a person to find the correct rhythm in all manifestations of life — singing, playing, dancing, speech, gestures, thoughts, actions, in birth and death... Through finding this correct rhythm, a person, considered as a kind of microcosm, could first harmoniously enter the rhythm of polis harmony, and then connect to the cosmic rhythm of the world whole. From Pythagoras came the tradition of comparing public life with both a musical mode and a musical instrument. Musical stimulation of labor processes and various physical exercises reached a special flourishing in ancient Greece. In the understanding of the ancient Greeks, music was an integral part of philosophy, so almost all Greek philosophers showed interest in it. The ancient Greeks saw the ideal of upbringing in the so-called kalokagathia, which meant an indissoluble combination of excellent physical, moral and spiritual qualities. According to this principle, every free citizen was required to have the necessary psychophysical proportionality, i.e. a strong, trained body and at the same time a certain spiritual development, and moral purity. And music as an inspiring, connecting principle in this social process was assigned a very important role (Petrushin, 1997a).

In Russia, interest in the problem of the relationship between music and the psychophysiological state (PPS) of a person is obvious. In the early 19th century, the famous neuropsychiatrist Bekhterev (1857–1927) began to study the effect of music on the human body. On the initiative of Bekhterev in Russia in 1913, the Committee for the Study of Musical and Therapeutic Effects was founded, which included a number

of prominent doctors and representatives of the musical world. The scientist came to the conclusion that music can relieve fatigue and charge a person with energy, have a positive effect on the circulatory and respiratory system. Bekhterev noted the great complexity of studies of the influence of music on the body, spoke about the need to create a special experimental environment for this work (Bekhterev, 1916; 1913; Bekhterev, Nikitin, 1913). The impact of music affects not only the central nervous system, but also the functions of other vital physiological systems: cardiorespiratory, muscular, and digestive. So, Dogel (Dogel, 1888) and Sechenov (Sechenov, 1952) noted the stimulating effect of marching music on muscle performance, which, in particular, revitalizes tired soldiers.

In the second half of the 20th century, interest in music therapy and the mechanism of its action increased significantly. Apparently, this can be explained by scientific and technical progress, which made it possible to study the physiological reactions that arise in the body in response to musical therapeutic effects at a new, higher level. At the same time, this interest is due to the possibility of using music as one of the means for preventing and relieving fatigue and fatigue, as well as for increased human performance, including under conditions of human space flights.

Modern research in the field of music therapy is developing in several directions. The study of the artistic and aesthetic patterns of musical perception is carried out in aesthetic and musical theoretical works (Asafiev, 1947; 1952). The psychophysiological aspects of music therapy are studied in the works of psychologists and physiologists (Brusilovsky, 1969; 1975; Vasilenko, 1989; Grineva, 1981; Shushardzhan, 1995; 1998; 1999).

Among the most famous Russian techniques are the models of Petrushin (Petrushin, 1997b), Shushardzhan (Shushardzhan, 1995; 1998; 1999), Elkin (Elkin, 2000), Blavo (Blavo, 2002). When studying the influence of music on a person's PPS, it is very important to have methods that would allow recording the results of this influence. In our research, we used the Vibraimage technology (Minkin, 2017; 2020; Vibraimage 8PRO, 2015).

Materials and Methods

The studies were carried out using a system for monitoring the psycho-emotional state of a person (Vibraimage 8PRO, 2015). The system for monitoring the psycho-emotional state of a person (after referred to as Vibraimage system or Vibraimage) is intended for registration, analysis and research of the psycho-emotional state of a person, quantifying the levels of emotions, detecting lies, psychophysiological diagnostics.

Vibraimage system allows visually and automatically assess the psychophysiological state of a person based on the vestibular-emotional reflex (Minkin & Nikolaenko, 2008) using vibraimage software with function of vibra-aura visualization by processing the components of amplitude and frequency vibration (Vibraimage 8PRO, 2015). The influence of various musical genres on human PPS was investigated. The research results presented in the form of various text, graphic and graphic files showing the influence of various musical genres on the human PPS.

On given figures 1–4, we see images around the head. This is not the supernatural radiance of our halo, but an external vibraimage or vibra-aura (Minkin, 2007; Vibraimage 8PRO, 2015). External (around a head) line-by-line display the maximum frequency and average amplitude of vibration and looks like an aura. It displays a person's PPS state more informatively than an internal vibraimage. The colors of vibra-aura are encoded with the same color scale as vibraimage and displays the maximum frequency in each line. Any unevenness in the color and size of the aura characterizes the movement of the object and the psychophysiological state. The asymmetry of vibra-aura (shape, color) indicates a deviation from the mental or physiological norm. The color unevenness of vibra-aura characterizes the psychophysiological imbalance of a person's state. Any break in the uniformity of vibra-aura characterizes a certain deviation from the psychophysiological norm. The ideal vibra-aura is mono-colored, symmetrical and uniform.

Analyzing external vibraimages in figures 1–8, we note that when listening to rhythmic, aggressive music (Figs. 1–3), muscular energy, activity, and a state of special vigor appear. Space, as it were, expands, it is filled with a huge number of people moving in a single bodily impulse. This music encourages action, it is good to do something to it, dance, jump, jump. It is characterized by the maximum frequency and large amplitude of the external vibraimage. Listening to classical music, church bells, and prayer has the opposite effect (Figs. 4–8). The frequency and amplitude of the external vibraimage becomes much lower than when listening to aggressive music and corresponds to the normal distribution (Minkin, 2007; Vibraimage 8PRO, 2015).

This is how Kazinik describes the peculiarities of the perception of music of various genres (Kazinik, 2011). “Normal” music sounds, and we do something to it, wash the dishes, dance. Then the “abnormal” classical music starts to sound, and we turn off the radio, because it prevents us from “washing the dishes”. By turning off the radio, at this moment millions of people really show respect for classical music, denying it a background function and thereby depriving themselves of the opportunity to hear classical music. Any music is ready to be the background, accompany washing dishes, ice skating, dancing in the company.

However, not classical music. Unlike other types of music, classical music cannot be used in the background. She requires attention only and only to herself! For the perception of classical music on a spiritual level, it is necessary that the psyche of the person who perceives this music is not at the everyday level of mental reactions, but at a higher level.

Based on the data obtained from the study of the influence of various genres of music on the PPS of a person, various versions of audio clips were developed, which, according to our hypothesis, could restore the normal form of the external vibraimage. Several different audio clips have been developed to suit people with different temperaments. The Vibraimage 8PRO system (Vibraimage 8PRO, 2015) was used to measure the PPS before listening to the audio clip, during listening and immediately after listening. The measurement results were processed using the VibraStat program (VibraStat, 2020), which is designed to statistically process the results of the Vibraimage 8PRO program and improve the accuracy of determining the psychophysiological state of a person or a group of people using vibraimage technology (Minkin, 2007; Vibraimage 8PRO, 2015). The results of the program are formed in the form of graphs and tables.

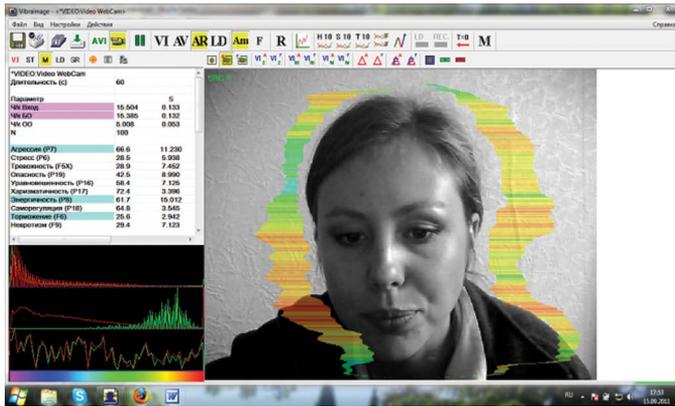


Fig. 1. External vibrimage of a person while listening music of Viktor Tsoi

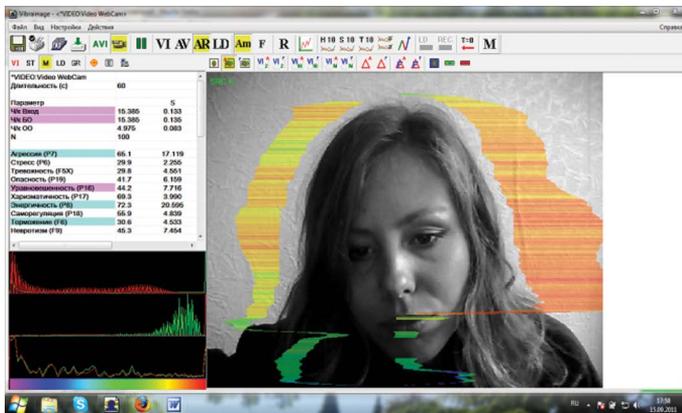


Fig.2. External vibrimage of a person while listening music of Rammstein band

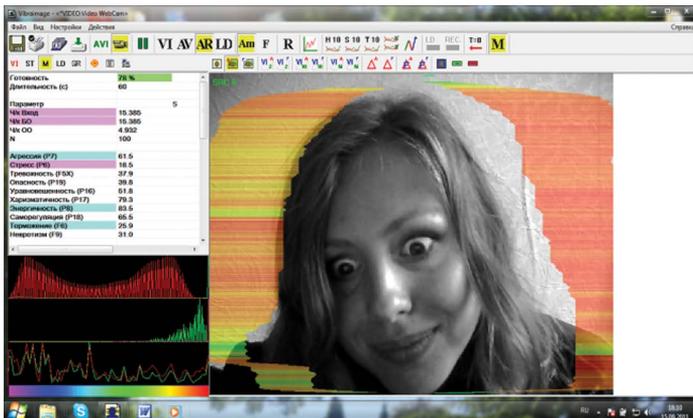


Fig. 3. External vibrimage of a person while listening music of Korn metal band

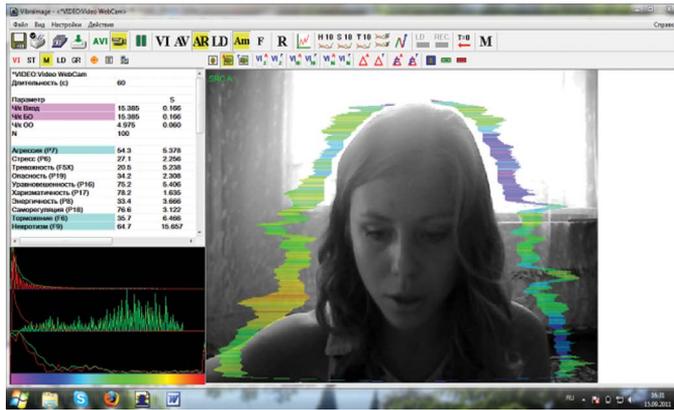


Fig. 4. External vibrameage of a person while listening to Prayer of Detention



Fig. 5. External vibrameage of a person while listening Adagio of Mozart

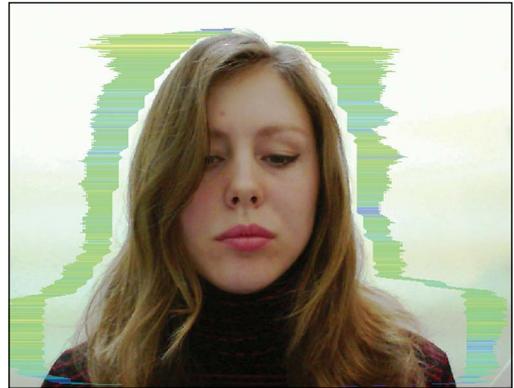


Fig. 6. External vibrameage of a person while listening of Liturgy



Fig. 7. External vibrameage of a person while listening to Tchaikovsky's music



Fig. 8. External vibrameage of a person while listening to Church bells

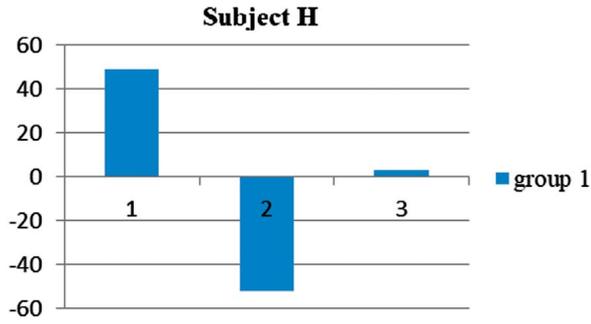


Fig. 9. Histogram of the variability changes Vs of the T1–T10 emotion parameters of subject N. 3 measurements performed on one day.
 1. PPS – before listening to the audio clip.
 2. PPS – while listening to the audio clip.
 3. PPS – after listening to the audio clip.

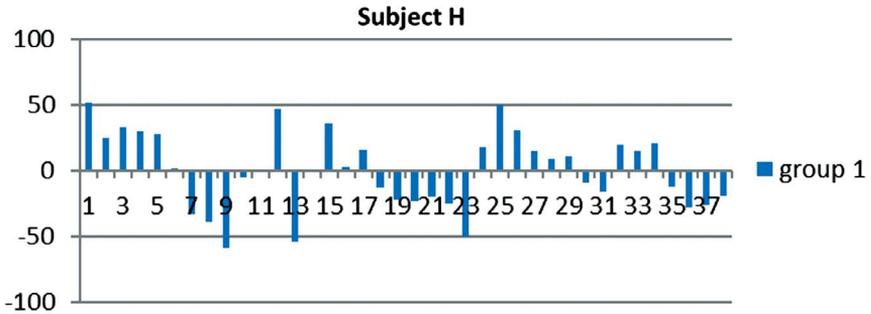


Fig. 10. Histogram of the relative change in the variability Vs of the parameters T1–T10 of subject N. 38 measurements performed during the year.
 Measurements 12–14 in figure 10 correspond to those shown in figure 9.

Consider another subject K., 34 years old.

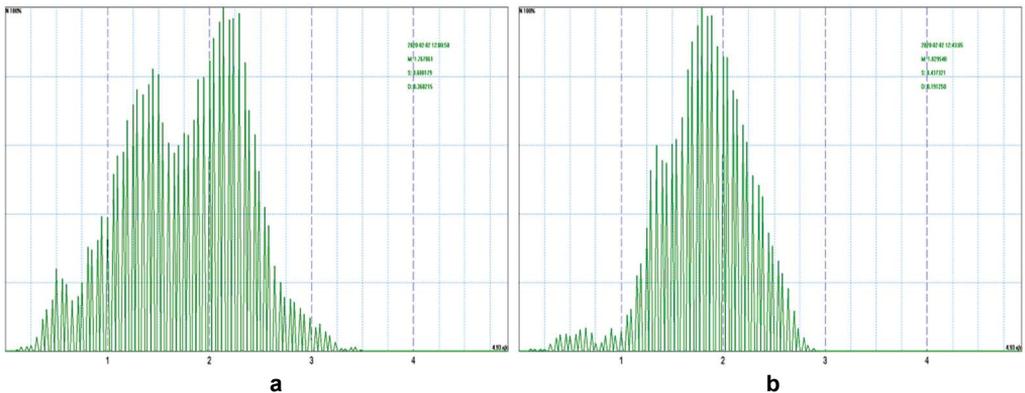


Fig. 11. Histograms of vibraimage frequency distribution a) before listening to an audio clip b) after listening to an audio clip

The histograms for these states differ from each other. Histogram (Fig. 11b) is close to the normal distribution. In order to confirm the effect on the PPS of the audio clip, and not the time factor or the factor of habituation to the camera, 4 measurements were carried out. The first three measurements were taken with an interval of 15 minutes before listening to the audio clip, the 4th measurement was taken after listening to the audio clip.

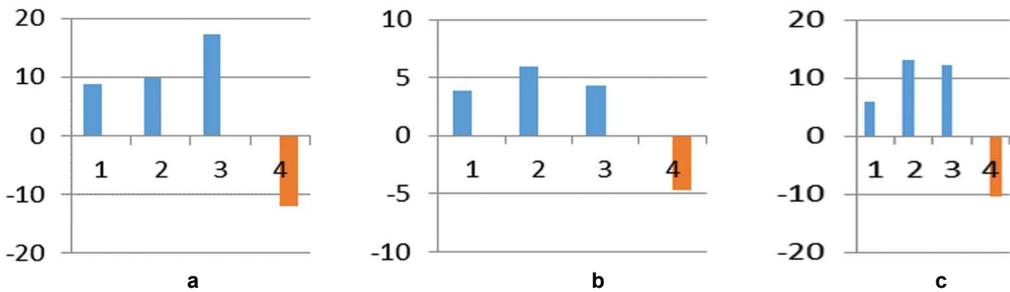


Fig. 12. Histograms a) Vs graph M of the mathematical expectation of the integral coefficient K, b) Vs graph S of the standard deviation of the integral coefficient K, c) Vs graph V of the variability of the integral coefficient K

All histograms for these states show the difference between the indicators of the 4th dimension from the first three. Consider the Stat Sheet of the VibraStat program, which shows the generalized statistics for the parameters M, σ , V (Table 1). The VibraStat program (VibraStat, 2020) allows you to study the average PPS values of each individual person for the studied period of time and compare them with each other. Table 1 shows the parameters M1, S1, V1, which correspond to the average values for the first three measurements before listening to the audio clip. Parameters M2, S2, V2 correspond to the measurements taken after listening to the audio clip.

Table 1

Stat List

Var	M1 avg	S1 avg	V1 avg	M2 avg	S2 avg	V2 avg
T1	42,667	5,3333	13,333	37	3	9
T2	36	3,6667	11,667	28	4	15
T3	32,667	8,3333	25,333	18	6	37
T4	37	3,6667	11	28	2	10
T5	60,333	9,3333	15,667	71	5	7
T6	68	7	9,6667	77	4	5
T7	24,667	4,6667	19,333	28	3	11
T8	64,333	7	11	74	4	5
T9	12	1	13,667	18	3	17
T10	17	2,6667	16,333	31	4	14

Discussion

Analyzing the data obtained, one wonders if we are simplifying the influence of music on a person, limiting this influence only to the PPS factor. Interesting reasoning on this topic Kazinik (Kazinik, 2011) — art critic, musician, educator. Why in the educational system, which gave the world an outstanding galaxy of outstanding representatives of art such as Tchaikovsky and Dostoevsky, Gogol and Chekhov, Pushkin and Pasternak, Mussorgsky and Rachmaninov, Chagall and Malevich, Leskov, Bulgakov, Rimsky-Korsakov, Shestakovich, Tolstoy, the study of music was mandatory ... The high quality of liberal arts education, from the 20s of the 19th century to the early 20s of the 20th century, generated an incredible need for culture and prepared a cultural explosion, the likes of which, I think, human history has never known. The most of Russian culture is precisely these 100 years of unprecedented flowering of literature, poetry, music, and fine arts. The 21st century should be the century of Personality, Individuality, for we have already passed through the faceless crowds, or peoples that are “silent”. Art and its peak — the music of geniuses — is the greatest panacea against spiritual slavery. There is a mass and elite culture. There is no longer any doubt about this. Giant stadiums that can accommodate tens of thousands of pop listeners and small concert halls for chamber music.

Staying at the disco is filling your free time. Listening to Bach’s music is communication with eternity, with the Universe. It seems very important to restore the mass PSYCHOLOGY OF PERCEPTION OF ART (music, poetry, literature, fine arts). After all, art in its essence is a grandiose energy of love. This energy, for those who are able to comprehend it, becomes the most important criterion of the value of life, the bearer of the most intimate, capable of manifesting itself in all other spheres of life and activity.

Conclusion

Vibraimage technology allows studying the influence of music on the human PPS. The combined use of the Vibraimage 8PRO system (Vibraimage 8PRO, 2015) and the VibraStat software (VibraStat, 2020) makes possible effective record and process the results of such studies using text, visual and graphic information.

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