с. 9].

Отже, аплікація – це один з найважливіших та цікавіших видів образотворчої діяльності в дошкільному закладі. Тому постійно потрібно проводити різноманітні заняття з аплікації, залучати дітей до самостійної художньої діяльності, до оформлення приміщень до свят; робити виставки дитячих робіт, різні стінгазети та багато іншого, що пов'язано з аплікацією.

Заняття з аплікації впливають на всебічний розвиток особистості дошкільників. Рівень оволодіння вміннями і навичками, передбаченими програмою з аплікації, дозволяє здійснити і визначити ступінь готовності кожної дитини до успішного навчання в школі, подальшого засвоєння змісту і техніки різних видів аплікації.

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MUSICAL ART IN THE CONTEXT OF NEUROAESTHETIC METHODS

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МУЗИЧНЕ МИСТЕЦТВО В КОНТЕКСТІ МЕТОДІВ НЕЙРОЕСТЕТИКИ

Оболенська М.М.

The article discusses the mechanisms of analysis and evaluation of musical works in relation to neuroscience. A projection of some developments of neuroaesthetics from visual forms of art to music as an audio system is proposed. In particular, the article checks whether the universal laws of perception proposed by the doctor of neuroaesthetics V. Ramachandran are applicable to music. The purpose of the article is to explain how the universal laws, according to which the brain

works, correlate with the art of music.

Keywords: *neuroscience, brain, musical perception, aesthetic laws, assessment of creativity, mirror neurons.*

У статті розглядаються механізми аналізу та оцінки музичних творів в площині нейронауки. Пропонується проєкція деяких розробок нейроестетики з візуальних видів мистецтва на музику як аудіальну систему. Зокрема, в статті перевіряється, чи можуть бути застосовані для музики універсальні закони сприйняття, запропоновані доктором нейроестетики В. Рамачандраном. Метою статті є пояснення як співвідносяться універсальні закони, за якими працює головний мозок людини, з музичним мистецтвом.

Нейроестетика як молода і, в той же час, досить розроблена наука дає нам нову унікальну можливість розібратися в структурі і функціях «Я» не тільки ззовні, спостерігаючи поведінку, але також вивчаючи внутрішню роботу мозку. Для музичного мистецтва, в якому багато процесів протікають в області підсвідомого, зіткнення з напрацюваннями нейроестетики і подальша дослідницька робота в сфері цієї науки бачиться досить перспективною.

Ключові слова: *нейронаука, мозок, музична перцепція, естетичні закони, оцінка творчості, дзеркальні нейрони.*

Music and the human brain are objects of scientific study that will always be of interest to researchers because of the huge number of insoluble riddles and issues contained in them. Studying both of these areas from the perspective of interdependence is a mutually beneficial project: on the one hand, the possibility of studying the work of the brain is associated with musical activity, and on the other hand, there is an explanation of the basic foundations of musical art through the specifics of brain activity. The knowledge of the human brain (in particular, the mechanisms of auditory perception) today seems to be a fairly developed area to the extent that we can reason rationally about music, based on the latest research in this area.

In the mid-90s of the twentieth century, a completely new scientific discipline, neuroaesthetics, emerged as an integral part of cognitive science, the program of which overlaps the development of neurobiology, cognitive psychology and aesthetics. The central task of neuroaesthetics is to explain how the brain works with the help of art. What specific processes occur in different lobes of the brain when a person perceives or creates a work of art? The amount of scientific and popular literature on this topic is rapidly increasing every year. This fact testifies not only to the relevance of such a research profile, but also to the prospects of finding long-awaited answers in the foreseeable future.

Since the main part of the information from the world around us is perceived by means of sight, then a naturally large share of research interests falls to work with visual arts. However, it is the communication associated with the auditory activity that formed speech, and then abstract thinking. It has long been known that music plays a very important role in human evolution. On this issue there is a fairly extensive amount of materials of varying degrees of scientific. Some describe the influence of various musical modes on the mood and emotions of a person, others describe the influence of the metro rhythm on the body of a person. In February 2017, an article was published in Scientific Reports [2] with the results of experiments proving that music and narcotic substances involve the same brain areas. The book of the neurologist Oliver Sachs "Musicophilia" [5] describes the effect of music on the physiology and psychology of man, through the consideration of various cases of diseases. The author comes to the conclusion that such phenomena as absolute pitch, synesthesia, amusia are a kind of deviations from the normal development of the brain. Using the examples of his patients, he visually shows that fine line that separates pathology from genius. If in this case the neurologist examines various musical phenomena from the point of view of medicine, then Daniel Levitin examines and studies the work of the brain from the perspective of a musician [1].

The founder of neuroaesthetics, Semir Zeki (he also proposed this term in 1999), studied the neural mechanisms of the brain with the help of new science, trying to explain what exactly happens in the brain when it perceives works of art. With the help of various experiments, it was revealed that in the process of aesthetic evaluation of a work of art, the brain uses special cells – mirror neurons. These cells play a crucial role in the evolution of man as a species, allowing him to accumulate life (sensory) experience without risk to the organism. Mirror neurons are able to be excited in the same way, both when performing an action and when monitoring the implementation of such an action, thus determining the mechanisms of empathy. It is thanks to the mirror neurons that the catharsis effect described by Aristotle is possible.

The processes of everyday life, such as involuntary imitation of interlocutor's actions, unconscious learning, crowd psychology, and much more, are explained by the activation of the motor zones with the help of mirror neurons (hence their name). So, at a concert of classical music, the preference (the highest mark) will be given to the performance that the listener “tried on” for himself, presented himself at the place of the artist. The structure of the limbic system of the brain is responsible for the formation of emotions. For example, the amygdala works with memories. Signals from the amygdala enter the hypothalamus, which secretes hormones and activates the autonomic nervous system. If the music is familiar, that is, the memory of it is already stored in the amygdala, and then the emotional response during the repeated listening will be stronger.

We may not like something radically new. The brain is always looking for clues and the degree of satisfaction depends on their identification. Memory is the most important property of the brain for music. A system of expectations and their violations is built on its basis.

Neuroscientists revealed that different parts of the brain are responsible for the perception of various elements of expressiveness. That is, when we look at an object, the image of the object is not reflected in the visual cortex of the brain, as in a mirror. Completely different zones are set to the perception of individual properties: colors, shapes, locations. The auditory zones also work in a similar way, which each perceives separately: pitch, shape, rhythm, harmony, timbre, tempo, melodic contour, volume, reverberation, meter, alteration. This property of the brain is called modular perception.

Then synchronization occurs between all the identified properties and they are added up to the representation of a single object. If we want to focus our consciousness on the perception of a musical object, then we can consciously control only one of its aspects. Due to memory and fast switching from one aspect to another, it will seem to us that we perceive the music as a whole. However, this is not quite true. For example, listening to the performance of the orchestra, consciously focusing attention is possible only on one specific group of instruments (timbre), or switch to the “track” of perception of the rhythm, or the structure of the form, following the appearance and transformation of the themes. Switching from one stream of perception to another, the others act as a background and are not fixed by consciousness. This concerns the initial listening of the piece. At subsequent auditions, those moments on which attention was previously fixed were already fixed in the memory, and by holding them we isolate other signs that interest us. This is how the music analysis mechanism works.

One of the brightest supporters of neuroaesthetics – Vileianur Ramachandran developed a theory of human artistic experience and outlined 9 of its basic laws, based on pleasure, as the main evaluation criterion: *grouping, maximum displacement, contrast, isolation, peek-a-boo (perceptual problem solving), aversion to coincidences, order, symmetry, metaphor*.

Dr. Ramachandran in his book “The Tell-Tale Brain” [4] outlined the universal principles of aesthetic perception on the example of visual types of art – painting and sculpture. It is interesting to consider how these “laws” relate to the art of music, whether uniform universal principles work in it.

In this case, universal principles are those elementary structures that underlie the brain organization. They occur in any human brain that develops normally, and are associated with basic animal survival function. They will be considered in more detail.

1) The law of *grouping*. The perception of any object by the brain is fragmentary, that is, many neurons react to the stimulus in parallel, after which the pulse chain is synchronized. Such synchronization transmits to higher brain centers that the fragments belong to the same object. In a matter of seconds, the brain solves the perceptual puzzle, isolating the meaning from the chaos of the information received. When it is possible to give a familiar image to disconnected elements, a feeling of pleasure arises.

In everyday life, examples of the law of grouping are found at every turn. The easiest way to illustrate it is on the example of visual images. As an option, there is a combination of colors in clothes. If the shoes and the handbag are of the same color, and at the same time harmonize in color with the other accessories, then this picture causes a sense of aesthetic pleasure. Evolutionally, such a brain function has developed in order to be able to easily recognize among the incoherent spots a complete image of a predator in the bushes.

As for the musical perception, each element of a musical work excites individual cells in the areas of the auditory cortex. The result is transmitted to the emotional center of the brain. If from a complex background it manages to highlight a clear form, then, again, there comes a feeling of pleasure.

2) The law of *maximum displacement* means the greatest attractiveness of what is given in exaggeration. In this case, the task of the creator is to grasp the very essence and strengthen it. That is why the cartoon causes a greater emotional response than the real picture. Speaking of artists, Dr. V. Ramachandran very precisely defined the essence of abstract art: "They [abstract artists - M.O.] got into the figurative elements of our perceptual grammar and created ultra-normal stimuli that activate certain visual neurons in our brain more powerful than realistic images" [4, p.249].

Cartoon approach is widespread in music. For example, the ballet "The Golden Age" by D. Shostakovich is a series of caricature sketches, and his opera "The Nose" is built on the caricatured rhythms of the XIXth century music. And there are quite a lot of such examples.

3) *Contrast*. In a broad sense the contrast is a relatively unexpected change of some property of two homogeneous sections adjacent in space-time. Contrast is usually pleasant for our senses – a sharp change in the color palette, a change in the texture gamut. In music, contrast is one of the most powerful means of expressiveness: from changing parties in a sonata form to a larger-scale contrast at the level of parts of a cycle.

4) *Isolation*. The brain has a limit of attention. At one point in time it is possible to consciously pay attention only to one aspect of the perceived complex object. One stable percept automatically excludes all others from the radius of attention. For example, impressionist artists deliberately obscure the outline in order to draw attention to color. V. Ramachandran outlined this phenomenon as follows: "The artist emphasizes only one source of information about the subject (color, shape, movement), and deliberately diminishes or eliminates the other sources" [4, p. 259]. The same thing happens in the music of the so-called impressionist composers, when the melody is deliberately blurred in favor of admiring the timbre-harmonic phonism.

5) *Peek-a-boo* or solution to the problem of perception. The bottom line is to enjoy not the final result, but the very process of finding the beautiful. The following paradox often happens in art: sometimes an object can be made more attractive by making it less visible. Pleasure arises in the process of articulating. A well-known example from painting, when a girl veiled with a veil is more attractive for perception than a naked girl. In the internal representation of the object is ideal, while in the real world, the opposite is true. It is unlikely that imagining a naked maiden will present scars and irregularities on her skin. In the imagination the object is always perfect. It is unlikely that in recollecting of a fragment of the symphony by Mozart in the imagination will be fake French horn. The effect of thought-out as a kind of space for freedom of thought is always present in the perception of musical works, in which the program is either devoid of specifics or is completely absent.

6) *Aversion to coincidences*. There is always an unconsciously drawn parallel with real scenes from life, when perceiving works of art. The probability of coincidence in real life is very

small, and they need to find a plausible explanation. If the brain system fails to explain them, then such coincidences are perceived as suspicious. The feeling of pleasure is included in the case when it is possible to find the typical and avoid suspicious coincidences. For example, the identification of the composer's individual style is a complex musicological puzzle with an inevitable sense of pleasure in solving it. However, in the case of imitation and, as a result, with a low idiomorphic level, such a composer's style will be assessed as bad (lack of style). Steven Pinker, a scientist in the field of cognitive sciences, describing and explaining the work of the brain revealed that: "We have a tendency to dissatisfaction with inexpressive, monotonous scenes and the desire for multi-colored and diverse scenes" [3, p. 578]. This law is closely related to the law of contrast.

7) *Order*. The brain has a tendency to streamline information, search for a form even where there is none. Therefore, he always tries to find predictability, correctness. Sometimes it can take on extremely radical forms, which in modern psychology is called perfectionism. For example, in most cases, people are annoyed by crookedly hanging watches, garbage on clothes or hair. Such a "built-in" need for correctness is a deep need for saving the process of processing an incoming signal from outside. Therefore, musical works with repetitive, predictable, orderly metro rhythm are regarded as more pleasant than those in which the fuzzy and difficult to define metro rhythmic organization.

8) *Symmetry*. All objects important to humans from a biological point of view are symmetrical: food, partner, own reflection. If a person's face or body is not symmetrical, this may indicate a disease, and this means that such a partner is not suitable for procreation. If the fruit is not of a symmetrical shape, then it can be affected by bacteria and is not suitable for food. Therefore, all symmetrical objects are perceived as attractive. Examples of symmetry in art are countless and music is no exception. However, symmetry is good only for individual objects, and not for whole complexes. For example, a symmetrical sofa or table is good, but a symmetrically furnished room will not bring aesthetic pleasure. Symmetry along with contrast are the most important musical expressive means.

9) *Metaphor* – the brain's tendency to create abstract cross-modal concepts and get pleasure from it. The meaning inherent in the work, as a rule, is not obvious. It is captured by the right hemisphere, affecting the subtle emotional level, long before the verbal-logical left hemisphere can decipher it. Through the principle of metaphor, music is capable of revealing a wealth of meaning, which is much thinner and more complex than the logical apparatus can express.

For example, a musical element such as lower-pitch tremolo is often used by composers to convey an image of fear, anxiety. Dr. Ramachandran explains this pictorial device as follows: "... the spatial echo of your own tremor, which, in turn, resonates with the notion of fear" [4, p. 280]. The principle of metaphor permeates all levels of musical activity, unites the composer, performer and listener, while maintaining the unity of semantic and value coordinates.

The unifying basis of the above aesthetic laws of Ramachandran is the principle of the search for pleasure, which consists of a combination of tasks and energy saving. We like music that plays with our expectations. In the process of perceiving music, the brain tries to predict what will be heard. Such prediction is constructed on the basis of educated cultural and musical patterns: melodic, rhythmic, harmonic, etc. You can imagine a speculative scale in which there are limits to the expected experience. If the perceived object is located within this scale, then for the brain it is of a certain interest, the extent of which, in turn, is directly dependent on the width of the range of acceptable expectations. If the object of perception goes beyond the limits of permissible expectations, then in this case it is regarded by the brain as hostile. (see fig. №1)

Figure №1

- a) the boundaries of the expected experience;
- b) averaged value (typical, banal);
- 1) the closer to the middle, the weaker the interest;
- 2) the greater the amplitude of permissible expectations, the greater the interest in the object;
- 3) if the object of perception is beyond the boundaries of the expected, it is incomprehensible and hostile.

The brain predicts and foresees each subsequent step, therefore, a violation of expectations is regarded as an error. In this case, the brain has to create new schemes to understand this deviation, to expand the horizon of its own knowledge. And this is an energy-intensive process, which is interpreted as difficult and, therefore, undesirable, because by its nature the brain is aimed at saving energy. As a result, we like more what we are used to.

The laws of aesthetic perception of Ramachandran are quite suitable for the art of music, although, in my opinion, this list is not exhaustive. For example, one can add to them the law of species compatibility, the essence of which lies in the uniqueness of all elements of the perceived object. When houses on the street are designed in the same style, it brings more aesthetic pleasure, such as, for example, in the historical center of Paris. If there is a poly style, then this is a kind of intellectual rebus, the solution of which requires the expenditure of energy. From a biological point of view, this principle can be illustrated by the fact that in the animal world the female chooses a partner of her own kind. The combination of different species can lead to undesirable mutations. The man also overwhelmingly chooses the partner of his race.

Neuroaesthetics as a young and, at the same time, sufficiently developed science gives us a new unique opportunity to understand the structure and functions of the "I" not only from the outside, observing behavior, but also studying the inner workings of the brain. For musical art, in which many processes take place in the subconscious, contact with the developments of neuroaesthetics and further research in the field of this science seems quite promising.

The perception of music, its understanding, performance, and composition are represented not only by creative actions with varying degrees of talent, but also are a complex set of neurophysiological processes in the human brain.

Dr. Ramachandran was primarily engaged in the study of the perception of objects of fine art. However, his "laws" work well in other forms of art, in music in particular. So, at the intuitive unconscious level, preference is given to the symmetric form of the work, repetitive predicted rhythm, logical harmony. When listening to a piece of music, pleasure is experienced in the process of the action itself, while in places where forms are completed, pleasure is enhanced by embracing and understanding the principles of the form itself. The evolutionary human brain is set up to search

for the whole, to pick up this whole from the scattered elements. Getting a sense of pleasure in solving such problems is a kind of reward for the work done. Therefore, the value of the whole exceeds the value of the sum of its individual parts.

At the level of biological structures, all people are similar. Their uniqueness and individuality is formed mostly in the field of psychological processes. Therefore, regarding the universal principles of aesthetic perception, it can be argued that laws are given by nature, and specific content is acquired in the process of training and education.

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ВИХОВАННЯ ПРОБЛЕМИ ЗДОРОВ'ЯЗБЕРЕЖУВАЛЬНОЇ ПОВЕДІНКИ ДІТЕЙ МОЛОДШОГО ШКІЛЬНОГО ВІКУ: ТЕОРЕТИЧНИЙ АСПЕКТ

Поринець Д. І., Брижак Н. Ю.

EDUCATION OF THE PROBLEM OF HEALTH-PRESERVING BEHAVIOR OF YOUNGER SCHOOLCHILDREN: THE THEORETICAL ASPECT

Porynets Diana, Bryzhak Nadiia

У статті розкривається теоретичний аспект процесу виховання проблеми здоров'язбережувальної поведінки дітей молодшого шкільного віку. Узагальнено сучасні підходи до інтерпретації поняття «здоров'язбережувальна поведінка» дітей молодшого шкільного віку; Використовуючи метод теоретичного аналізу психолого-педагогічних і навчально-методичних джерел уточнено зміст понять «здоров'я», «здоров'язбереження», «здоров'язбережувальна компетентність» у сучасних дослідженнях українських науковців.

Визначено, що збереження та розвиток здоров'я молодших школярів заслуговує особливу увагу.

Ключові слова: здоров'я, здоров'язбережувальна поведінка, молодші школярі, «здоров'язбережувальна компетентність».

The relevance and expediency of this research has shown that the dynamism and transformation of modern life predetermine the objective need to recreate a healthy Ukrainian nation, especially younger students, as a national potential in solving globalization problems of society, since it is precisely at this age that the foundations of the future life position of a person are laid, functional functionalities are developed. systems of the child's organism, the assimilation of moral norms, the social orientation of the personality is formed.

In the context of the study of theoretical foundations of the problem of upbringing the health of preservative behavior, the essence of the concepts of "health", "health preservation",