

Musical Art in Theoretical and Methodological Projections: Present-Day Music and Neuroethics

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Abstract: *An attempt is made to comprehend the latest developments in such a field of neuroscience as neuroethics, music through the perception of the human brain. Yes, for example, the key ideas of neuroethics are generally in line with the spirit of Kantian apriorism, reinterpreted in the current terms of cognitive neuroscience. Today, more and more arguments are found that "music excites such internal physiological programs that contribute to the restoration of the homeostatic equilibrium of the organism ... This means that music plays a role in human evolution.*

The article proposes the concept of a musical module, which correlates with a cognitive neurostructure. The theoretical and methodological features of the formation of today's classical music are investigated. The methods of analysis, synthesis, explanatory, research and scientific methods have been applied to conduct an effective research. Priority directions of modern music development in the context of neurophysiological development have been determined. Formed the results of the study, which were the basis for determining aspects of prospective musical development. Scientific research in the field of music and the field of psychology is investigated, which is the basis for the development of neuroscience. The relevance of the article is determined by the need to adapt music to the challenges of information and communication society and to determine the prospects for further development of today's classical music.

Keywords: *Cognitive neuroscience, neuroaesthetics, music, analytical and holistic thinking, polyphonic and monodic music.*

How to cite: Yeromenko, A., Toloshniak, N., Kaplun, T., Havryliuk, O., Havrylenko, L., & Bazan, O. (2023). Musical art in theoretical and methodological projections: present-day music and neuroethics. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 14(4), 612-625. <https://doi.org/10.18662/brain/14.4/524>

Introduction

Music is the universal language of mankind. The 20th century was marked by the conquest of atomic energy. The 20th-21st centuries were marked by the triumph and rapid development of information technologies. Meanwhile, the baton of scientific progress is now passing to the complex of cognitive research, primarily neuroscience.

In 2014, the Nobel Prize in Physiology or Medicine was awarded for the discovery of cells in the brain's navigation system. It would be strange if the scientific revolution in neuroscience did not affect such a sphere of human activity as music and musical activity. Recent advances in neuroscience are beginning to shed new light on the nature of music and musical creativity.

Back in 2005, the leading scientific journal *Nature* drew attention to the fact that music could become an important testing ground for neuroscience research. Music engages almost all cognitive functions, and musical exercises can markedly improve the functioning of a number of neural networks. This is especially true for those neural networks that support speech, and therefore music training will be beneficial for dyslexic children, for example. In general, music training improves the cognitive abilities of both children and adults, which is particularly reflected in the growth of their abilities.

Of considerable interest for psychophysicists analyzing artistic creativity is the fact of functional asymmetry of the hemispheres of the human brain, which means the predominant connection of the left hemisphere with verbal, logical, conceptual thinking and assessment of temporal characteristics of the surrounding world, and the right hemisphere - with sensual-concrete, figurative and spatial perception of the environment. As a result, neuropsychological studies have shown that rhythm in music is perceived by the left hemisphere, while melody is perceived by the right hemisphere.

Here neurobiologists are looking for answers to a number of questions about the neurophysiological mechanism to playing and creating music, are responsible for determining pitch, rhythm and tonality, and whether the perception of music at the neurophysiological level differs in men and women.

The purpose of the study: to investigate the features of musical art in theoretical and methodological projections in the context of the development of modern classical music and neuroethics.

Theoretical and methodological features of the formation of musical art in the context of neuroethical development

Natural languages and music can be seen as poles of a single sound continuum: in a certain sense, speech is a discrete entity, and music is continuous. However, musical art as a continuous linguistic system is fixed only by "phonetic subject matter". The first textural, phonetic, subject-sound level of this system involves the mechanisms of sensory response, which forms the "direct" most concrete-subject associations. The second "syntactic, intonational level" activates mechanisms of motor and intonation-voice stereotypes and systems of speech intonation of thought related to motor and speech associations, the third "compositional, musical-content level" of functioning of mechanisms of thinking, as well as the "compositional-content level" of functioning of mechanisms of thinking, memory, semantic, mental, communicative equivalents of a certain sociocultural identity. Therefore, it is not surprising that the brain areas responsible for speech and musical functions are colocalized and overlap (Bern, 1992).

Among current neuroscientists, the idea of so-called "psychoneural monism" dominates, according to which the origins of human thought can in principle be traced back to some material basis. Actually, this idea is embodied in the recently formed movement of neuroconstructivism, which is its immediate predecessor. Its leitmotif is the notion that epigenesis is carried out according to probabilistic laws, i.e. of the brain and, consequently, of adaptation (Bibik, 2002).

Apparently, musical abilities are formed and begin to manifest themselves visibly at certain stages of brain and intellectual development around one year of age. In newborns of the first months of life, music and speech are not differentiated according to language or musical sound; they can only respond to prosodic information. Thus, even in early childhood, the human brain responds not so much to music as to cheerful and affectionate voices, whether they are clothed in music or language. It is no coincidence that lullabies in many cultures have similar acoustic features, and that the lullaby genre is uniquely human. People with formal musical training have more localized areas of neural network activity than those who have not studied music. A child's exposure to music, or even passive exposure to Western tonal music, also contributes to the formation of these kinds of networks localized in the brain. Music is always directly related to physical activity, dancing. Children develop the ability to respond with movement to music before the end of the first year of life, and in adults, music is known to be often accompanied by dancing and ritualized actions. Movement to music is naturally woven into the lives of all peoples, regardless of what a

given people understands by music and what musical rhythms they prefer. Appropriate sensations of pleasure are inspired by sound, as are physical movements. From a neurobiological point of view, movement is triggered by so-called mirror neurons in the brain, which are triggered when an action is observed. Apparently, these neurons play an important role in language learning and open up the possibility of empathy, a kind of empathy. They are also indirectly accompanied by the production of oxytocin during the enjoyment of music, dancing, or in the highest form of mental concentration - falling into a trance (Gardner, 1983).

It turns out that natural languages and music are connected by some implicit correlative relations. A specific language, as it were, sets a certain angle of view on the perception of music and the peculiarities of musical creativity. Thus, analyzing the work of British and French composers allows us to conclude that "they hear different rhythms"; there is also a difference, for example, in the perception of simple rhythmic tones (short and long) by native speakers of English and Japanese.

Research in the neurophysiology of the choreographic artistic and cognitive practice of dance supports this hypothesis and is proving to be very useful for studying cognitive processes of the brain and thinking. Despite the fact that dance is a fundamental form of human expression, neurobiologists have traditionally paid less attention to it than, for example, to music. The results of the study, in the course of which functional magnetic resonance imaging of the brain of subjects of choreographic artistic and cognitive practice was performed, allowed us to consider dance as a combination of the representational capacity of language and the rhythm of music. The cerebellum performs well as a neural metronome, a kind of conductor: it receives many sensory signals from the auditory, visual and somatosensory systems (this is necessary to be able to adapt movements to different signals, from auditory to visual stimuli and touch) and contains whole-body sensorimotor mapping (Geising, 1994). Activity in the mesio-capillary body of the subcortical structure of the brain was specifically related to synchronization, not just listening to music. This discovery allowed scientists to formulate a hypothesis, according to which during unconscious subordination of rhythm, auditory information goes directly to the cerebellum, bypassing the higher levels - auditory areas of the cortex.

Here it is appropriate to recall the phenomenon of L. van Beethoven's composer's artistic and cognitive practice at the moment when he lost his hearing and sight. An unusual study was conducted under the direction of a cardiologist. This study showed that the rhythm of the heartbeat is inevitably reflected in the rhythm of the music the composer writes.

It turned out that punctuated rhythm, changes in tempo, unexpected pauses and complex notes - all these elements, characteristic of Beethoven's music, indicate an irregular pulse of the composer. According to scholars, hearing loss made Beethoven more sensitive to his own pulse, the only "music" he could feel at that moment (Giddens, 1991). Moving harmony is rhythm, a universal dynamic law superimposed on time, a universal energetic substance. Time in musical cognitive practice acts as a kind of supergestalt. Rhythm in the brain is associated with the activity of the basal ganglia and plays a major role in the synchronous functioning of some neurostructures.

Ontogenetic musicality as the basis of the cultural-ethnic music module

Musical abilities are natural and, most likely, unique properties of the human brain, which are the result of its long evolution. They are connected with the phenomenon of the so-called implicit memory, which turns out to be the most important tool for mastering and operating language. This memory is practically not formed in monkeys, which can be considered our distant ancestors and "relatives" (in the sense of common genetic apparatus). Therefore, monkeys have well-developed visual memory, but in fact it is absent, and auditory memory is very weak. Although they can distinguish between sounds in the modality of consonance and dissonance, they do not consider the former.

The experience accumulated by German art history of the early twentieth century opened the way for a research step towards the search for neurobiological regularities aimed at the problem of identifying and substantiating the sociocultural and neurophysiological foundations of the genesis of art. They are manifested in the attempt to search for systemic and probabilistic processes in the history of spiritual practices, in particular, in the works on art-historical cycles. When the dominant canon changes, forms begin to emerge not as individual experiences of "deviation" from the norm" but as a certain general trend, a system of interrelated methods (Gygli et al., 2019). At the same time, such methods are shown simultaneously between representatives of different types of artistic practices, completely independently of each other. The reasons that give rise to these shifts are each time found outside the artistic range proper and are rooted in more fundamental processes of spiritual culture.

The analysis of the concrete material of the history of literature, fine and musical arts has shown that any seemingly internal questions - about the artistic cycle, canon, tradition and innovation, about the boundaries of the existence of individual styles and trends - can only be answered. The genesis

of an artistic work is located in a kind of "electric arc" arising between the perceptions of an individual subject of artistic creation and the intentions of the mental field to which he belongs or with which he correlates. This confirms the position of modern neuroethics: art does not develop according to any principles of its own.

Inheritance of musical abilities has a pronounced genetic nature: about 85% of musicality is genetically determined. In this case, as it turned out in the study of dozens of pairs of mono- and dizygotic twins, musical perception is associated with the gene AVPR1A chromosome 12q, and musical memory and the ability to choral singing and dancing - with the gene SLC6A4 chromosome 17q, which is a carrier of serotonin. At the same time, the ability to reproduce and follow a certain rhythm is associated with the FOXP2 gene. At the same time, it is believed that the same genes are involved in the formation of social behavior *modus operandi*.

In the brain, certain "modules" responsible for speech, language acquisition and musical abilities are formed by the natural (i.e., from nature, from birth) nature of the subject's activity, as well as in the process of life activity and its cultural environment. Finally, a set of such modules ensures the vital activity of living organisms. These systems include cognitive modules (neurodynamic archetypes), which, in general, are designed to fix objects that come into the organism's field of vision; specific actions of the organism; quickly realize the number of objects - "number sense"; provide orientation in space; communicate with immediate partners and realize the differences between "us" and "others" ("us" vs. "them").

Neuropsychologists are convinced that any complex types of material and spiritual activities, including music, are built on the foundation of these rather ordinary systems (modules) (Imel, 1998).

In Russian art criticism there is a concept of musical "structure", which can be considered as the closest equivalent of the neurocognitive module, which refers to the limbic and paralimbic systems of the brain that control emotions. The musical "structure" is a musical-linguistic structure proper, which generalizes and "amplifies" psycho-emotional states that have established themselves as historical-cultural types and norms. Such a musical module is an expression of a neurodynamic cognitive archetype, a specific state, for which a certain socio-culturally identified constant, determined by a certain ethno-cultural atmosphere, is historically fixed. The role of such a constant, in our opinion, is played by musical intonation. The similarity of musical and speech intonation is manifested in the presence of reference sounds, in the location of the main reference sound in the lower register of the vocal range, in the alternation of wave-like rises and falls in pitch with

downward movement. as a result of semantic utterance. Musical intonation is connected with speech-grammatical rules - the presence of pauses, caesura, question-appropriate structure, etc. A characteristic technique in intonation utterance is rising tension, weakening, falling(Kolomiets ,2007).

It is in peculiar ethnic musical modules, which can be defined as complex systemic formations - a kind of special synthesis of ethnic intonational, tonal, rhythmic, textural, form-creative features, that musical mentality is most clearly manifested. The peculiarities of their genesis have a neuroscientific explanation. The idea of cultural conditioning of artistic and cognitive practice and its reverse effect on the brain is that culture has a significant impact on the objective biochemical processes occurring in the brain and on changes in the human genetic material, which, in turn, can entail their carriers the formation and support of certain social and cultural environments directly related to the nature of perception, reasoning and features of human cognitive activity in general. Studies in the field of cultural neuroscience in the aspect of studying the phenomenon of mentality demonstrate the difference of cognitive strategies inherent in carriers of different cultures(Kudykina, 2003).

Ethnic musical modules most clearly represent the musical mentality and demonstrate the neurobiological nature of their genesis. The logo type of thinking, characteristic of Western European culture, is embodied in musical culture in the principle of determinism and rationality of musical thinking, expressed in strict certainty, isolation and completeness, extraversion - the desire to embody and reflect in the form of artistic images real historical events, phenomena . The basis of the Eastern musical mentality is continuum-cyclic thinking, based on the principle of the circle as an embodiment of infinity, sensually figurative, emotional style of thinking, meditation, based on the connection with the Buddhist and Islamic religious traditions, numerical symbolism, interrelation with extra-musical cosmological phenomena, introversion, embodied in the state of self-immersion as an embodiment of the Eastern principle of "everything in everything".

Accordingly, at the level of architectonics and style, Western European musical tradition is characterized by the principle of tonal organization of sound material, the extended system of harmonies and harmonies, with tonal gravitation (with the separation of unstable degrees in the bar), the extended system of harmonies and harmonies consolidated in homophonic-harmonic, later - in poly musical thinking, reflected in a strictly fixed language of musical signs - five-line notation. The strongest rational ordered beginning of the Western European musical tradition is the beat, the

accentuated rhythmic structure, the ratio of strong and weak parts, and the completeness of form (Marevych, 2013).

Eastern music in time develops vertically, statically: first of all, it should be said about the complete absence of polyphony in the music of the Eastern tradition, i.e. there is no concept of musical texture (system of polyphony). Eastern music by its origins is fundamentally monophonic (single-voice), which is due to a very special Eastern style of thinking and the peculiarities of the cult (religious) musical tradition (Vuckovic, 2019). Musical representation is also directed in depth - a whole event can unfold in one duration, music sounds spatial, vertical, sound has a vector (Melnyk et al., 2019). Music lessons not only improve hearing, but also develop a person's creative potential. In Western pedagogy it is common to talk about the "Mozart effect", an effect that was experimentally confirmed in 1993 and expressed in the fact that listening to music increases the intellectual potential of the individual, especially develops spatial thinking (Wojnar, 1964). Some brain structures of musicians are more complex than those of non-musicians (Iqbal & Sidhu, 2017). In any culture, music can also be used as a therapeutic tool for various neuropsychiatric pathologies. This effect is probably due to the fact that certain types of music can promote the production in the body of dopamine, a neurotransmitter associated with feelings of pleasure.

Current classical music in the context of neuroethical perception and genre diversity

It is now believed that there is no special module in the brain for natural speech (Melnyk et al., 2021). If we have in mind the action of specific neural modules, we should mention the brain navigation system, the discovery of which was awarded the Nobel Prize (Ferris & Bannon, 2002). These maps are strongly dynamic in nature, as groups of neurons are excited only when the organism is in specific parts of its environment. It can be hypothesized that these modules behave similarly in the case of musical activity.

The conditions of existence of academic music in the situation of modernity have undergone significant changes, denoting a tendency to lighten the musical content, gravitation towards entertaining functioning, everyday life. A new concert tradition is emerging in today's artistic practice, located at the intersection of heterogeneous modes of music. A situation where the barrier between the elite and the masses is erased, allowing the individual to restore the integrity and fullness of being. This definition covers a vast area of artistic phenomena located between academic and non-academic art.

The notion of an "everyday" form, takes on meaning only when the situation of a concert "in specially designed halls" arises. The concert has become a form of existence of some phenomenon of the surrounding reality. It can take the form of direct acoustic contact between performers and audience, but it can mystify it, for example, when performed under a phonogram. It can be audiovisual, designed for both visual and auditory perception, or exclusively auditory, addressing only the ear, like a "disk concert". The concert is called the furthest from the traditional understanding of the phenomenon. Middle culture breaks stereotypes about the forms of existence of the classical heritage. Music intended to be performed in academic settings is often taken to unexpected places and presented in the most unusual ways.

The systematic nature of concert forms of "middle culture" is an unexplored musicological problem. Due to the variety of forms of concert performance of academic music that emerged in the second half of the twentieth century.

Any innovation in the presentation of music can be a source of individualization. If the academic concert was some kind of schematized, at least presumed structure, in the "middle culture" the concert depends on a much larger number of characteristics individually chosen by the performer.

The proposed taxonomy of concert forms takes into account the following factors: 1) the appearance of the performer; 2) the location of the concert; 3) the composition of performers; 4) the principle of the concert program structure; 5) theatricalization. techniques of musical performance; 6) the technical means used.

Naturally, in each specific case different attributes may be mixed. Based on the individual combination of potential changes reflected in the proposed classification, there are numerous varieties of concert forms. Let us take a closer look at the types of concerts, paying attention to the changes that each of these forms brings to the traditional concert ritual.

Today's digitally organized media space can integrate a wide range of information. Classical music as well as other traditional analog artifacts are transformed into digital formats of media space, as a consequence of which, in addition to losing the "aura" with technical reproducibility, a number of equally significant characteristics of this art form are reduced (Mead, 1963). Today's digital media space makes it possible to represent previously recorded performances, to broadcast live performances online, to update classical music through computer programs without the participation of a live performer. Accordingly, the main transformations of classical music art can be traced in its representation through digital gadgets and in modern

media space (Padalka, 2008). Classical music as an artistic project includes not only performing art, but is also a cultural phenomenon traditionally defined in terms of actualization, i.e. related to the context of culture. The traditional practice of classical music performance implies its actualization in culturally fixed positions: philharmonic hall, a cappella, concert hall, salon, room (Gray, 2008).

As a result of the transformation of a live performance into a digital audio codec, the "aura" of the artwork is lost, not only through archiving and potentially unlimited reproducibility and replication, but also through the removal of traditional topoi of actualization. With the advent of the digital age, the recorded auditory artifact is no longer ascribed to specific topos, but is presented through technical gadgets anywhere in the current media space (Settel et al., 2009). It turns out that classical music becomes the "soundtrack" of everyday life of the modern subject of culture, often performing utilitarian functions of a "pure" auditory substrate, devoid of the properties in which the ideological and essential basis of music as art consists. diminishes, and only the aesthetics of sound remains (Sheremet et al., 2019).

Art is not one of these needs. On the contrary, classical music, as an originally elitist, complex form of art that requires special attention from the subject of culture, traditionally comes to the fore when updated, relegating everything except itself to the background.

One of the options for using classical music in modern media space is advertising. Behind the apparent incompatibility of the conceptual foundations of classical music with the rules of marketing communications lies another metamorphosis leading to the destruction of this art form (Smith, 1997). Advertising is a good example of clip culture based on the fragmentation of short visual images. Classical music, complete with clip visual content of advertising, always appears to be presented to the subject of culture as a separately cut auditory fragment (Vasylenko, 2003). On the contrary, the very structure and ideological basis of any classical music cannot do without the integrity of the artistic work and the obligation to perform at least its parts from beginning to end. Breaking the whole into fragments seems possible when the aim is to renew the work of musical art as such (Vatamaniuk, 2014). On the contrary, in the situation of presenting classical music in advertising, both the structural and ideological integrity of the artwork is reduced to serving the aesthetics of the sound of a separate auditory fragment.

There is a point of view that any creativity in the sphere of art has a common source set by ontogenetic features of the human brain that determine the aesthetic experience. This experience applies to all types of

creativity, including artistic and musical creativity, because it "integrates neural networks that are neutral to each other, evoking sensory and emotional responses according to the characteristics of a particular organism". Moreover, studies of the cognitive mechanisms of scientific cognition and artistic creativity generated by aesthetic experiences have prompted questions about their commonalities and peculiar unity of growth points (Van Lange, 2007). In such a new direction of cognitive research, musical creativity is directly connected with neurophysiological processes and the formation of "neuroscience of moral experience" - neuroethics - is asserted.

Conclusions

One group of prominent neurophysiologists believed that music was a kind of "evolutionary parasite", a mere "sonic pleasure" that had no influence on human survival; another, on the contrary, saw music as an important element of human evolution and enculturation. If we proceed from biological considerations, all apes are characterized by elements of physical care for their relatives, providing them with assistance. Probably, in humans, this property was transformed into courtship not only by physical, but also by vocal, sound methods. With the help of music, the cohesion of a large (human) collective was achieved, creating between its members, so to speak, not purely formal ties, but mental closeness, which promoted and filled with content mutually beneficial cooperation and mutual help.

A number of researchers of the reasons for the emergence of the musical phenomenon of sound actions, when sound acquires a collective meaning and allows to achieve a collective goal, when sound becomes a kind of social glue that allows them to work together and more effectively achieve common goals. At the same time, this quality was not acquired and borrowed from humans for many hundreds of years by those animals that lived not just near, but in close contact with humans, such as dogs.

Thus, the origin of music has natural and cultural foundations: musical activity is determined by commonality with linguistic activity at the neurobiological level and is at the same time an important component of the culture that allowed the formation of the genus *Homo sapiens* as we know it today.

Acknowledgement

Author 1 formed the concept of research on the development of modern classical music

Author 2 analyzed scientific intelligence on the topic and formed the theoretical and methodological foundations of the research work

Author 3 created the context of neuroethics as one of the important factors in the creation of current classical music

Author 5 formed the structural components of the work subject, formed the research criteria, outlined the work methodology.

Author 6 analyzed the concepts and structural thematic blocks of the study.

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