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PSYCHOLOGICAL PECULIARITIES OF REGULATION OF MOTOR ACTIONS OF OLIGIPHRENS WITH THE HELP OF SEMANTIC TASKS

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INTRODUCTION

The study of the structure of activities has allowed scientists to ascertain that meaning is created as a result of reflection by the subject of the relations existing between him and what its actions are directed as its immediate objective. The motive's attitude to target generates personal meaning, and smalloutline function in this regard motive (Leontiev). At the same time, in the psychomotor action the backbone for it is a semantic task. However, studies on the role of semantic tasks in the management of psychometrika of children oligophrens are mostly absent, and they are studied simultaneously in the context of other problems.

We investigated the effect of semantic tasks on the regulation and efficiency of psychomotor activity of retarded children aged 6-7 years (32 children) with significantly damaged thalamo-pallidar level. First, they performed the semantic task "raise your hand" and then "take off your hat". Mentally deficient children aged 11-12 years (35 children) with significantly damaged pyramido-striatal level first performed a semantic task "draw a circle", and then – "write the letter O". Indicators of motor coordination during the execution of children semantic task was assessed by three experts on a 12-point scale. In the selection of experts to take account of their theoretical framework (master's level special education) and practical preparation (experience of working with children oligophrens not less than 5 years).

An innovative level-structured program of developing skills of regulation of motor actions, which applies all five classes of semantic tasks that operate at all levels of movement construction was developed. Each class of semantic tasks improves coordination on one level, and together they are a kind of "school" of coordination, configuration, and psychomotor actions with objects in normal, and with different intellectual pathologies.

1. Psychophysiological mechanisms and the control of motor actions of a human

Among the various diagram explanations of the control of human behavior prominent place in the history of psychology belongs to the cause of the ring. Perhaps the idea of circularity in the explanation of the mechanisms of control by different processes refers to the so-called "eternal" ideas, which in its general characteristics was mentioned in the ancient Indian epic "Mahabharata". This issue remains relevant for contemporary scholars. Research of features of formation of the ideas of reflexive rings is an important scientific problem in the history of psychology, which started in the works of V. A. Romance, M. G. Yaroshevsky, A. M. Zhdanov and others.

Significant steps towards the development of this problem were made by the French philosopher and naturalist in the first half of the XVII century. The schematic responses of the organism to the influence of factors external and internal environment was a unique explanation of the causal features of control of behavior, mechanisms of its determination. Psychological knowledge has received a powerful impetus for the transition from a purely philosophical to an empirical basis.

At the same time, the English materialist philosopher T. Hobbes created a system of psychology in which sensations and representations (traces of sensation) as the elements of consciousness interact are based on adjacency in space and time. Such mechanistic links will be called "the association" in the future and will contribute to the emergence of associative areas in psychology. Since evaluating the author's false view that mental processes are just phenomenal reflection of brain processes, as well as his theory of mechanistic constraints it is still possible to argue that the proposed mechanisms of functioning of the psyche contain the basis for the development of materialistic deterministic scheme behavior.

A prominent German scientist (philosopher, linguist, historian, mathematician) G. Leibniz, reflecting on the principles of mental reflection, came to the recognition activity of the soul even in sensation. He introduced into scientific use the term "percepta". The allocation of perception and percepts, or primitive presentation of specific content and a clear conscious perception, stated not only the dependence of perception from a combination of factors caused by the experience of the subject, but also meant certain cyclic diagram of operation of these processes.

Regarding the problem of the reflex ring, we note that the approaches to its understanding in psychophysiological terms are outlined in the theory of vision operation developed by John. Berkeley. This English philosopher explained the visual perception of space from the perspective of the principle of association based on subjective idealism that contributed to the formation of associative psychology.

Cyclic mechanisms of behavior control are holistically viewed in the ideas of reflex rings, formulated by George Dewey. This psychologist and philosopher of Michigan, Chicago and Columbia universities, was convinced that all psychic abilities are tools to solve life's problems. Actually George Dewey's instrumentalism resulted in functionalism, and he can be considered the founder of functional psychology as a distinct phenomenon.

Dewey and his followers believed thet the body is a holistic system and criticized the structuralism of W. Wundt and E. Titcher, who sought to highlight “sensory mosaic” of consciousness. Representatives of functional psychology were convinced that all mental processes and properties are directed to the connection of the organism with the environment, and structural psychology is a kind of concentrated essence introspective interpretation of the psyche, the study of the psyche as a closed in itself consciousness.

Functional psychology, based on the theory of evolution of Darwin, positivist psychology Herbert Spencer, the pragmatic psychology of W. James, is completing a significant amount and content of the period of formation of natural-scientific psychology, and the concept of the reflex ring developed by J. Welles Wilder. Dewey presents the idea of cyclicality on a new, much higher level. V. A. Romenets said: “The idea of the ring, according to Dewey, takes on a significant life of meaning, precisely because the ring is the coordination of members who come together in conflict situations. This conflict is expressed in the temporary disintegration of the adaptive act and the need to recreate the integrity in the interaction of sensory stimuli and motor responses”. Also, the scientist stresses that the concept of the Dewey “stimulus” and “response” are different in both the functional phase-coherent mutual mediation or supplement. “The idea of the ring makes it possible to understand how the stimulus is adequately determined, and the answer can be logically and naturally completed. Any behavioral achievement means that the motor response helps in the discovery, invention, and institutionalization of incentive. So. there is the movement of a certain

level, as the result, the complex of sensations becomes clearer and more objective”[1].

This is the first in the history of science to describe the principle of feedback in the management of human behavior. Even more so, Dewey applies the idea of a reflex ring to explain the nature of psychic evolution, the analysis of thinking activity, the study of motor systems, the justification of identity consciousness.

The founder of the first laboratory of the experimental research of the psyche in the territory of Ukraine M.M. Lange, the author of the theory of volitional attention (motor theory of active whole subordinate perception), explained the processes of attention and perception, based on the reflex nature of the functional brain units, and described them on the principle of "ring reaction". This substantially enriched the paradigm of the reflex ring in psychology. In particular, this approach allows us to explain the assimilating sense and the integrative image function.

M. Zhdan noted that the work of I. P. Pavlov significantly influenced the development of psychology, particularly in Russia, his doctrine o conditional reflexes was the determining factor for the development of natural-scientific psychology. “However in the conditions of ideological pressure, which was felt by science in the Soviet period, there was an absolutization and dogmatization of Pavlov's doctrine and turned on the forcible imposition of it in psychology and in other fields of study (medicine, pedagogy, linguistics, etc.). The development of the reflex theory of I. P. Pavlov was slowed down”[2].

M. A. Bernstein’s, P. K. Anokhin’s and other scientist’s attempts to develop the doctrine of reflexes were administratively prohibited. In particular, the development of schemes of management actions based on the principle of the reflex ring was forbidden.

The first who experimentally demonstrated the idea of the functioning scheme of the reflex ring was an outstanding physiologist, psychologist, biomechanist M.M. Bernstein. Biomechanically examining the management structure of psychomotor action, the author came to the conclusion that the relationship between the effector commands and the actual results of the motions are ambiguous. Experiments have shown that the result of the movements, in addition to effector orders directly impact beyond the individual gravitational, inertial and reaction forces. And this

[1] Роменець В.А. Історія психології XIX початку XX століття / В.А. Роменець. – К. : Вища школа, 1995. – С. 256.

[2] Жиляк Н.В. Психологічні особливості регуляції моторних дій за допомогою смислових завдань: монографія / Н.В. Жиляк. – Кам’янець-Подільський : Медобори-2006, 2015. – 150 с.

with the extreme complexity of the structure of the musculoskeletal system (more than 200 bones and over 600 muscles, more than 100 degrees of freedom of motion in the joints) that knocks the implementation of the motor function of a person of certain trajectories and hinders the achievement of goals. Therefore, the repetition of even simple actions is not their exact copy. It is a repetition without repetition.

Therefore, under these conditions, once sent to the effector muscles orders can't fully determine the kinematic and dynamic characteristics of the action. The required correction of movement based on the detection of differences between the forming target of the action and its actual parameters.

Biomechanical measurements experimentally confirmed the idea of "the regulation of movements with a feeling of" using the feedback scheme of the ring. This is one of the most important principles of all types of control. The correct relationship, in particular, muscle tension and effective movements require the continuous introduction of corrective signals to the working muscle synergies. Corrective signals are generated, as already noted, on the basis of comparison of planned and actually made movement.

Exploring the neurophysiological mechanisms of higher nervous activity, the author of the theory of functional systems and one of the founders of neurocybernetics P. K. Anokhin assigns a cyclical control reflex the leading role. According to the scientist, without a recurrence the control is impossible. Anokhin emphasized that all functional systems, mechanical or living, which are focused to give useful effect, and therefore, they must have a cyclic character. In other words, functional systems can't exist if they do not receive reverse signaling about the degree of usefulness of the effect.

P. K. Anokhin justified the existence of "accentor of actions" – the device intended for the perception of the expected outcomes of the action. It is important that accentor of the action is formed earlier than the reflex. Its main purpose is to take in all stimuli that arise as the operation in forms of reverse differentiation and its result, and conducts a comparison of this synthesis with predictable results of the action. When the planned and actual movements are coincidence, the entire cyclical process completes, but their "difference" is a series of new preferential adjustments aimed at achieving a reflex response adequate to the nature of the acceptor of the action.

In a complex system of afferentation, the author had identified basically three types: a) starting aperently submitted to the action of the

conditioned stimulus; b)situational afferentation, represented by a set of stimuli that creates a certain dominant state of the living organism; c) the opposite afferentation apparently associated with proprioceptive sensations needed to control the activity of the muscle periphery. Anokhin's special attention was paid to the synthesis of all the afferent signals of external and internal sensations. According to the author, any reflex action could not be formed in the effector apparatus until the synthesis of all reference information that represents the organism at a particular time is finished. Even more, the exclusion of at least one of the afferent systems immediately destroys the reflex.

Exploring the management features of arbitrary action by the scheme of the ring (the brain is centrifugal nerves – muscles – of proprioception – nerves), towards the center, the brain, the area where direct communication is the way the brain is a muscle, and feedback – muscle, brain, M. O. Bernstein's student L.V. Chhaidze proposed to divide this ring into external and internal. External ring, according to the author, includes a direct connection (brain – muscle) and outer arc feedback (visual, auditory, olfactory, tactile, and other receptors that have semantic apparently, the brain). The inner ring includes a direct connection (brain – muscle) and the inner arc feedback session (proprioception not directly related to human consciousness, the brain). So, in dola-ring (two ring) scheme proposed by Chaze, the plot of a direct connection is common for the inner and outer rings.

L. V. Chhaidze proposed such a control scheme of arbitrary motor actions of a human because the inner and outer ring play a different role in the control of the psychomotor activity of the subject. The outer ring controls the semantic side of the motor act and the internal work of muscular synergies. Such functional separation proves clinical trials. The regeneration pathways of the spinal cord loss of movement coordination (meaning the action is stored) and the relatively high damage of brain areas observed violations of the meaning of actions(coordination is maintained). For example, animals with distant higher parts of the brain walk well but do not notice the food. It can be stated that the function of the inner ring is the provision of biomechanically appropriate movements by prolonged exercise, as a function of the external – perform semantic tasks by knowledge of the fine structure of the semantic structure of the action.

At the same time, Chhaidze notes that this distribution of functions is not absolute and identical in all cases. In particular, when performing

unfamiliar work in the lower divisions of the Central nervous system does not yet have the relevant work program of muscle synergies and higher departments have to monitor the semantic structure and motor structure. It is clear that the higher departments are not designed to manage energetic, specific details and actions are biomechanically inefficient (using external feedback). The author stresses that if one of the action control rings does not fully cope with their responsibilities, then the second (partial) assumes his functions, however, the engine act, under such conditions, always drop one or another of its components. These facts are confirmed in the studies of A. I. Shinkaruk.

Dola control scheme movements by L.V. Chhaidze, was improved by E.G. Malkhazov, actually offering two schemes: a scheme of forming a mental image of the running motion (action, operation) and the scheme of the psychophysiological mechanisms that provide the construction, organization, and control of motor activity. In these schemes, the author revealed the relationship between psychological and physiological control mechanisms of psychomotor actions. As for the distribution of functions between the two rings, the author stresses that the "full control becomes possible after the lower divisions to form respective modules and provide internal feedback. Only under these conditions, it becomes possible to perform complex motor actions where the monitoring of the semantic structure is an outer control ring, and the inner provides the finest synergistic implementation details of this movement"[3].

Analyzing the cyclical behavior management, V. A. Romainets writes: “However, the idea of the ring must be completed. Then the “ring” becomes a “spiral”, because the feedback is not a repetition of content, but the getting of new” [6, p.257][4]. We agree with this, and use it to confirm the control of psychomotor actions: “It is known that a motor-sensory way of operation and domain-intellectual thinking, that is, the same mental model of the action that regulates and supervises its implementation, inevitably presupposes the existence of search and trial selection in the process of repeating actions. Successful guidelines that are justified, the methods of regulation and the ways of combining movements into a complete action is selected and fixed”[5].

[3] Малхазов О.Р. Психологія та психофізіологія управління руховою діяльністю: монографія / О.Р. Малхазов. – К. : Євролінія, 2002. – С. 95-96.

[4] Роменець В.А. Історія психології XIX початку XX століття / В.А.Роменець. – К. : Вища школа, 1995. – С. 257.

[5] Шинкарюк А.І. Психологія діяльності: навчальний посібник / А.І. Шинкарюк, В.А. Шинкарюк, Р.Т. Сімко; за заг. ред. А.І. Шинкарюка. – Кам’янець-Подільський: Оіюм, 2018. – С. 21.

Consequently, feedback is not a repetition of content, and acquires new methods of performing movements, changing patterns of the touch control, changing patterns of central regulation.

There are two levels of programming of movements. First, a part of the outer ring and ensures the implementation of the tasks associated with the semantic structure of motion. The second determines the sequence of movements in detail (the order of inclusion of muscle synergies) and is included in the inner ring control. A.G. Malkhazov writes that "The presence of pyramidal and extrapyramidal tracts gives the ability of the Central nervous system to control movements with both rings, giving preference in the management of one of them, depending on the degree of mastering of this movement by the individual. The mechanism that sets and the mechanism that programs do not have specific "residence" in certain centers of the brain. Depending on the objectives, level of automation of the motion, con-rol is completed by different subordinate levels of the Central nervous system"[6].

Proving the existence of sets of movement negrams, M.A. Bernstein leads the existence of motor skills and automatic movements. Mechanisms of functioning of movement negrams as multi-step processes are elaborated by O.R. Malhasov.

The conditional reflex, as ontogenetic engram, according to A.R. Malkhazov is a highly integrated phenomenon, in the establishment and operation of which various cortical and subcortical structures of the brain are involved, which also are involved in this process from different functional and temporal contributions.

Considering the problem of the functioning of functional systems from the standpoint of psychophysiology and psychology, the author argues that "psychophysiological features of activity of functional systems and levels of building and managing movements, selected by M.O. Bernstein, L.V. Chhaidze, D.D.Donskyi, P. K. Anohin, do not fundamentally differ from each other"[7].

Specific features of managing human behavior are influenced by his age, individually-typological properties and non-normative development – mental retardation.

Therefore, one of the major schemes of the relationship between motor skills and psyche is a reflexive ring. Understanding of the cyclicality in explaining the mechanisms of control of movements was developing and specifying in the history of psychology and allowed

[6] Малхазов О.Р. Психологія та психофізіологія управління руховою діяльністю: монографія / О.Р. Малхазов. – К. : Євролінія, 2002. – С. 96.
[7] Там само. – С. 92.

identifying how adequately the stimulus is determined and response acquires its logical conclusion. The principle of feedback in the control of motor action has allowed us to understand how sensations become more expressive and objective. Recognition of the functioning of the brain units based on the principle of "circular reaction," explained the assimilative function of integrating sensations and images.

Experimental evidence of ambiguity between the effector commands and the actual results of the movement substantiate the need for their correction. Important steps in the study of mechanisms of control of arbitrary motor actions of a human were proposed two-ring diagram of the formation of a mental image perform the movement, the scheme of psychophysiological mechanisms that provide the construction, organization, and control of motor activity. The idea of cyclical behavior management has acquired new meaning when the "ring" became "spiral", as feedback is a mechanism of finding a new and not a repetition of content.

2. Features of the structure of the program of development skills of regulation of motor actions in a semantic task

Physical training of the younger generation is one of the urgent problems of the development and strengthening of the state, to establish its independence. Human health is a decisive factor that determines the fate of future reforms. At the same time, the evidence of these statements contrasts with the real low level of physical fitness and health of school children and university students. Under such conditions, the physical education of the younger generation can be considered as the most efficient and cost-effective way of disease prevention, improve mental and physical health, employability of workers. Contribute to the psychophysical development of young people has its psychomotor training, which significantly enhances the professional reliability of a specialist in modern conditions when the human factor is the cause of the vast majority of accidents and disasters. The methodological basis of psychomotor training of student's youth can be the principle of unity of consciousness and activity, are well described in modern literature, according to which the opposite of objective motor and subjective psyche is not absolute. This contrast is eliminated by functional transition of noticed phenomena that prove the organic unity between the motor skills and mind, material, and ideal. A. I. Shinkaruk emphasizes that the psyche is objective in functional parts of the body as the temporary combination

of forces that can carry out a specific achievement and, the author notes that biodynamic fabric living movement at the same time becomes its sensual tissue in them[8].

Functional organs are complex systems and behavioral achievements that they provide include both psychological and physiological processes, which is particularly important for the study of psychomotor. In particular, the functional approach to the study of psychomotor is not possible without taking into account the system's levels of movement construction, studied in detail by M. A. Bernstein. However, it requires further development of the problem of the development of skills of regulation of motor actions in a semantic task.

The lowest level of the building movements that has a functional autonomy is a level A – paleokinetic regulation (rubrospinal). It already contains morphological derivations, which can send certain effector commands from the brain to the muscles, and specific receptor derivations, which perceive reference information. First of all, synthetic sensory field of rubrospinal level can determine the body's position in space relative to the earth's gravity and the relative arrangement of the parts of the body, getting proprioceptors apparently the strength and direction of pressure on the muscle tissue (mainly deep) and information about the magnitude and direction of muscle stress. Central nervous coordination level of paleokinetic regulation A is partially located in the spinal cord and partly in the nerve centers (red nucleus, and others) of the lowest divisions of the cerebellum. This level maintains muscle tone and the excitability of the muscle groups needed to execute the command pulses from the layers above.

Rubrospinal level of movement construction is a morpho-functional basis of the decision of semantic task of motor actions according to the adoption and preservation of kinematic postures of the body, it controls muscle tone of the trunk and neck. The leading level of paleokinetic regulation is also in the arbitrary motions rhythmic vibration and involuntary shake from fear or cold, and also in jerking.

Analyzing the conditions when level A is leading for saving poses, M. O. Bernstein notes that this usually occurs in one of the phases of the chain of complex motor act, and cites the examples of the phase of flight of the long or height jump, the ski jump, a starting jump into the water, etc.[9]

[8] Шинкарюк А.І. Психологія діяльності: навчальний посібник / А.І. Шинкарюк, В.А. Шинкарюк, Р.Т. Сімко; за заг. ред. А.І. Шинкарюка. – Кам'янець-Подільський: Оіюм, 2018. – С. 85.

[9] Бернштейн Н.А. Физиология движений и активность / Н.А. Бернштейн; под. ред. О.Г. Газенко, изд. подгот. И.М. Фейгенберг. – М. : Наука, 1990. – С. 59-60.

For all other motor actions and, accordingly, the semantic tasks, which they deal with, the level of paleokinetic regulation is the background. The function of the level A in their implementation consists in the regulation of tone and the excitability of muscles, which, as we know, are not determined directly by consciousness.

Consequently, functional autonomy of rubrospinal level should be treated dialectically[10,11]. At the same time the necessity of getting psychomotor activity experience proprioceptive regulation of the positions in space of the execution of motor actions by subjects does not cause doubts. Awareness of body position and its separate parts in space and the retention of postures, undoubtedly, are separate "class" semantic tasks of motor actions.

To develop the coordination capabilities of rubrospinal level by using various physical exercises for the reproduction and differentiation of various kinematic poses. These exercises should be presented in the program of the development of skills of regulation of motor actions. To determine the psychomotor capacity of the subject at the level of paleokinetic regulation is appropriate by using a variety of tests on the preservation of static equilibrium.

Thalamo-pallidar level of synergies is located above rubrospinal level A or the level of friendly movements and standard stamps B. Proprioceptoral and tangoceptoral apperentice of the level allows to obtain information about the dynamics of movements in the body schema, in particular, to assess the relative positions of the parts of the body, the value of the angle between biochains in the joints, the speed, and direction of their changes. M. O. Bernstein emphasizes that the thalamo-pallidar system (the major subcortical nuclei deep brain regions: the optic protuberances, pale bodies, and some others) secures three important focal qualities. First, the level of synergies can combine the work of many dozens of muscles to coordinate the movements of all links in the schema body. Second, the level of friendly is able to combine movements in time to coordinate the sequence and alternation of movements of all extremities with millisecond precision. Thirdly, due to the fact that the movements of the thalamo-pallidar level are performed without regard to the world, they tend to be repetitive, to stamps[12].

[10] Шинкарюк А.І. Рівні побудови рухів і смислова структура дії / А.І. Шинкарюк. – Кам'янець-Подільський: ФОП Сисин О.В., 2008. – 200 с.

[11] Шинкарюк А.І. Психологія діяльності: навчальний посібник / А.І. Шинкарюк, В.А. Шинкарюк, Р.Т. Сімко; за заг. ред. А.І. Шинкарюка. – Кам'янець-Подільський: Оіюм, 2018. – 208 с.

[12] Бернштейн Н.А. Физиология движений и активность / Н.А. Бернштейн; под. ред. О.Г. Газенко, изд. подгот. И.М. Фейгенберг. – М. : Наука, 1990. – С. 67-69.

Having a perfect afferentation on a dynamic picture of the movements in the scheme of the body and rich coordination capabilities, level B as a leader acts only in the movements expressive facial expressions, pantomime, and plastics. The author of the theory of the levels of movement construction emphasizes that they are not symbolic, but directly emotional movements. At the same time, he writes that "Almost beyond the level that is characterized many of the movements in gymnastics are occurred: trunk bending, flexing, tilting body, a variety of plastic and rhythmic movements"[13].

Thalamo-pallidar level ensures the stability of motions in a dynamic force field of action that involves the use of inertial and reactive forces in solving motor tasks. At the same time, it should be noted that providing a certain stereotype of human movement, the level of friendly movements and standard types is not stereotypical, and that allows it to fit the movement in the dynamic conditions. "The functional possibilities of level B can be defined by dynamic tremor, dynamic balance, fidelity (without visual control) spatial and temporal characteristics of the movements"[14].

Thus, thalamo-pallidar level has its afferent and efferent synthesis, which distinguishes it from all other kinetic systems of the human body and ensures the implementation of a particular semantic class of problems for which this level is leading.

To improve the coordination capabilities of thalamo-pallidar level by using various physical exercises of reproduction, and differentiation to measure the relative positions of the parts of the body, the magnitude of angles in the joints, the direction and speed of changes need to be presented in the program development skills of regulation of motor actions. To determine the psychomotor capacity of the subject at the level of friendly movements and standard dies appropriate using a variety of tests on dynamic equilibrium and the fidelity of the spatial, temporal and power characteristics of movements without visual control.

Pyramido-striatal level of spatial fields C morphologically is located between the oldest and the newest formations of the brain and is divided into two sublayers. The lower forms the core of the "striped body" – striatal sublevel of the extrapyramidal system, and the higher – giantpyramid field of the cerebral cortex, pyramid sub-level cortical

[13] Бернштейн Н.А. Физиология движений и активность / Н.А. Бернштейн; под. ред. О.Г. Газенко, изд. подгот. И.М. Фейгенберг. – М. : Наука, 1990. – С. 71.

[14] Шинкарюк А.І. Рівні побудови рухів і смислова структура дії / А.І. Шинкарюк. – Кам'янець-Подільський: ФОП Сисин О.В., 2008. – С. 10.

system. Accordingly, the level of spatial fields gets afferentiation on balance, changes in the joints and muscles with the lower structures of the human brain and information from visual analyzers, which provides the functionality to control involuntary muscular groups and arbitrary complex actions.

The level of spatial fields is proprietory, has tango-receptor and teleceptor afferentation that allows it to coordinate movement with external space that is "tied" to their environment. M. A. Bernstein writes that "the movements of the spatial fields are first clearly identified target, they are from somewhere, where and why. These movements are extrovertive facing the outside world and to a lesser extent than movements in the level of synergies, introvertive. Movements of the level C carry, push, pull, take, tear, throw. Movement in spatial fields are always transportable; if their appearance is sometimes cyclical when necessary due to the construction of our limbs (walking, running), because of the semantic structure these movements as well as space in which they occur are non-periodic"[15].

Pyramido-striatal level ensures the achievement of the target in space with enormous flexibility and variability of the trajectories of biochains of the body. The level of spatial fields is the lead in all movements of the body as a whole and its parts (locomotion, throwing, punching). The psychomotor ability level can be determined by the indicators of the accuracy of various movements, where the level A is leading. A. I. Shinkaruk writes: "It can be argued that oral-search activity at this level provides a significant opportunity to generate a "cognitive hypotheses". If you extend this provision to all functions of the psyche – tonic-inductive, regulatory-practical, and imaginative, and other functions, we can assume that oral research activity allows to generate hypotheses from all sides of the act of reflection"[16].

To develop the coordination capabilities of the pyramido-striatal level by using a variety of physical exercises to target precise movements in space. For example, throwing objects at the target, the execution moves to bypass obstacles and so on. The determination of the psychomotor capacity of the subject at the level of the spatial field-expedient with a variety of playback tests, measuring and differentiating the spatial accuracy of movements should be included in the appropriate program.

[15] Бернштейн Н.А. Физиология движений и активность / Н.А.Бернштейн; под. ред. О.Г. Газенко, изд. подгот. И.М. Фейгенберг. – М. : Наука, 1990. – С. 83-84.

[16] Шинкарюк А.І. Психологія діяльності: навчальний посібник / А.І. Шинкарюк, В.А. Шинкарюк, Р.Т. Сімко; за заг. ред. А.І. Шинкарюка. – Кам'янець-Подільський: Оіюм, 2018. – С. 12.

For example the accuracy of the jump (or triple jump) from place to a certain reference distance.

Over pyramido-striatal level is parietal-premotor level of subject actions or semantic chains D. Morphologically it is the highest divisions of the cerebral cortex. Getting teleceptor information not only about the size of the object, but mainly on the ratio of its individual parts as a whole (topological quality), this level is responsible for the semantic decision task of the action items and only a human has it. M.A. Bernstein writes: "The leading motive at the level of action is actually not a subject by itself, as a geometric form as something with a certain weight, texture, etc... and the semantic side of the action with the object still appears whether the object in this action object or even as its instrument"[17].

Level D allows the subject to carry out actions with the objects of human culture on the basis of understanding their functions and topological qualities. This allows indirectly influence the environment (affect some items on the other) implementing tooling function in human work. In the process of activity management level D gets the importance of acquiring functional asymmetry of brain hemispheres and the possibility of the formation of appropriate skills. All the action items parietal-premotor level is the leading and only through acts of speech and writing it is the background, acting as a "higher automaticity".

Describing the parietal-premotor level, the author of the theory of movement construction writes that "the movement in the level of substantive actions constitutes acts of meaning, i.e., it is not so much movement, how many elementary actions, defined by the sense of the task. To put on and fasten coat, lubricate ski ointment, to drive the soccer ball into the opponent's net, cultural to eat the egg... – here is the simple object action; and each of them is a set of movements that, in general, solve a particular semantic problem". And further: "... not all high intelligent engine acts can find a place in this level. In the level of actions coordination does not fall, for example, symbolic or conditional semantic actions, which primarily include not technically executive, but leading in semantic coordination of speech and writing..."[18].

Therefore, you can definitely say that N. And.Bernstein points to the complexity of the meaning of actions in a hierarchy of levels of building movements: each higher level of movement construction is leading to

[17] Бернштейн Н.А. Физиология движений и активность / Н.А. Бернштейн; под. ред. О.Г. Газенко, изд. подгот. И.М. Фейгенберг. – М. : Наука, 1990. – С. 120.
[18] Там само. – С. 144.

more complex actions than the lower one. In other words, higher levels are able to solve more complex semantic tasks than lower.

To improve the coordination capabilities of parietal-premotor level, you can use a variety of physical actions with objects, changing both the geometric and topological features of these items. These semantic tasks should be included in the program development skills of regulation of motor actions. To determine the psychomotor capacity of the subject at the level of substantive actions, or semantic chains by appropriate using of a variety of tests on the effectiveness of the implementation of the action with items of human culture, particularly important are the indicators of fine motor skills.

Over parietal-premotor level, as it can be seen from the following, is the highest cortical level E-level of symbolic (verbal and writing) or the symbolic meaning of actions. Morphologically it is formed by the highast layers of the cerebral cortex, which probably can be divided into different groups E. Describing this level A. I. Shinkaruk writes: "As a result of the evolutionary process corticalis nerve functions, level E dominates all the previous levels. Therefore, the functionality of this level is the highest that is in oral activity as in the semantic characteristics of a speech, and respective motor components, as well as the impact of speech is for all motor actions regardless of what level of construction of movements in their regulation is the leading"[19].

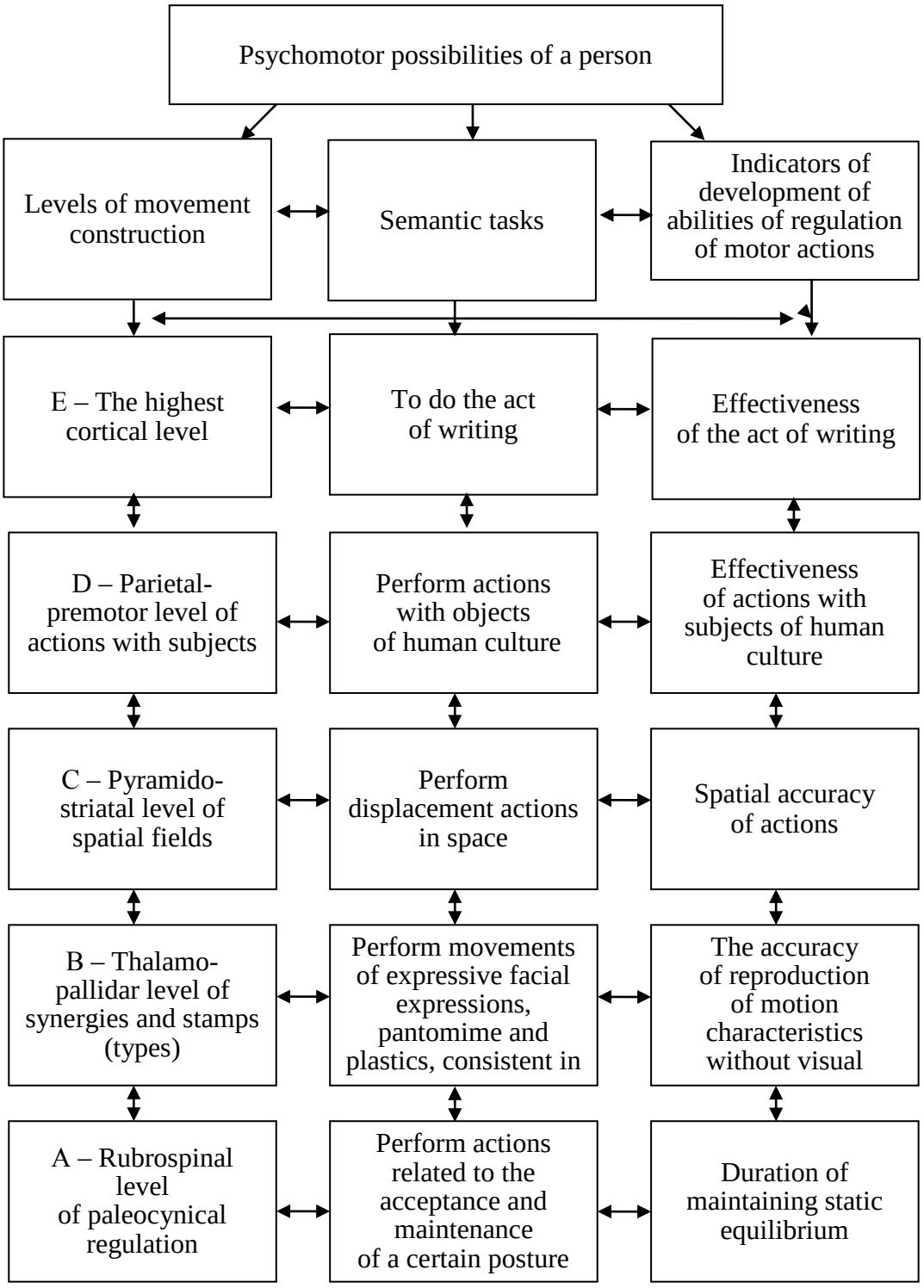
To develop the coordination capacity of higher cortical levels of movement construction you can use the action of writing with the help of different devices and on different surfaces, which must be submitted to the appropriate program. To determine the psychomotor capacity of the subject of the level E should be done by using a variety of tests on the effectiveness of the writing. For example the definition of indicators of the error and the time of coordination of writing between wavy lines.

Model of development of skills of regulation of motor actions with the use of semantic tasks is presented in pic. 1.

In modern psychology under psychomotor task the external or imaginary pattern of movements that the subject should reproduce by motor manipulation is understand. A motor task can also be understood as a verbalized instruction that the subject should do in a certain situation by motor activity. And neck, and a verbal description of motor tasks reflects the meaning of motor actions to be performed, and in this way

[19] Шинкарюк А.І. Рівні побудови рухів і смислова структура дії / А.І. Шинкарюк. – Кам'янець-Подільський: ФОП Сисин О.В., 2008. – 200 с.

they are primarily a semantic task of the subject concerning the future of motor activity.



Pic. 1. Model of development of the skills of regulation of motor activities of institutions with the help of semantic tasks

Image-purpose of the future motor activity is a great idea of the ending result. Psychological regularities and mechanisms of formation of the image of target disclosed in such terms as "setup", "advanced reflection", "advanced setup", "model of required future", "extrapolation", "the acceptor of action results" and many others. For them, the construction of the image-purpose are possible if you have an experience with the patterns of the past and the possibility of the future.

Synthesis of the available information of the person provides an existing conceptual model that decodes all the afferent signals from the system analyzers in a particular moment of execution of motor actions and updates the information stored in the memory and are necessary for the solution of this motor problem. So, a conceptual model is a mental picture of the process of control of movements and modalities for their implementation.

Misalignment between the image-task and conceptual model overcomes the operational image. It is a conceptual model in action. As a perfect reflection of the implementation of the operational image it is quite dynamic. It, on one hand, is constantly changing with the change of movements, and on the another –affects change of movements itself.

In the process of repetition of motor actions specified systems the sensory syntheses, sets the leading level of the building movements specified engine composition and its images are its reflection. It switches the coordination of the correction motor act on the most relevant afferent level. It is important to emphasize that the process of automation of the motor action is accompanied by a reduction of the content of images, movements and situations of their implementation. Remain the most significant landmarks, important for the solution of a motor task, realize their meaning.

So, the semantic task, formulated verbally, as the core of a motor task, can almost completely match or be a part of it. In the initial stages of mastering the action they are almost identical in terms of content, since the subject has no experience of their differentiation. In the process of skill formation its motor, sensory and central components differ more and more, gain a new conscious content, its relevant components are specified. In the future, there is a collapsing of information again and the focus of the subject remains only the most important components, which are semantic task-specific psychomotor actions. To understand a motor task is easier than the nucleus – the semantic task. To understand the semantic task means in practice to

find a way of solving motor tasks. During the process of execution of motor actions the subject is trying to find its meaning is relatively biomechanically feasible trajectories, accents, muscular effort, rhythm combining the movements in action, etc. With independent search of the meaning of this action it takes a lot of time, and it is not always possible to find. In terms of pedagogical impact and work of the student under the teacher's guidance on the implementation of semantic tasks, the process is optimized.

Motor tasks, especially verbally semantic tasks affect the composition of motor actions, which are understood as the set of motor operations performed in a particular spatial-temporal mode in accordance with the content of motor tasks and available external and internal ways of its decision.

M. A. Bernstein noted that the engine part is a function of the task and its execution. Its content is determined by the structural features of the locomotor apparatus: the kinematic chains of the moving parts of the body with their numerous degrees of freedom of motion in the joints (passive part) and the muscular system, the nervous centers, afferent and efferent paths (active part). Undoubtedly, the composition of motor actions depends on the conditions of its implementation, and the objects with which it is performed. At the same time, the motor part of the action before its beginning cannot be fully determined. Its full manifestation is in the process of practical implementation of the actions of a subject when implementing a correction system that corrects for differences between the image target and the actual movements at different levels of the coordination structure. So, for the development of skills to make an effective correction in the process of regulation of movements is advisable to create optimum variable conditions of implementation of the motor function of the subject and aiming movements (the assimilation of the sensory metric standards).

Analyzing the theory of levels of construction of movements by N. A. Bernstein E.M. Surkov stresses that it gives reason to two important conclusions: control of motor actions are carried out at different levels of the nervous system, levels of construction of movements interact on the principle of the dynamic of subordination. Motor tasks, semantic tasks are the motor part of the action, afferent and efferent synthesis (specific for each level), master level.

So, individual features of the development of the skills of regulation of motor actions are predetermined first of all by the originality of their

coordination capacity at different levels of construction of movements. Thus, the program of development of the psychomotor capabilities of a subject must contain means of influencing all levels of movement construction. This level-structured program of developing skills of regulation of motor actions should include a system of semantic tasks to do that will lead to the use of all levels of movement construction. So, it is advisable to apply a system of semantic tasks, which are solved at all levels of movement construction, in variable conditions, which can improve the ability of regulation of motor actions of children with mental retardation.

3. Features of the implementation of the semantic task to perform the motor actions that are leading to different levels of movement construction of children oligophrens

Conscious regulation of the subject motor action, which is implemented through specific semantic tasks, has always been one of the central problems of psychological science. A. G. Luria highlights in the motor actions their semantic structure and motor structure. Semantic structure characterizes both the content of the tasks of the action, its meaning, and engine structure as a way of solving the problem, work of specific muscle synergies. The fact that any motor actions are both mental and motor components, is confirmed by.G. Ananiev, Is.P.Ilyin, V. V. Klimenko, and others.

M. O. Bernstein found that the motor components of action are determined and sent to the semantic task. He identified five levels of movement construction and, accordingly, five classes of semantic tasks. Levels of construction of movements interact with each other according to the principle of dynamic of subordination and violation some of them can be compensated.

In Particular, O. M. Leontiev, A.V. Zaporozhets, restored movements after injury using occupational therapy, systematization of violations of psychomotor mentally retarded children in the structure of the levels of construction of movements studied by M. P. Wiseman.

The relationship between semantic structure and composition of motor actions is also confirmed in modern studies of O. G. Malkhazova and others.

But still, the question remains open how the different semantic tasks according to the regulation of motor actions can be used for rehabilitation, psychomotor disorders of mentally retarded children.

At the stage of ascertaining the experimenting, we organized a group of mentally retarded children 6-7 years (32 children), with a noticeably damaged thalamo-pallidar level of movement construction level or level of coordinate movements and standard types. The effectiveness of psychomotor activity (coordination of movements) was studied in all studied students when the first semantic tasks "raise your hand" (which is the leading level B), and then semantic tasks "take off your hat" (for which the leading is the level D – parietal-premotor or level of actions with objects and semantic chains).

On the second sub-phase a group of mentally retarded children 11-12 years of age(35 children)was created, with a noticeably damaged pyramido-striatal level of construction of movements or spatial fields. The group was studied on the subject of coordination of movements (efficiency psychomotor activity) in the performance of their first meaningful task "draw a circle" (for which lead is pyramido-striatal level or spatial fields), and then the semantic task "write the letter O" (which is the leading level E – the highest or the cortical level of symbolic coordination of speech and writing).

Indicators of motor coordination for children semantic tasks were assessed by three experts on a 12-point scale (pic. 1. and pic. 2.). In the selection of experts to take account of their theoretical framework (master's degree of special education) and practical preparation (experience of working with children oligophrens at least five years). The proper performance of the semantic task was demonstrated and explained.

The execution of mentally retarded children 6-7 years meaning task "raise your hand" was estimated to 4.78 ± 0.17 points. The low level of efficiency of performance of psychomotor action is primarily due to the fact that this group consisted of children with violations of sight tubercles, pale bodies and other major subcortical nuclei deep departments of a brain. According to morphological damage they observed a deterioration of the processing of proprioreceptoral and tangoceptoral information about relative position of body parts, angles of joints and the direction and speed of their changes. General dynamic picture of the movements of the whole body and its parts is incomplete.

With the damage of thalamo-pallidar system the coherence of the muscle synergies of dozens of muscles in space and time is noted, and during the repetition of movements. Performing semantic tasks "raise your hand" surveyed the first group was characterized by a lack of plasticity and rhythmicity of movements, ineffective involvement of inertial forces

to its solution. The movements investigated in the force field of the action are unstable.

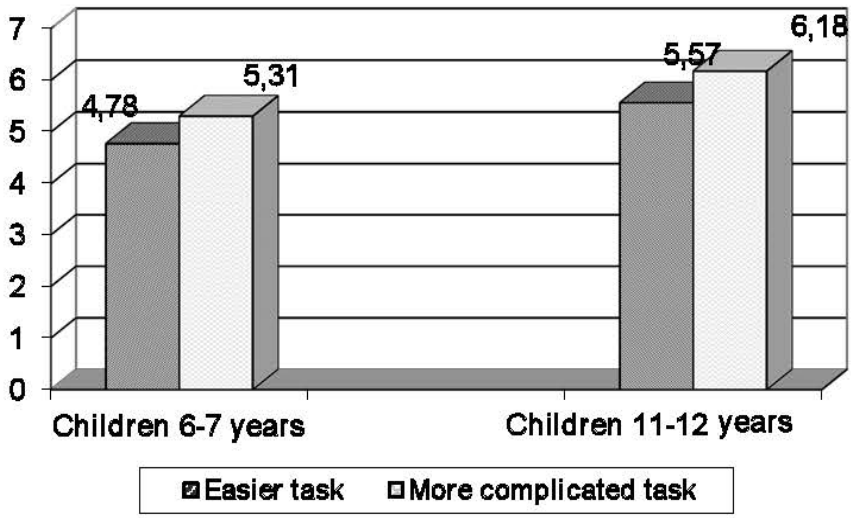
The second semantic task ("take off your hat") is much more complicated than the first. Leading in his performance is the pariento-premotor level of construction of movements or the level of actions with objects and semantic chains.

The execution of the task "cap off" by children oligophrens 6-7 years was assessed 5.31 ± 0,15 points. Therefore, an arithmetic average of the studied differ by 0.53 points, which is statistically reliable indicator, $\rho < 0,05$ according to efficiency of the execution of semantic tasks.

Table 1

The results of empirical research skills of regulation of motor actions of (in marks) mentally retarded children in the process of implementing various semantic tasks

The semantic task	Leading levels	The average results of the groups (M ±m))
The studied pupils of 11-12 years		
Write the letter O	The Highest cortical, E	6,18 ± 0,13
Draw a circle	Pyramido-striatal , C	5,57 ± 0,16
The studied pupils of 6-7 years		
Take the cap off	Parietal-premotor , D	5,31 ± 0,15
Raise your hand	Thalamo-pallidar, B	4,78 ± 0, 17



Pic. 2. The performance skills of regulation of motor actions (in points) mentally retarded children in the process of implementing of various semantic tasks

Taking into account the variety of damage of the Central nervous system in the examined children with persistent disorders of the intellect, the higher divisions of the cerebral cortex are better preserved than the major subcortical nuclei. Level D with its telereceptoral afferentation allows to perform actions with objects, reflecting their topological, but not metric qualities. At the same time, observation convinced that the solution of the investigated semantic specification has the value of the functional asymmetry of the brain, and education skills.

Comparison of efficiency of psychomotor activity in the process of solving the semantic tasks by mentally retarded children of preschool age showed that the phenomenological side of the outer movements is an indicator of the processes in the Central nervous system and higher mental functions. Semantic task determines which levels of the nervous system are leading in the motion control, which afferentation for them would be leading, how the motor action will change.

On the second sub-phase of the fourth stage of ascertaining experiment of the study mentally deficient children aged 11-12 years implemented the first semantic task "draw a circle", which was estimated 5.57 ± 0.16 points. Leading in the management of this action is the pyramido-striatal level of spatial fields C. Low assessment of coordination of movements of the subject in the drawing of the circle is due to the available morpho-functional disorders in subcortical and cortical structures of the brain. The level C is between the newest and the oldest structures of the brain and unites grantopera field cortex (pyramid sub-level cortical system) and subcortical nucleus – "striped body" (striatal sublevel of the extrapyramidal system). Consequently, the level of the spatial fields receives information from visual analyzers (higher sublevel), as well as information about the dynamics of motion in joints and muscle status (lower sublevel). At the same time, violation of the level destroys control arbitrary complex action and phylogenetically ancient coordinative and involuntary movements.

Children with mental retardation with violations of pyramido-striatal level primarily target precision of movement is destroying. While drawing a circle, they usually are difficult to start and complete, transportable movements are inaccurate, that is, inconsistent with the space in which they are implemented, and the movements lose variability and flexibility. Error in "bondage" to the environment are the basic signs of violations of spatial fields C. Analyzing the work of sublevels, M. O. Bernstein notes that " on the upper sublevel of C2, the same adaptability to the external space becomes thinner and more special, acquiring more target or final in

nature, and turns into the projection of the motion on its endpoint in the external space with the installation of precision or accuracy. This sublevel is largely indifferent to the trajectories, the method, and manner of performing the intermediate stages of movement, fully corrective shifting the emphasis in the final paragraph, in which, like in focus, should gather all possible... the trajectory of motion".

At the same sub-phase surveyed mentally deficient children aged 11-12 years implemented the semantic task, "write the letter O", which was estimated 6.18±0.13 points. Leading in the management of this action is the highest cortical level E. Morphologically these are the highest layers of the cerebral cortex. We emphasize that managing higher symbolic coordination (speech and writing), this level always plays a leading role.

We considered that as a result of the evolutionary process cortical nerve functions level E dominates all the previous levels. Therefore, the functionality of this level is the highest, which is manifested, as noted by A. I. Shinkaruk in oral activity in informative speaking and the relevant engine components and the impact of speech on all motor actions regardless of what level of construction of movements in their regulation is the leading. At level E of psychomotor activity, according to the author, acquires its highest manifestations, it could be far beyond a specific space and time, and muscle movement is the most collapsed, and transferred to the internal plan. So, the semantic task, "write the letter O" is a much more difficult than the semantic task "draw a circle". Despite this, the second surveyed group coped with it better with the harder tasks, the difference between the middle arithmetic statistically significant $P<0,01$. So, the semantic task in the psychomotor action is the factor that determines the dynamics and content of mental reflection of the movements, morphological education, which are brought to management of the action,afferentation and efferention, mechanisms of regulation of movements and other components of the functional agencies which implement the action.

In psychomotor the different types of semantic tasks be can distinguished depending on what they focus on: coordination; the manifestation of physical qualities; on connecting movements to the environment; on the "binding" motions to the "body scheme"; on transfer of certain information; to attract certain levels of control of movements. In the latter case it is especially noticeable, as observations show, that the semantic task of motor actions are the factor that determine the leading level of construction of movements in its management.

Our pilot study at the same time proved the existence of causal relationships between changes in semantic tasks that are solved in the process of motor activity and neurological mechanisms of movements. Different semantic tasks form different functional bodies or various functional systems. And when you consider that neural activity has a high "plasticity", the involvement of various semantic tasks in rehabilitation of persons with neurodevelopmental disorders will not only "enable" the existing functional bodies, but also rearrange them, compensating for specific developmental defects. In addition, the representation of mental functions in the Central nervous system is not local but systemic.

For mentally retarded children, the principle of changing the semantic tasks motor actions in the process of assimilation opens up new possibilities of rehabilitation. Because children with congenital or early acquired disorders of intellect are usually observed certain violations of psychomotor. It is important for them to form correct images of the action.

The use of semantic tasks of psychomotor actions for children burdened with intellectual disabilities, as observations show, fosters their skills for the realization of motor functions, especially exercise, household, and the labor action, as well as enrichment of their behavior and speech. Performing the physical exercises with a specific semantic task is a specified corrective job after as the flaws in the movements are characterized for children oligophrens. Even when children with mental disabilities of coordination of movements and the level of development of physical qualities are not inferior to healthy peers, however, less ability to rebuild psychomotor stereotypes and the ability to strong-willed efforts in terms of increasing muscle fatigue. In general, the mentally retarded children have reduced plasticity of the movements, and semantic tasks, differentiated by levels of movement construction can contribute to its improvement.

So, it is established that mentally retarded children with damaged thalamo-pallidar level B movements may be relatively better preserved parietal-premotor level D. Accordingly, children with congenital or early acquired intellectual disabilities can best perform semantic tasks, which is the leading level of actions with objects and semantic chains D and implement semantic tasks worse, for which the leading level is the level of coordinated movements and standard stamps B. and this is when the semantic task in the parietal-premotor level is much more difficult than the semantic tasks on thalamo-pallidar level. Moreover, children of 11-12 years burdened with intellectual disabilities can best perform their semantic task, "write the letter "O" for which the leading is pyramido-striatal level of

construction of movements C. The reason is that in the surveyed mentally retarded children, with all the "patchiness" of damage of the Central nervous system, the best preserved is the highest cortical levels of movement construction E, and pyramido-striatal level of spatial fields C has more damages. This is the kind of partial functional levels of construction of movements of mentally retarded children.

CONCLUSIONS

Developed by M. Bernstein the theory of levels of construction of movements is also the system of semantic tasks as was shown affect the coordination of movements of the subject, and his psychomotor capabilities at different levels are characterized by partiality, both in norm and in pathology.

The same surveyed person has different levels of development of skills of regulation of motor actions on different levels of the building. Each examinee is characterized by its own profile of skills development regulation of motor actions in the structure of the levels of movement construction.

Mentally retarded children of 6-7 years can show a higher expression of coordination of movements as they perform complex actions (cap off) and lower levels when performing simple actions (raise your hand), since these children better preserved parietal-premotor level of actions with objects and semantic chains D than thalamo-pallidar level B or coordinated movements and standard types. So, different levels of movement construction are responsible for implementing various semantic tasks.

Children aged 11-12 years with a congenital or early acquired persistent disorders of cognitive activity may have higher manifestation of coordination at the highest cortical level E (semantic task, "write the letter "O") than pyramido-striatal spatial fields C (semantic task "draw a circle"), located much lower. So, the semantic task determines the coordination of movements of mentally retarded children and the senior level of their construction during the execution of externally similar actions.

Performing semantic tasks is a mean of rehabilitation of a person with neurodevelopmental disabilities, as between semantic tasks that are implemented in the process of motor activity and neurological mechanisms are the causal relationship. So, different semantic tasks form different functional systems, a temporary combination of forces able to carry out a specific achievement. Restructuring of existing and formation

of new functional organs may contribute to compensate for defects of the development of psychomotor.

SUMMARY

The results of study of the problem of manifestation of semantic tasks implemented by the subject of psychomotor activity, on the motor of skills of action both in norm and in pathology are presented in the work. The activity approach, which is elaborated in psychology is analyzed and selected as a base of research of features of regulation of motor actions, by applying the semantic task. It was noted that for the understanding of the implementation of semantic tasks in functional organs, it is advisable to apply the theory of levels of construction of movements by N. Bernstein. It is emphasized that there is no definite total score of psychomotor gifted-ness of the person, and for coordinating the setup of a subject for perfor-ming a wide range of motor actions you can use the system of exercises, which is represented as leading on all levels of movement construction. It is emphasized that the semantic task with maximum manifestation of those or other components of psychomotor qualities determines the content of the functional organ that provides the corresponding achievement. It is found that there is a relationship between the semantic content of the task and demonstration of psychomotor qualities of the subject.

It is determined that the opportunity to implement one of the semantic tasks may interfere with the other, and it is possible to identify that the various components of the same quality are poorly connected among themselves. The analysis of the effect of semantic tasks that operate in the structure of the levels of movement construction on psychomotor abilities of a person is made. The psychological features of the implementation of semantic tasks of motor actions by mentally retarded children are analyzed, which determine the change of coordination of movements of mentally retarded children during the fulfillment of externally similar actions with different semantic tasks, the possibility of using them as means of rehabilitation of persons with psychomotor disorders, the results of studies of the relationship between the individual semantic tasks and leading levels of movement construction are presented that encourage the search for individually suitable semantic tasks.

The program of skills development of regulation of motor actions using level-structured semantic tasks is proposed.

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