



# **MODERN TECHNOLOGIES IN THE GLOBAL SCIENTIFIC SPACE**

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based on the results of  
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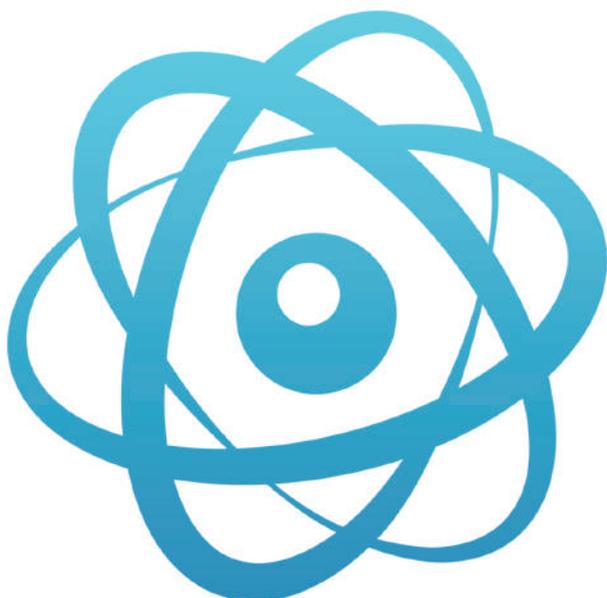
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**ФИЗИКО-МАТЕМАТИЧЕСКИЕ  
НАУКИ**



**PHYSICAL AND MATHEMATICAL  
SCIENCES**

## THE EXAMPLE OF USING ARTIFICIAL NEURAL NETWORK FOR THE REGRESSION DIAGNOSTICS AFTER OPHTHALMOLOGICAL OPERATIONS

### Abstract

The article is devoted to artificial neural networks, which can be used for the medical diagnostics. The example of using the artificial neural networks for the regression diagnostics after ophthalmological operations.

### Keywords

Artificial neural networks, medical diagnostics, regression diagnostics after ophthalmological operations.

The human brain executes difficult tasks of the continuous thread analysis of the sensory information from the environment, distinguishes important data from the thread of trivial information and adapts to the former. Understanding the process of the human memory is very difficult because new patterns are memorized, while old patterns are not forgotten or modified. Artificial neural networks (ANN) – the direction in the field of artificial intelligence, which simulate the process of the human brain.

At present time methods of artificial intelligence uses for the development intellectual expert systems and special focus on the expert systems, based on artificial neural networks. Many areas of knowledge need assistance of expert systems, including medicine.

In this article the example of using artificial intelligence methods for the regression diagnostics after ophthalmological operations is considered.

This research used a real empirical data, the description is presented in [1]. The medical data, which representing the influence of various factors on the regression after ophthalmological operation - is a table contains 97 rows and 64 columns. Input parameters of the model are these 64 parameters. Each row represents one patient, corresponding to one of the following conditions: without regression (0), the level of the regression 1 - 4, which correspond to some numerical values – outputs of the model. Each column is the one of the factors, from which the state of the patient after 6 months depends [1]. These factors (in Russian) are shown on the fig 1.

Фактор (состояние пациента)		Осложнения после операции								Время зрения (мин)				Видение (лучше, хуже, норма)				Осложнения операции				Время зрения (мин)				Видение (лучше, хуже, норма)						
1	2	7	8	9	29	30	37	38	39	40	47	48	49	63	64	65	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	1	0,05	1	26,66	-5,54	18914	63	0,9	-0,5	168	0,9	0,9	26,66	29	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	2	0	0,03	0,8	27,39	-8,5	15042	63	0,8	-0,25	0	0,9	0,9	27,39	34	0	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	2	1	0,04	0,7	28,52	-7,25	19566	65	0,6	0,75	100	0,55	0,55	28,52	29	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	1	0,04	1	28,6	-7,75	17823	59	0,7	0,75	95	1	1	28,6	29	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	0	0,05	0,9	28,07	-5,75	22131	74	0,9	-0,25	0	1	1	28,07	35	0	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	1	0	0,04	0,6	26,58	-7,5	18890	62	0,7	1	120	0,7	0,7	26,58	29	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	0	0,04	0,9	25,68	-8	20502	38	0,8	-1	19	0,9	0,9	25,71	9	0	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	2	1	0,02	0,9	26,2	-9,25	18144	54	0,8	0,75	170	0,7	0,7	26,2	30	3	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	1	0,02	0,7	26,23	-9,75	20265	68	0,6	-0,25	184	0,8	0,8	26,23	30	3	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	2	0	0,04	0,9	26,34	-8	18482	62	1	0,25	135	0,9	0,9	26,34	26	0	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	2	0	0,03	0,95	24,21	-5,5	18864	63	0,5	-0,5	1	0,5	0,5	24,21	8	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	1	0	0,02	0,6	27,76	-10,5	20556	69	0,5	-2	118	0,2	0,2	27,76	332	3	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	1	0	0,02	0,6	27,27	-11	19000	64	0,8	0,25	332	0,8	0,8	27,27	17	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	1	0	0,02	0,6	28,9	-11	19112	64	0,6	-0,5	12	0,6	0,6	28,9	17	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	2	0	0,03	1	27,6	-8,25	19440	55	1	0,75	12	1	1	27,6	29	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	0	0,04	1	27,8	-9,75	19534	64	1	-0,5	4	0,9	0,9	27,8	17	0	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2	1	0	0,25	1	25,27	-2,5	8423	28	1	0	5	1	1	25,27	24	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	1	0	0,04	0,95	27,8	-7,75	25514	85	0,7	-0,25	179	0,7	0,7	27,8	24	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Fig. 1. Factors, which representing the influence on the regression after ophthalmological operation.

The structure of the ANN - model of the medical expert system for the regression diagnostics after ophthalmological operations is represented on the fig.2. It is including three functional neurons (linear, quadratic and cubic). Weight coefficients of the ANN - model were determined [2].

As a result of computational experiments, the ANN - model makes 12 errors from 100 cases. It is shows that the ANN - model is adequate to the object of research and is of interest for further research and possible integration into an intellectual expert system.

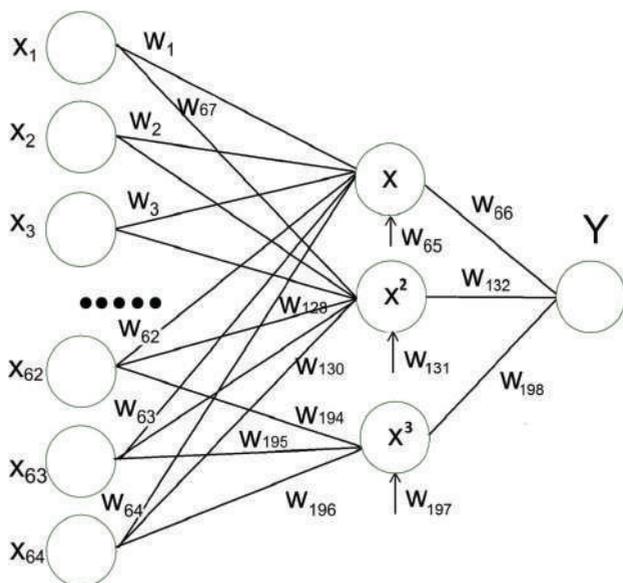


Fig.2. The ANN - model of the medical object for the regression diagnostics after ophthalmological operations.

On the basis of this model, factors were identified that significantly affect the regression of visual acuity [1].

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## **STORAGE OF ENERGY IN DIELECTRICIANS UNDER EXPOSURE TO IONIZING RADIATION**

### **Annotation**

To displace an ion from a lattice site to an interstitial site, energy is required, which will cause an increase in the free energy of the ion system in the lattice. With the reverse movement of the ion to the lattice site, the system will return to the equilibrium state, and part of its energy stored during the first transition will be released.

Thus, the storage of energy and its value are associated with reversible processes in the lattice, occurring due to the absorbed radiation energy.

### **Keywords**

internode, energy storage, lattice, free energy, ion, atom.

The energy absorbed by crystals during their irradiation is spent on heating, the production of various radiation damage to the lattice. The consequence of this is an increase in the total energy of crystals and the energy of elastic deformation. Thus, after irradiation, the crystal possesses additional free energy, which is super - equilibrium for the given conditions, which is usually called latent or stored energy. The amount of stored energy is associated with radiation disturbances and can serve as a measure of their concentration [1].

The energy stored in the crystal under certain conditions can be released. It is released, for example, in lasers in the form of a flash of light or a long glow during luminescence, or during dissolution or heating of a crystal; in an electric field or with increasing pressure, or the simultaneous action of several external factors on the crystal [2].

The stored energy in the body, in fact, is called only that part of it, which is released during dissolution or heating of the body, causing an additional increase in the temperature of the solution or the heated body. In the process of heating or dissolving the body, luminescence occurs, and part of the stored energy is dissipated from the investigated volume. The fraction of energy released during luminescence will depend on the conditions of heating or dissolution of the body [3].

An integral consideration of the process of storing energy in a body under external influence on it, as well as an energetic consideration of the process of releasing energy accumulated in a body, makes it possible to combine the external description of such various factors as plastic deformation (mechanical treatment), hardening (heat treatment), introduction of impurities, etc. the formation of solid solutions, and exposure to radiation [4].

External analogies in the description of changes in the properties of a body under the action of various external factors make it possible to establish unity in the regularities in the course of physical processes that determine the changes in the properties of bodies under consideration. Since the elementary processes under the action of radiation on the body seem to be more studied, in this way a prerequisite is created for understanding the physical processes taking place in the body, for example, during its hardening. Of course, in each case it is necessary to analyze the processes and establish not only the unity in the course of the processes, but also the differences, as well as the boundaries of a reasonable single description of them. The energy of radiation passing through the crystal is absorbed and causes reversible and irreversible changes. Irreversible changes include chemical transformations of a substance under the influence of absorbed radiation energy - radiolysis.

The formation of radiation - induced structural defects, for example, the displacement of ions from lattice sites to interstices, are reversible processes. Under certain conditions, an ion from an intermode can return and occupy a vacant site. To displace an ion from a lattice site to an interstitial site, energy is required, which will cause an increase in the free energy of the ion system in the lattice. With the reverse movement of the ion to the lattice site, the system will return to the equilibrium state, and part of its energy stored during the first transition will be released. Thus, the storage of energy and its value are associated with reversible processes in the lattice, occurring due to the absorbed radiation energy.

Irradiation is accompanied by a change in body size. As in tensile deformation, the absolute increment in body size  $\Delta l$  is accompanied by energy storage. The saturation of the  $\Delta l$  increment with increasing dose  $D$  is associated with the onset of irreversible processes or the onset of mechanical destruction of the body during its stretching. The onset of irreversible processes during irradiation is marked by a decrease in the increment in the amount of energy stored in the body, with the same increase in dose.

In this work, the main attention is paid to dielectric materials by the example of well - studied alkali halide crystals (AHC). A large amount of factual material on energy storage in alkali halide crystals is given in the monograph [1], and the mechanisms of defect formation - in monographs [2 - 4]. Unlike numerous works, which we will mention below, we will consider the processes of energy storage from the point of view of nonequilibrium statistical thermodynamics. In pure crystals, the accumulation of radiation defects over time at the initial stage and at low concentrations can be described by a linear function. With the accumulation of radiation defects in the form of vacancies and their associations, as well as ions in interstices, radiation annealing of defects will become increasingly important, the processes of structure restoration or the formation of vacancy associations will disturb the linear behavior of the dependence of the accumulation of the concentration of single radiation defects on the irradiation time.

Figure 1 shows the dependence of the accumulated light sum on the X - ray time for BiOCl crystals. Here, a linear dependence is also observed at low radiation doses. Let us now analyze the indicated effects on the basis of the relation obtained by us in [5]. As a response function, we take the optical density of the F centers  $\mu$  or the stored light sum  $S$  (Fig. 1), then

$$\begin{aligned} \mu &= a \frac{kT}{G^0} \cdot N, \\ S &= b \frac{kT}{G^0} \cdot N, \end{aligned} \quad (1)$$

where a, b are const,  $G^0$  is the Gibbs energy of the crystal, N is the concentration of radiation defects, k is the Boltzmann constant, T is the temperature.

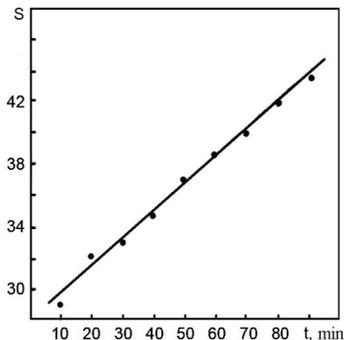


Figure 1 - Dependence of the accumulated light sum in the TSL peak  $T = 200$  K for a BiOCl crystal on the X - ray time.

It can be seen from formulas (1) that at low irradiation doses the dependence of  $\mu$  and S is indeed described by a linear function.

The defect accumulation rate is given by the slope of the straight line (1):

$$v_d = \text{tg}\alpha = a \frac{kT}{G^0} \quad (2)$$

For a number of alkali halide crystals, the  $v_d$  values determined from the experimental data are given in Table 1. Since the Gibbs energy has a negative sign, it follows from Table 1 that the greater the absolute value of the Gibbs energy, the greater the defect accumulation rate.

Table 1 - The rate of accumulation of defects and the Gibbs energy of the AHC series.

Crystal	Defect accumulation rate, $v^d, \text{cm}^{-3} \text{s}^{-1}$	Gibbs energy $\Delta G^0, \text{kJ/mol}$
NaCl	$0,7 \cdot 10^{-13}$	- 356,2
KCl	$3 \cdot 10^{-13}$	- 409,05
KBr	$2 \cdot 10^{-13}$	- 380,7
KI	$0,3 \cdot 10^{-13}$	- 323,24

Since the rate of accumulation of defects characterizes the radiation resistance of the crystal, it follows from the above that the crystals in which the Gibbs energy is greater in absolute value will be radiation - resistant. Thus, for example, oxides of most elements (MgO,  $\text{Al}_2\text{O}_3$ , etc.) have a high Gibbs energy in absolute value and, accordingly, are radiation - resistant.

As noted above, the temperature dependence of the generation of F centers can be divided into three stages: the first is a linear dependence, the second is temperature - independent, and the third is decreasing with increasing defect concentration. It is believed that the complex behavior of the dependence of the generation of F centers is due to a change in the lifetime of various halogen

defects complementary to the F centers. In our opinion, another explanation of this effect can be given based on formulas (1). Indeed, the Gibbs energy depends on temperature as follows:

$$G^0 = A + BT + CT^2, \quad (3)$$

where A, B, C are constants.

For small T -  $A > BT + CT^2$ , and from (1) we have a linear dependence of energy storage on temperature. When  $G^0 \approx BT$ , then  $\mu$  and S are temperature independent. At large T, the Gibbs energy is  $G^0 \approx CT^2$  and, accordingly,  $\mu$  and  $S \sim 1/T$ , i.e. decrease hyperbolically with increasing temperature. A qualitative picture of the temperature dependence of  $\mu$  and S is shown in Figure 2..

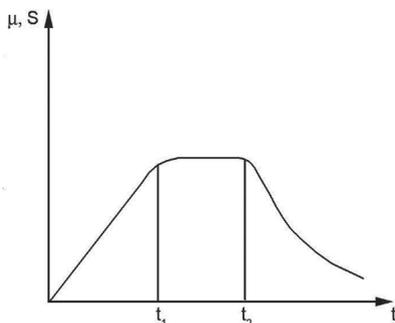


Figure 2 - Three stages of the temperature dependence of the optical absorption coefficient and stored energy ( $t$  °C).

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# ПЕДАГОГИЧЕСКИЕ НАУКИ



# PEDAGOGICAL SCIENCES

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**PSYCHOPHYSIOLOGICAL QUALITIES AND THEIR IMPACT  
ON THE PREPARATION OF THE FLIGHT (STURMAN) COMPOSITION  
OF THE RUSSIAN AIR FORCE FOR THE PERFORMANCE  
OF FUNCTIONAL DUTIES IN INFORMATION CONDITIONS**

**Abstract**

Relevance of the subject is determined by the peculiarities of functional activity and the influence on it of the individual psychophysiological qualities of the navigator in the performance of practical tasks; lack of a comprehensive system of training navigators on tactical - special training in conditions of information and psychological confrontation, as well as the need to improve the effectiveness of training of flight crews in tactical - special disciplines in conditions of information and psychological confrontation.

**Keywords**

Navigator, training, tactical - special training, information and psychological confrontation, individual psycho physiological qualities.

The process of communication as an integral part of learning can and should be optimized to improve the quality of learning. The information in this study refers to a message recorded by artificially created signs or iconic systems, accessible to the perception and understanding of the audience for which it is designed. So, the concept of information in the article will be used as a synonym for the message in its psychological sense.

In aviation universities, the information and psychological components of the training of a navigator - specialist are studied in separate training disciplines and interdisciplinary relations do not cover the full range of tasks performed by him. The complete complex system of tactical - special training of navigators in conditions of information and psychological confrontation has not been worked out at present.

The preparation of navigators for professional activities in the conditions of information and psychological confrontation today does not have a strict, scientifically - based concept, although the need for its formulation and definition of essence can be traced not only in practice (strengthening of negative trends of the information society, changing paradigm of education and new requirements for a specialist), but also in theory when considering the problems of information security of the person and information and security of the psychological activity of the navigator. This term allows us to approach the problem of providing information and psychological security of the individual in terms of the navigator's activity as a subject of this provision. Vocational

education, developing the information and psychological field of activities of future specialists - navigators, is one of the main subjects of information and psychological security.

It is no coincidence that Aristotle in the 4th century BC singled out the components of the human psyche, which are now the main objects of informational influence - consciousness, will, feelings: «... there are three powers of the soul, the main for the act and for the truth: feeling, mind, aspiration...» [7].

Director of the Central Intelligence Agency A. Dulles at the end of the Great Patriotic War said: «... The war will end, everything will somehow settle down. And we will give up everything ... to fool and fool people... The human brain, people's consciousness are capable of change. By sowing chaos there, we will replace their values with false ones and make them believe in these false values...». Analyzing the experience of the Second World War, the English military psychologist N. Copeland wrote: «... moral condition is the most powerful weapon known to man; more powerful than the heaviest tank, than the most powerful artillery weapon, than the most destructive bomb...». Military theorist Liddell Garth noted: «... although the battle is a physical act, it is controlled by the human mind...». The importance of this issue is reflected in the guidelines of the NATO Armed Forces: «... Morale of the troops is the most important factor in the war...» [9].

In the case of the subject, the object of control is the navigator of the ship as part of the crew, who accepts, processes information and decides on the task at hand, which includes the use of weapons, amphibious assault, conduct of all types of reconnaissance, suppression of the opposing side and other tasks inherent in the conduct of aviation. In generalized form, the navigator is an information object. Based on the description of the navigator - specialist as an information object, it can be said that it is a certain quality and amount of knowledge, the application of which to a small temporary and material resource is sufficient to generate this very object, or, in other words, to give the cadet - navigator such volume and quality of tactical - special knowledge, which will allow to effectively perform functional duties in the air. To do this, it is necessary to take into account in the training of the cadet his individual intellectual and psychological qualities.

Intellectual qualities, such as the development of sensations and perceptions (flight sense), clarity of spatial representations, speed and interference of thinking, the ability to focus correctly, distribute and switch attention with a large amount of incoming information, the ability to act in unforeseen situations and in the absence of time, determine the ability of the navigator to make full use in the air of the regular means of reconnaissance and electronic warfare, maneuverable and technical features of the modern aircraft.

The psychological component of training navigators is mainly in the field of training and combat training, practical flights, service and duty. It assumes on the basis of deep knowledge of the psyche its constant and comprehensive training for flight activities, taking into account the requirements of the modern military and political situation.

The main tasks are closely related to the current mental processes of the navigator's composition in flight activities, namely: sensation, adaptation, phenomenon of contrast, successive images, sensitization, perception, representation, memory, concept, feelings, will [11].

Perception as the main process reflects in the mind of the navigator directly affecting the senses objects and phenomena in general. Perception arises on the basis of sensations, but it is not just the sum of sensations, but a complex process of their interactions. It is the relationship between qualities, properties that define information and phenomena in general, and is perception. However,

perception also includes the accumulated practical experience of a person in the form of representations and knowledge. It proceeds in close connection with thinking, speech, feelings [6].

Characteristic properties of perception for the activity of the navigator are: subject matter, i.e. the perception of an object with its inherent content, purpose and nature. For example: the plane in the navigator's mind is not just a body made of metal, filled with the most sophisticated automation, but a weapon designed to destroy the «enemy»; meaningfulness, when the objects perceived by the navigator have a functional meaning for him, are evaluated from the perspective of acquired experience and knowledge; integrity characterizes the images of displayed objects in the navigator's mind in a combination of many qualities and properties. If the perceived object does not affect all its qualities, the holistic nature of perception makes up for the qualities and properties of the object displayed. For example: the navigator hears the characteristic sound of the aircraft engine coming from the parking lot. He sees nothing, but associates it with the preparation of the aircraft for flight, classifies by the type of aircraft and its capabilities; Activity highlights the basic information of perception at a particular moment, the rest of the information is the background; the upperpercept determines the dependence of perception on the general content of a person's mental life, on his experience.

The form of knowledge - fixing, or form of presentation of information, is understood to be objectified by a particular iconic system or on some material medium, for example on paper. The fact is that knowledge as such is a psychic phenomenon, is the property of the psyche of individual individuals and in this capacity is inaccessible to others. After fixing it on the material medium, say in the form of text, drawing, formula, etc., the content of this knowledge (considered as information, communication) becomes available to an unlimited number of its consumers, convenient for distribution in space and time. In our study, we took into account two heterogeneous aspects: semiotic and psychological. With this in mind, the information can be divided into three large classes: syntax, semantic and pragmatic.

Syntactic information, as in the case of the other two classes, consists of a set of characters combined into an alphabet (i.e. a full range of certain characters, such as letter, digital). In the message, these signs are not placed arbitrarily, not at random. They somehow relate to each other, are in a certain connection. The consistency and location of each sign is determined by the established rules. These rules are very important: their absence would make it impossible to read the message (drawing, diagram, text).

Semantic information implies the current or potential possibility of disclosure by the consumer of the implied means of its content, the meaning of the message, encoded by certain iconic means of its content.

Pragmatic information is aimed at initiating a certain way of thinking, a certain behavior, a particular state.

The psychological structure of information can be presented in the form of a three - tier hierarchy: the sign - sense - meaning.

The role of the sign is to represent, to replace any thing, acting as the «substituted» essence of this thing, for consciousness. In the most general form, the sign can be defined as a means of communication interaction and thinking. Based on definitions of the concept of «system», under the iconic system should be understood organized set of signs with relationships and connections between them, forming certain integrity. From the point of view of semiotics, the value of the sign can be defined as information carried by a sign. The concepts of sign and meaning in modern

science have not yet stabilized enough. There is no single definition that satisfies all. Moreover, it is impossible to attribute to the category of precisely defined notion of meaning. The meaning is psychological, personal formations, the ideal product of the functioning of the human brain. The most rigorous scientific analysis will not find meaning or thought either in the text, in the oral speech, nor in the drawing. It will find only what is there: a sequence of actions of the participants in the task, characterized by certain means of ground training and aviation equipment, the level of training of the navigator (crew) and flight documentation, or a system of graphic constructions organized according to certain rules. In no form of transmission of semantic information, there is no and cannot be what we call thought. How, then, is it possible, for example, to understand, to teach? This question can be answered unequivocally - because all the elements of training matter in the task.

Receiving information by the navigator begins with a feeling. If the sensation reflects the individual properties of objects and phenomena of the surrounding reality, the perception reflects the objects and phenomena of reality that are currently acting on the senses in the combination of their different properties and characteristics. The product of perception is always more or less complex image of the subject.

According to modern ideas, information in the central nervous system is evaluated on two main characteristics: the physical properties of signals and the significance of the messages contained in them. Both types of evaluation are related to the activities of different brain structures.

Recognition of the object involves the formation of its perceptual image and its similarity with the previously formed and stored in memory "level", in memory stored not one reference, but some organized in the system set of images. The human ability to identify an object is quite limited. Thus, according to a number of studies in the identification of various objects, the number of reference images with which the perceptive is found does not exceed seven to eight in the case of one distinguishing trait. This value is the length of the operational alphabet and corresponds to the amount of RAM. Increasing the number of different features increases the information capacity of the object. A person rarely has to face one - dimensional stimuli. Objects of our perception are usually multidimensional. When such objects are identified, it can be compared to different systems of operational alphabets (i.e. reference imaging systems) - depending on what features stand out as the main in the process of perception. Modern theories and models of identification can not yet satisfactorily solve the problem of the alphabet of the traits used by a person in the identification of iconic objects and objects in general.

Decoding - the final phase of the process of identification (and perception) - is mainly the "translation" of perceived characters into those units of internal speech that are directly related to perceptions and thinking.

Understanding is a specific cognitive process, a complex, hierarchically constructed mental reflection of objects of cognition, which creates new and recreated old, but in a new way visible, one way or another, emotionally colored systems of concepts and images, combining the actual product of this reflection with the relevant elements of personal knowledge. For example, simple subject situations are understood at the level of perception, the formula is usually at the level of thinking.

It is advisable to distinguish between two fundamentally different cases: understanding of iconic and unfamiliar objects. If in the first task of understanding is to disclose, clarify, figuratively put it, by someone embedded in the object of meaning, decoding it, in the second objects themselves, as a

rule, do not make sense (except for such as machines, devices, structures and other products of human activity, where with certain reservations it can be considered that when they are created in them there was a "meaning") and the person in this second situation of understanding by matching, comparison and the way the object's connections and relationships seem to bring a "new meaning" to it, tries on its meaning brought into the object and, if such fittings are successful, considers the object to be clear.

The problem of visibility originally, even in ancient times, arose due to the difficulties of presenting many fragments of different cults and entire religions. Visibility is the quality of the navigator's cognitive processes, when interacting with iconic systems, when extracting and processing information from these systems in the mind generated visual images. In building messages, you need to take into account the practical rule: the visual tool used performs its function only if it relies on well - learned knowledge and figuratively reveals the subsequent presentation. After all, it is pointless to "explain" the material through the same incomprehensible. Hence the undesirability, psychological unreasonableness of such a statement of the material, when this statement begins with some generalizing provisions, rules, definitions, wording, etc., and only then their meaning is revealed, justifications, evidence are given; this disrupts the natural order of cognition and therefore creates additional difficulties in understanding the material. Visual means also perform the following functions: - contribute to a more complete and accurate transmission of thought; - serve as the main argument in verbal evidence; illustrate different kinds of dependencies and ratios that are difficult to imagine in a verbal description.

However, there are and always will be certain arrays of information that is optimal, if not the only one known for the form of fixing and transmitting which there is text. Memory is the main focus of this process.

Memory allows you to memorize and preserve information followed by reproduction of what was previously perceived, experienced, committed and understood. Individual features of the navigator's memory are very wide. There are navigators who easily remember, reproduce specific facts, tactical and technical data of specific samples of military equipment, formulas, call radio stations, etc. Others better remember the internal connection of phenomena and events, their sequence and logical development, arguments, evidence, theoretical provisions. In addition, the navigator may be more productive at memorizing objects or phenomena. By the nature of mental activity, prevailing in the activity of the navigator, memory is divided into figurative (visual, auditory and motor), emotional, verbal and logical. Memory is the basis of knowledge, and therefore is a prerequisite for human activity. The following memory qualities are distinguished: volume, speed, accuracy, duration of preservation and readiness [11].

Military aviation makes its specific requirements to the navigator's memory. Memory serves as the basis of knowledge, abilities, skills in flight work. Memory development is carried out by constant training in classes, simulators and in preparation for flight (memorizing tactical - technical data, operational parameters, sequence and order of actions in normal conditions and in an emergency environment, memorizing instructions to the crew, instructions and other guiding documents, etc.). Activity, responsibility and interest in mastering the specialty play a big role in the development of memory in order to improve efficiency [1].

The role of information carriers in the training of the navigator is performed, and in some cases supplemented: - a photograph of military objects and weapons and is a flat image; A technical drawing that provides sufficient scientific and technical reliability, accuracy, definition and clarity

of the image of the object. The drawing defines a graphical structure linked to a given coordinate system; - a diagram that displays a given object in order to show only the most significant, fundamental in it. The information factor (the ratio of the share of essential information to the full information capacity of the message) for the diagram will obviously be close to one, and for the drawing is much lower; - the pictogram performs several functions: - in a figurative, conspicuous form to show the quantitative characteristics of a phenomenon, process, object. To show the location of an object. Show the functional purpose of the controls or indications; Showing a situation or object to instigate a particular type of recipient's behavior or abstinence from certain actions. A graph expressing the quantitative dependence of interconnected values.

The arithmetic scale increases the efficiency of graphs by more than 3 times compared to logarithmic. The grid increases the efficiency of the charts by about 30 % ; - tables of numerical data, pre - made, reduce the time to work in flight, it contains only facts and nothing else. Tables and graphs are mutually transformable; the entire information capacity of the table can be presented in the form of a graph. The average relative error in reading graph readings is about four times higher than reading information from tables; - Formulas are usually used in the process of preparing for flights or developing a solution to the task, analysis of the advantages and disadvantages of formulas allow to draw such conclusions:

- The formula tends to have a large informative capacity because it is more versatile. The versatility of the formula is, of course, not limitless - it has a clearly defined range of applicability; - The degree of visibility of the formula and table is about the same, but the degree of "visibility" of the formula is determined by the level of mathematical training of the navigator, and the requirements for preparing it when perceiving the table is much less. The visibility of tables and formulas is the product of analytical thinking. Formula calculations take about 20 times longer than reading table readings. The formula is the most concentrated, most capacious form of presentation of information.

Thus, the performance of the flight mission is significantly influenced by the professional - psychological factors of the flight crew, which include: personal qualities (flight orientation, morality, willpower and others, which form the basis of the professional suitability of the navigator); intellectual qualities (development of sensations and perception (flight sense), clarity of spatial representations, speed and interference of thinking, ability to focus correctly, to distribute and switch attention with a large amount of incoming information, the ability to act in unforeseen situations and time constraints; psychophysiological qualities (emotional resistance, resistance to fatigue and monotonous work at a forced pace, etc.); physiological (vestibular stability, the ability to tolerate large overloads for a long time) and others that influence the relationship of personality and military activity: the choice of the profession of navigator (initially); high - quality mastery of the profession (period of study at the university); improving professionally important qualities (during service in parts) and psychological support of all military activities. In view of the above, the approach to the navigator's professional activities in a complex information environment, which is based: on taking into account the individual psychological qualities of cadets at all stages of training at the university and service in the army, it allows to reduce the number of training flights, the cost of training, improve the efficiency of flight tasks not only in standard, but also complex information and psychological conditions; on the developed modular system of tactical - special training, the technology of readiness of navigators to professional activities in the conditions of information and psychological confrontation [8, 10, 11].

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## FORMATION AND DEVELOPMENT OF THE THERMODYNAMIC PHASE OF HOLISTIC AND SYSTEMIC CAREER GUIDANCE IN MARINE EDUCATION

### Annotation

The article presents the formation and development of the thermodynamic phase of holistic - system career guidance in marine education in relation to the holistic - system life cycle in the training of specialists.

## Key words

Thermodynamic phase, formation and development, career guidance, marine education, holistic and systemic life cycle.

Features of formation and development of thermodynamic phase holistic system of career guidance activities in marine education on the holistic system of life cycle in preparation of specialists are determined to further the establishment of career guidance activities through the improvement of joint educational and professional holistic system - cycle of life. The establishment of the processes of the development of holistic and systemic knowledge is associated with the mathematical modeling of the pedagogical functions of the development of subject, economic and social relations [1, p.64].

Features of formation and development of thermodynamic phase holistic system of career guidance activities in marine education with respect to the integrity of the system life cycle are established: basic generalized star Artgame hyperspace of life (E1); base - generalized holistic system - cycle of life (E2); base - generalized star Artgame systems analysis (E3); basic - generalized manifestation of the twelve stages and forms of cognitive hyperspace of life activity in relation to the educational process (E4); basic - generalized expression of the twelve stages of holistic - systemic action (E5) [2, p. 225].

The formation and development of thermodynamic phase holistic system of career guidance activities in marine education performs in phase three of their comparative functions: orientation, execution and control of the basic phases of development of the educational process relative to normative educational and professional developmental activities archammer type.

Each base - standard global process activity formation and development of thermodynamic phase holistic system of career guidance activities in marine education is pedagogicheskoi function image of the corresponding moment of the General scheme pedagogicheskogo career - oriented analysis – is related to the purpose: to allocate the object of study as a system – a holistic system of formation and development of thermodynamic phase holistic system of career guidance of maritime education as a measure of the level of consistency and integrity; to define a generative environment – externally selected integral system of formation and development of thermodynamic phase holistic system of career guidance of maritime education; to establish holistic properties private holistic consistency of formation and development of thermodynamic phase holistic system of career guidance of maritime education; to allocate the levels of formation and development of thermodynamic phase holistic system of career guidance of maritime education; to define the structure of the formation and development of thermodynamic phase holistic system of career guidance of maritime education; to establish the structural elements of the formation and development of thermodynamic phase holistic system of career guidance of maritime education; to highlight the backbone of communication inside the level of formation and development of thermodynamic phase holistic system of career guidance of maritime education; to identify inter - layer communication in the formation and development of thermodynamic phase holistic system of career guidance of maritime education; to establish the form of organization of formation and development of thermodynamic phase holistic system of career guidance of maritime education; to highlight the system properties of the formation and development of thermodynamic phase holistic system of career guidance of maritime education; to define the behavior of the formation and development of thermodynamic phase holistic system of career

guidance of maritime education; to establish the prognosis of improvement of the formation and development of thermodynamic phase holistic system of career guidance of maritime education [3, p.40].

The process of formation and development of the thermodynamic phase of holistic and systemic career guidance in maritime education is the basic parameter of creating new relationships in professional activity. The definition of each holistic - system cycle of career guidance in maritime education in relation to the holistic - system cycle of life activity in the training of specialists is determined by the formation of subject - activity relations in the educational process - there is an instantaneous joint holistic - system cycle of educational and professional activities. The student is included in the system of communication under the strict and real control of the teacher. Operational schemes of intellectual educational activity include students in the dynamic educational process, when the motives of educational activity are formed, indicative schemes of activities and individual actions are issued, there is a normative educational and professional vocabulary that forms symbolic forms of interiorization of the developing meaning. The thermodynamic phase is a further impulse in the formation and development of the entire wide - profile training of specialists.

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## PR AS A FORM OF EDUCATIONAL INSTITUTION DEVELOPMENT

### Annotation

Public relations today are becoming an integral part of the development of many industries, including education. Promoting an educational brand becomes a carefully calibrated strategy. It is very important to understand where and how the promotion should be carried out, so that the success and effectiveness of PR technologies is highly appreciated by the end user to whom the information is directed

### Keywords

PR, PR in education, brand, brand development, educational institution, educational environment, mass communications, educational brand

Public relations technologies in the modern world have no boundaries. All sectors of the economy, science and technology today depend on how end - users will learn about them. Much depends on the effectiveness of 1.

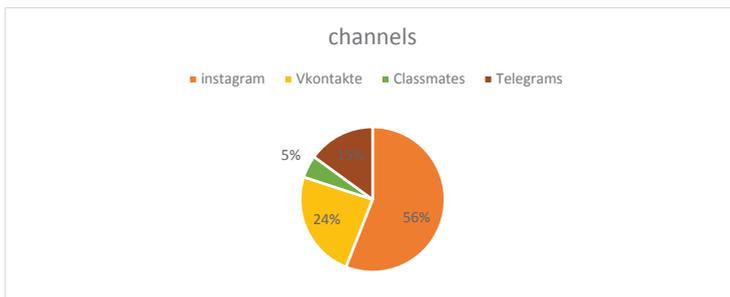


Figure 1 - Popularity of Internet sources for obtaining information among young people

We see that 56 % of the total audience surveyed today receive information from the network «Instagram», 24 % of the surveyed audience find information in the network «Vkontakte».

Next in the sequence and popularity of mass communications is the Telegram channel and the «Classmates» social network.

Less than 1 % were scored by such channels as Facebook and Twitter. That is, we can assume that today it is not enough for an educational institution to promote and develop only its own website. Any site can not provide the activity and implementation to the masses, which is guaranteed by social networks and messengers. All the information among the youth today has relevance only in the case when it is located in the trendy channels.

Do applicants today associate the educational brand and prestige of an educational institution with the direct PR that it carries out? To understand this question, we also conducted a survey. Moreover, three categories of respondents were involved in the survey: applicants, students and individual representatives of various social groups and societies.

The results are presented in Figure 2. Based on the results of processing the results, we can draw a number of conclusions.

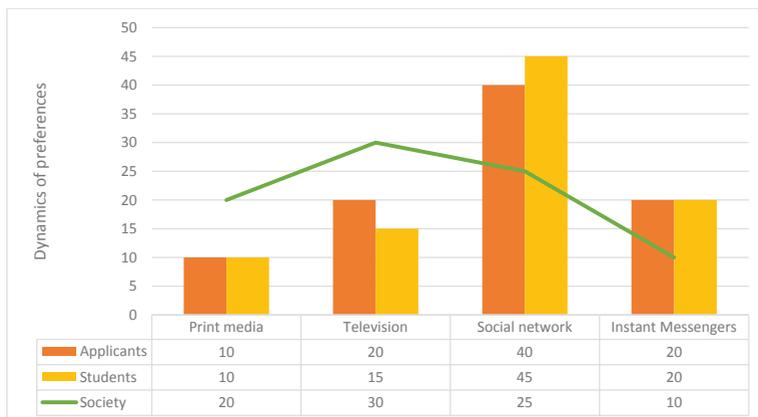


Figure 2 - Relationship of educational brand prestige with promotion channels

We see that students and applicants trust the print media much less than the public as a whole, that is, the understanding of the prestige of the print media is significantly different.

On average, the difference between the understanding of prestige is two times different. The assessment of television as the most important media channel today also differs in the perception of young people (students and applicants) and representatives of various segments of the public.

The difference differs almost as much as 2 times. Relatively equal popularity today can be noted in social networks, which is noted by students and applicants, but in general, in the eyes of the public, it is social networks that are significantly inferior in terms of prestige and popularity against the background of print media and television (45 % vs. 25 %).

Well, messengers have absolutely minimal trust and prestige in the eyes of the public as sources for obtaining information. They are trusted by only 5 % of society. The student environment and applicants also have a low percentage of trust, but approximately equal to the level of television sources.

Thus, we can draw an important conclusion. Of course, PR today is a powerful lever and tool for the development of an educational institution. But an even more important aspect today is the choice of channels for PR promotion.

Since the age categories of the public are diverse, it is important to remember that the value of information sources in the youth environment may differ significantly from the value of information sources that exist in different circles of the public. Accordingly, the PR - promotion of an educational institution should take into account the trends of the time and the preferences of young people in choosing information channels.

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# ПОЛИТИЧЕСКИЕ НАУКИ



# POLITICAL SCIENCE

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## **THE STRUGGLE OF POLITICAL IDEOLOGIES IN RUSSIA AT THE END OF THE XX CENTURY**

**Abstract:** This article examines the struggle of political ideologies in the 90s of the XX century. The formation of a new state wasn't easy, old trends were broken and radically new ideas were promoted. The article provides a general analysis of the formation of the economic ideology of the new period. The research is conducted through the consideration of the main problems of the economy of that time, the results of the struggle of ideologies are described.

**Keywords:** political ideology, economic development, formation of the state, politics, post - economic society.

The formation of a modern economic ideology should be considered in its gradual creation by various political and scientific figures in their works. In this article, we will pay special attention to the formation of economic thought during the creation of the Russian Federation in the early nineties of the XX century.

The transition period began for our country after the collapse of the USSR at the end of 1991. The nature of the new social order was still undecided at that time. Along with the old order of things, there was a continuity.

This period of national history marked a change in economic development, which entailed changes that affected almost every citizen of our country. The economy used numerous examples of Western economic science, and each government, which often did not work out its term of office, began to use economic tools of a different nature.

For the Russian transformation of the economic processes characterized by enlargement of the role of natural factors, the weak controllability and unpredictability of the outcomes, and, as a consequence, the occurrence of crisis, loss impressive part of the scientific - technical and production potential of fuel and raw material orientation of exports and the dominance of imported goods in the Russian market, which led the country to serious, depending on the Economics and politics of industrialized countries turned into the most serious of competitors and pushes the country on the periphery of the world economic system [1].

We observe the struggle of opinions of various scientists and the defense of ideas, often diametrically opposed to each other. For a more accurate understanding of the situation in the economic science of the period under review, we will pay attention to the most well - known areas.

Of course, the first was the program of radical reforms in the field of the national economy, developed by the government, headed at that time by the economist E. T. Gaidar. The main measures here were «shock therapy» (the transfer of the economy to market methods of management). But the liberalization of prices caused a powerful jump in inflation. During the year,

consumer prices in the country increased almost 26 times. The standard of living of the population has decreased: in 1994, it was 50 % of the level of the early 90s. There was a decline in production, the agricultural sector, trade and the collapse of the energy infrastructure.

The financial situation of the population deteriorated significantly, and the state budget deficit continued to grow.

In the autumn of 1994 the second stage of privatization began, which was based on the corporatization of enterprises, the free purchase and sale of shares. However, everything did not go quite according to the rosy scenario. Controlling stakes in enterprises were still in the hands of senior officials, budgets were not replenished, and the crisis situation persisted.

The features of the economy of the government of V. S. Chernomyrdin were the chronic delays in the payment of wages, the growth of social tension, especially in the mining and mining industry.

This leads to a very fundamental error. The choice of modernization strategy in these reforms was traditional - a «catch - up model» of modernization was proclaimed. The only clear justification for what was happening was an indication that we should become a «normal» country, where normal meant just the West, which is rather unique in comparison with the predominant non - Western population. The question arises, which phase of Western development did we try to catch up with - the current one, leading to the post - industrial, information world, the former industrial one, or the stage of initial accumulation? There was no answer to this question. [2]

The main reasons for the failure of the economic reforms of the new Russia were:

- centralization and command and administrative principles of management, inherited from the times of the USSR;

- shock methods of the state, which introduced the population into depression, stupor and caused only a negative reaction;

- greater focus on the military - industrial complex, relegating to the background the financing of civilian industry and solving social problems of the population.

The transition economy has a number of distinctive features: instability; incompleteness, absence or rudimentary state of individual market institutions; the scale and depth of ongoing transformations; alternative nature, and others [3].

The methods used by the country's leadership at that time have been the subject of controversy and discussion by scientists for many years. Someone criticizes the chosen economic policy, someone adheres to neutrality or finds positive features.

Selectivity leads to a distortion of the meaning and loss of historical experience of a large period of our history, which affects the fallacy of decisions taken to eliminate problems in modern Russia [4]. Radical changes not only in the structure of government, but also in the minds of scientists lead to the spread of Western ideas about a post - economic society.

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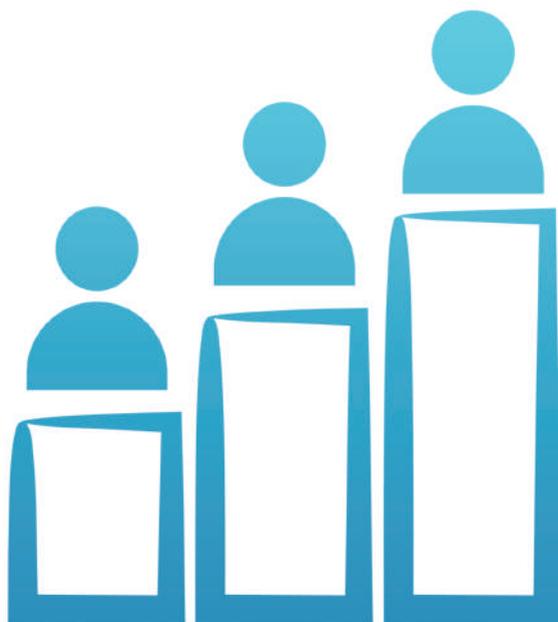
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# **СОЦИОЛОГИЧЕСКИЕ НАУКИ**



**SOCIOLOGICAL  
SCIENCES.**

## **DIGITAL AGE IN ANTHROPOLOGY AND LINKS WITH THE PAST**

### **Annotation**

Over the past decades we have been witnessing the speediest development of digital approach towards all possible disciplines. Digital age has left its imprint on the studies of ethnos. Commonality and misbalancing dominate over the links with the past. Ethnicity issues are outstanding and the whole complex of methods could serve as a guide for a deeper investigation of the problem.

### **Keywords**

Theory of ethnos, commonality, cultural boundaries, historical background, passionarity, globalization, digital power, digital media, disruptions, transformation, diversification.

Much has been said on the issue of the theory of ethnos and statehood, respectfully considering the general concept of a nation as a historically shaped stable commonality of the people formed on the basis of the common language, territory economic way of life, psychological peculiarities, demonstrated in the single culture. However, there are scholars who insist on the prominence of one or another feature, coloring it as a more significant one within the row of all others.

As Tishkov V.A. writes, the critics of the theory of ethnos and revision of the notion “nation”, initiated by academicians towards the constructivist approach and civil political and ethnic cultural perception of nation, yielded some results [7]. Considering European peoples, we may say, we could hardly determine or identify cultural boundaries of different ethnos, their identification marking is somewhat blurred. The idea suddenly springs up, allowing the peoples of Russia to have somewhat different structure or concept due to their historical background and historical memory. Rossiyanе, (Russians, and but only) composing the population of the Russian Federation, represent the unique phenomenon of closely knit family of nations, as it was stated under the Soviet Constitution, are still a versatile kaleidoscope of ethnos and big nations. The peoples comprising the great country, first called the Russian Empire and then the Soviet Union spoke the same language, Russian, had the same territory, not always the same confession, though it was generally accepted that being Orthodox Christian meant being Russian. Evidently, there was something else.

According to Nick Spencer, “the emergence of cities widened the bonds that had been the property of the family, and families had now their power in cities. What is more, cities were inherently religious institutions: quasi - churches, as families had been, patriotism and piety being essentially the same thing” [4]. Mindful of this idea, we may recall that Moscow appeared in a far more advantageous position in the course of the history. Analysts saw the reason behind this phenomenon in the geographical position of Moscow: it was in the center of the Russian lands, a cross road on the way from West to East. From the point of view of the *passionarity theory of ethnogenesis* introduced by L. Gumiliyev, it was the Moscow principality, or Moscow area, that attracted a lot of peoples, namely, Tatars, Lithuanians, Russichies, Polovtzy, and etc. So, all those

who were determined to acquire a reassurance in the future day, in social position, according to their merits. And Moscow managed to use the potential of these newcomers, according to their capabilities and to unite them by the Orthodox Christianity. The ethnic synthesis, boosted by passionarity spike became the decisive factor. Despite a certain criticism of Gumiliyev's works, accusing the writer of anti - scientific approach to the problem, his works produce a vivid interest among the broad public[6].

When we come back to the issue of cultural factor, we could easily make a conclusion that the culture is interpreted differently in many nations. Thus the British social anthropology, the main emphasis is made on organic or organismic analogy, while the American anthropologists' approach to culture meant economic, social, political and religious attitude. In the so - called globalization world, we are confronted by idea when a society is being homogenized into a "global village", according to Marshall McLuhan. He asserted that diversity of local cultures were being radically reshaped due to the speediest development of the systems of communication. Another scholar Frank Wallerstein and other anthropological political economists coined a question before the academic world, as to how asses the processes and consequences of the interpenetration of Western and non - Western cultural environment against the background of imbalances and disrupters in political and economic power in to - days world. The present circumstances of transnational communication and the dissemination of Internet gave birth to such notions as digital culture [3]. Gabriella Coleman, who considered such things as digital power or synergy, allegedly leading to "brave new world", put the ideas of "rupture" or "transformation" in the frontline. She puts forward the idea that the digital media became "central to the articulation of cherished beliefs, and ritual practices" [1].

The studies initiated by Horst and Miller indicate that digital technologies "intensify" the correlation between globalizing forces for cultural homogeneity and burst of diversification of particularities. According to their considerations anthropology must be tied up closely with traditional principles in the digital world. They assert that any studies void of holistic links between digital activities and institutionalized practices in economy, kinship and religion are doomed to failure [2].

The voluminous work, issued by Tishkov V.A. called *Russian People, History and Essence of the National Self- consciousness*, sheds light on many versatile theories on the subject of ethnicity and statehood in Russia [8]. Contrary to the vague imagination about Russia existing in the West as about a wild country, the book suggests the theories on identification according to the principle of state belonging on the one hand and on the other according to the sign of fulfilling of the civil duty, responsibilities before their compatriots. Of great importance, as it is believed, is the background on which the self - consciousness of the Russian commonality is built. Obviously, there values in the society that are becoming the cementing factor.

Against the background of the array of theories, ethnos remains the subjects that accumulates a vast majority of attitudes, to which we would add more and more features as the time puts versatile challengers before the society. The attempts to define ethnos on the basis of sophisticated technologies without considering historical routs will undoubtedly cause a lot of misunderstandings and mislead the science.

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**ФИЛОЛОГИЧЕСКИЕ  
НАУКИ**



**PHILOGICAL  
SCIENCES**

## **LANGUAGE REPRESENTATION OF THE SPACE MODEL IN LITERARY WORKS**

### **Annotation**

This article describes the main aspects of language representation of the space model in literary works. We enumerate some approaches to determine space category in different spheres and the ways it is represented in the text.

### **Key words**

Space, anthropocentric approach, time coordinates, continuum, chronotype, noosphere, worldview, metonymy.

Recently almost all fundamental and applied sciences, theory and practice of art became much closer to a human. Scientific theories, research and experiments, works of art are considered within the framework of an anthropocentric approach. Its essence is to study the interaction of a person and the world around him, while focusing on the person himself. The anthropocentric approach to the text combines the idea of its structural and semantic organization with the interpretation of the text in the aspect of psycholinguistics, cognition, pragmatics.

Traditionally, a literary text consists of three main components (Addresser - Text - Addressee), directly connected with an individual, i.e., the text is created "by a person about a person for a person". So, a fictional text makes it possible to identify specific features of information about a person from the given fictional text.

In linguistics, the text is defined as a holistic work of the creative process that meets the conditions of completeness, integrity, coherence, and therefore a communicative orientation. A literary text creates reality, reproducing the world that exists in space - time coordinates. According to E. S. Kubryakova, "the concept of space from the very beginning turns out to be anthropocentric, and it is singled out in order to reflect what extends around the observer" [1, c. 12]. The anthropocentricity of the literary text is also observed in the fact that the subject of the events and the worlds created by the author's imagination and the central object of the image becomes the protagonist, represented in time and space.

The anthropocentricity of a literary text, its aesthetic and expressive features, are closely connected with the category of artistry, which largely determines the ways of representing space in fiction.

In the modern works of many researchers, space is understood as a *linguo* - cognitive category, which includes ideas, knowledge about the world and a person, this gives grounds for describing and analyzing the ways of its speech implementation and representation in a work of art.

For example, D. A. Shchukina in her research, summarizing the information presented by different branches of science, distinguishes three types of spaces: physical, mental and cognitive [2, c. 35]. Physical space is correlated with the concepts of "world" and "existence". Usually it is objective, real, three - dimensional in its entirety, contains perceived material objects. Mental space

is closely connected with the concepts of "worldview", "consciousness". Mostly it is subjective, abstract, virtual and contains figurative, conceptual, symbolic ideas about the spatial characteristics of being. The main characteristic of the mental space is its anthropocentricity. Cognitive space is correlated with the concepts of "cognition" and "thinking". This is a structured body of knowledge and ideas that each person possesses. Due to the fact that cognitive linguistics studies the degree of participation in linguistic knowledge during the process of information processing, primarily the mechanisms of categorization and conceptualization, the cognitive space, in addition to knowledge and ideas about the world (information itself), it also includes mind, memory and language. Likewise, to study the problem of "space in a literary text" model representation we can observe such domestic scientific concepts as "chronotope" (Bakhtin), "noosphere" (Vernadskiy), "semiosphere" (Lotman), "conceptosphere" (Lihachev).

Within the framework of Russian linguistics the study of the depicting space problem in a literary text goes back to the works of I.R. Halperin, who introduced the term "space - time continuum". Exploring the space - time continuum of a literary text, K.I. Shpetny, distinguishes three types of the corresponding structural and compositional forms of the text: a frame spatial continuum, a concentric continuum, and a discrete spatial continuum. The author emphasizes that lexical means are the main linguistic means of representing the spatial continuum and assigns them the following functions: integrational, perceptual and aesthetic [3, c. 220].

According to O.I. Moskalskaya, any literary text has specific landmarks that clarify the time and place of the events described in the text. These guidelines create a local - temporal determinism of the literary text. In this regard, the special attention of researchers was drawn to the functions of the time and place circumstances in a literary text; proper and common nouns, adjectives, verbs and adverbs expressing the meaning of locality were also subject of the analysis. Studying the means of linguistic representation of space in a literary text, great interest was aroused by toponyms and their functioning in the texts of fictional prose [4, c. 112]. Sivokhina N.G. points out the participation of the main grammatical word classes (nouns, adjectives and verbs) in the expression of spatial and temporal relations in a literary text, also the change in their semantic structure as a result of interaction with the context. The role of spatial linguistic units in stylistic means is to convey the subjective assessment of the author, to highlight the details that are important for the disclosure of images, as well as for giving the presentation a reliable character. Among 97 cases of the stylistic devices use that contribute to the construction of spatial relations, 60 % belong to metonymy [5, c. 120].

Summing up, we can make a conclusion that the category of space in a literary text can be represented by various linguistic means. At the same time, the main concepts of the study of the these means functioning are based on the anthropocentric approach, since a person stands in the center of the world artistic vision, and space is considered as the dominant feature in the semantic "worldview".

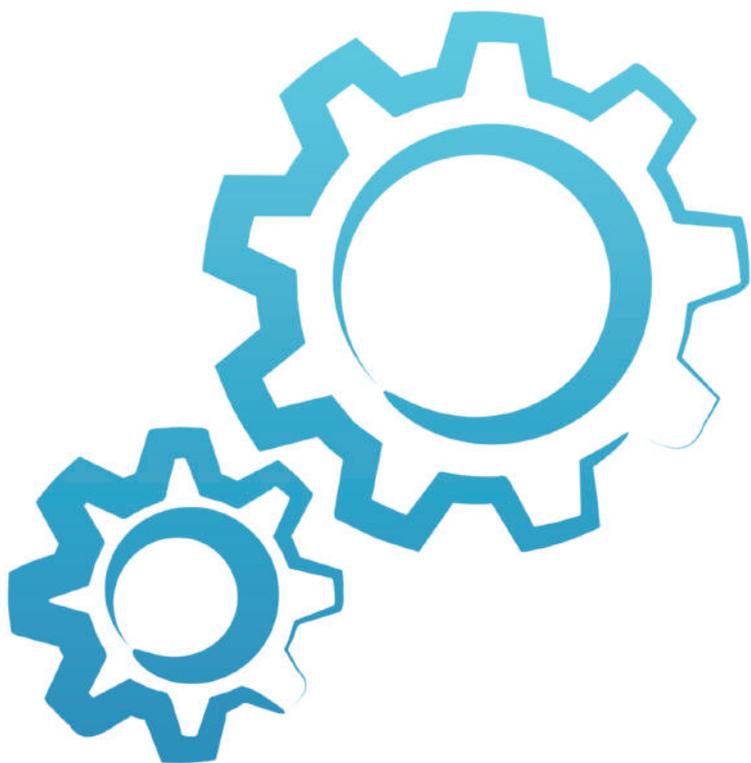
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# **ТЕХНИЧЕСКИЕ НАУКИ**



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## **STABILIZATION OF PERMANENT FROZEN SUBSTRATE OF INDUSTRIAL BUILDING BY ARTIFICIAL COOLING OF SOIL**

### **Annotation**

The active development of the territories of the Far North makes certain requirements for the buildings and structures under construction in this region. Climate change is also making its own adjustments to the construction industry. The need to achieve stability and preserve the bearing capacity of buildings on thermally shrinkable permafrost foundations is one of the main goals during construction in this area. These goals can be achieved by thermal strengthening of the bases using the local cooling method. Cooling is carried out by a system of horizontal channels located within the heat - insulating bed and ventilated with cold air in winter. The cooling effect provides the required temperature regime in the most stressed areas of the base, both in the first and subsequent years of the building's operation.

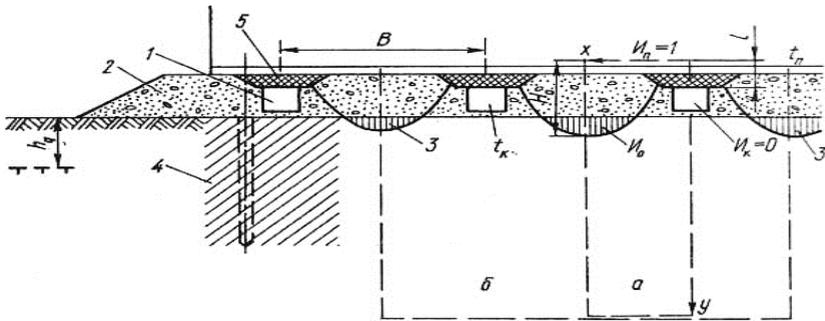
### **Keywords**

Foundations, cooling, strengthening, parameters, thermal resistance.

Stability and load - bearing capacity of buildings on thermally shrinking ever - numb foundations is ensured by maintaining natural negative ground temperatures under the entire building and lowering them in the most critical places of the foundation. [1,7, 8] For thermal strengthening of the foundations of multi - span industrial buildings with floors on the ground and in the presence of internal heat sources, it is advisable to use local cooling.

Cooling is carried out by a system of horizontal channels (Picture 1) located within the heat - insulating bed and ventilated with cold air in winter.

A fan is installed at the entrance to a channel or a collector that combines several channels. Its power is selected such that



Picture 1. Schematic diagram of thermal reinforcement of a permafrost foundation of a multi - span industrial building and a design fragment:

- a - electric model; b - physical model; 1 - cooling channel; 2 - heat - insulating bedding;
- 3 —boundary of the defrosting zone in the span; 4 - area of thermal soil strengthening;
- 5 - thermal insulation above the channel

the air velocity in the channel (2 - 5 m / sec) provided the necessary cold flow into the base. The ventilation unit is switched on when the outside air temperature does not exceed the temperature of the duct walls; this temperature should be below minus 10 - 15 ° C. The system turns off during blizzards and thaws. The fulfillment of these requirements excludes the formation of frost on the walls of the channels and their clogging with ice. The preservation of the system for the summer period provides a lower average annual temperature in the channels than the temperature of the outside air, and the preservation of a permanently frozen state of the soil in the fortified zones.

The temperature field at the base is formed depending on the cooling effect of the channels and the heat - insulating properties of the bedding. The selection of the optimal ratio of the parameters of the channels and the filling makes it possible to limit or completely exclude local thawing of the soil in the spans between the channels and to lower the temperature of the fortified zones. Channels and bedding, possessing thermostatic and thermal insulation properties, are also load - bearing structures. [2.4]

The optimal values of these parameters and the thermal resistance of the bedding should ensure that the natural temperature of the permafrost massif under the building is maintained or reduced, exclude or limit thawing of the soil in the spans between the channels, and ensure dimensional stability and the design temperature of the cooled zones.

Evaluation of the effectiveness of this or that channel cooling scheme should be carried out by comparing the greatest (limiting) depths of closed thawing zones in the center of the span between adjacent channels, as well as by comparing the sizes and average maximum temperature of the fortified zones.

The maximum depth of local thawing of the base is achieved with prolonged thermal interaction of the "building - cooling system - permafrost base" system, characterized by a stationary temperature field.

With the length of the building and the channel significantly exceeding the distance between the channels, the limiting temperature regime of the base is quite accurately approximated by the solution of the Laplace equation for the plane problem (design section a, see Picture 1).

The temperature on the open ground surface outside the building insignificantly affects the formation of the temperature field in the internal spans, where the negative temperature of the fortified zones and the massif as a whole is maintained as a result of the cooling effect of the channels. In the middle span, the limiting thawing between the channels and the soil temperature of the fortified zones are maximum calculated for the entire considered region of the temperature field.

Under the influence of the total heat flow from the building and the cooling channels, the temperature state of the permafrost base changes to a certain depth. The natural temperature of permafrost soils will remain below this depth, depending on the parameters of the building and the cooling system, the thermophysical properties of the backfill and the foundation soil. In the course of the research, the influence of the method for specifying the lower boundary condition, taking into account the natural temperature of the permafrost massif, on the limiting temperature regime of the fragment, in particular, on the depth of local thawing in the center of the span, has been analyzed. In the first variant, it was assumed that the limiting temperatures at the base of the building are formed only under the influence of the temperature in the building and in the channel; the influence of the temperatures of the permafrost massif below the zone of thermal strengthening was not taken into account. In the second variant, the influence of the natural temperature of permafrost on the temperature field of the fragment was taken into account.

Comparison of temperature fields for both variants of modeling the lower boundary condition allows us to conclude that there is a very insignificant difference between them.

Reducing the pitch of the channels and increasing their width leads to a rise in the cost of structures and complicates the placement of foundations for equipment; at the same time, some permissible thawing in the span practically does not reduce the bearing capacity of the fortified base zones. [1,5] Based on the technical and economic analysis of the research results, the following geometric parameters of cooling systems are recommended: channel spacing in terms of 6 - 12 m, channel width 1 - 2 m and height no more than 2 m.

The dynamics of the temperature regime of the area of thermal strengthening under the channel was investigated on a volumetric physical model of a fragment b (see Figure 1) made of homogeneous fine - grained sand.

Modeling was carried out for two options: a -  $B = 6$  m;  $b = 1.5$ ;  $h = 1$ ;

$\nu l = 0.05$ ; b -  $B = 18$  m;  $b = 2$ ;  $h = 1$   $\nu l = 0.02$ . For variant b, a constant average annual temperature was maintained on the channel wall. In variant a, the summer conservation of the cooling system is taken into account; during the cooling period, the average winter temperature was maintained on the channel wall; for the summer period, the ventilation system of the model was turned off and hermetically isolated from the external environment. The effect of summer heating of bedding and soil on the thermal regime of fortified zones has been studied.

The most intense thawing of soil between the fortified zones is observed in the first two years of the building's operation; further this process slows down. Near the channel, the natural temperatures of the soil are intensely falling, and a fairly rapid process of thermal strengthening of the permafrost base occurs. The most intense decrease in temperatures is observed in the first 3 - 4 years of system operation. In the future, the cooling effect manifests itself more slowly, but covers a larger area of the soil. Such intensity of cooling provides the required temperature regime in the most loaded areas of the base both in the first and in subsequent years of the building's operation. [3, 6] The results of physical modeling confirm the fundamental possibility of strengthening the base of the building using a system of ventilated channels.

The economic efficiency of using this cooling scheme was revealed by comparing the estimated cost for the zero cycle for a building with cooling channels and with a traditional ventilated

underground. The economic effect of using channel cooling for thermal strengthening of the foundations of the four projected buildings is on average 20 % .

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## **BIM TECHNOLOGY IN RUSSIA**

### **Abstract**

Nowadays, most processes are automated, as they increase the speed and quality of work. This trend has touched the construction industry as well. BIM technology was developed to improve efficiency in this industry. It can identify errors before construction begins, thereby reducing costs

and optimizing the entire construction process. Concept of BIM technology and the following Russian practices are studied in this paper: the level of implementation, legislative framework and real cases of using information modeling.

### **Keywords**

BIM, Building Information Modeling, construction, the level of implementation BIM, legislative framework, real cases of using BIM in Russia.

## **1. The concept of BIM technology**

At present, people are aimed at increasing the efficiency and improving quality of work. Modern technologies facilitate all the industries, including construction field. Today, the most modern technology in construction is BIM (Building Information Modeling). This technology is widely used the construction industry and shows quite good efficiency results. The capabilities of such modeling are significantly different from the traditional method, where a two - dimensional model (plans, drawings) is used. BIM technology takes into account not only the geometry of the object under construction, but also its physical, economic and operational characteristics.

BIM is an information model that provides a comprehensive interaction of the parties involved at all stages of the object's life cycle: design, construction, operation, repair and dismantling. This technology collects information about an object and its individual elements. This modeling method combines architectural, engineering, design, and economic parameters data. All of them are interconnected and changing one parameter leads to automatic recalculation of the remaining parameters. Such system allows you to identify defects and errors before construction operation starts, to choose the most effective ways to solve problems. This approach makes it possible to avoid mistakes during construction, optimize the project at an early stage, increase the payback and service life of the facility, and reduce operating costs.

## **2. Russian experience of using BIM technologies**

### ***Level of implementation***

Levels of BIM implementation have been introduced for a gradual transition to the use of this technology. There are four of them in total:

1. Level 0 means 2D CAD drafting only is utilized. Output and distribution of drawings and documentation is via paper or electronic prints [2]. There is no cooperation between the parties.

2. Level 1 combines both 3D CAD for concept work, and 2D for drafting of statutory approval documentation and Production Information. Data are distributed via a common data environment (CDE) [2]. Collaboration between the parties is still poorly traceable.

3. Level 2 - advanced level of implementation and the process of BIM is being followed. The level assumes collaboration. The information about the object becomes publicly available to all participants in the process. Each party must be able to export to one of the common file formats, such as IFC (Industry Foundation Class) or COBie (Building Information Exchange for Construction Works) [2]. This data structure makes it possible to create a merged model.

4. Level 3 covers the entire life cycle of the building, i.e. there is a combination of all processes: design, construction, financial analysis, project management, etc. [3]. The information environment covers not just one object, but entire neighborhoods and cities.

The majority of Russian companies are at the first level of BIM implementation with an initial degree of automation. Only a small part applies information modeling in their work. According to the Ministry of Construction, the number of such companies is 5 - 7 % . However, even these

companies are only reaching the initial stage of the second level. At the second level, there are a few Russian companies with development, design, construction management, general contractor and operation services under one roof.

### ***Legislative framework***

The first step in implementing BIM technology was taken on July 1, 2019. Federal Law On Amendments to the Federal Law On Participation in Shared Construction ... No. 151 - FZ was published on that day. Also, the concept of information modeling was introduced into the Urban Planning Code. According to the director of the Department of Urban Planning and Architecture, in September 2020, "the Russian government approved a number of documents for the transformation of the industry - the rules of the formation and maintenance of the information model, the rules of formation and maintenance of the classifier of construction information, the rules of SUDSIS (State Urban Development Support Information System) RF [1].

### ***Real cases of using BIM in practice***

MR Group was one of the first companies that applied BIM technology in the creation of residential complexes Seliger City, Tsvet 32 and Fili City. At the moment, the implementation of new residential complexes of this developer is carried out using information modeling.

In 2017, FSK Leader began to apply BIM technologies in a test mode, and the technology was used in the design of the social infrastructure of the Scandinaviankiy UP - quarter in the Moscow region in 2018. The DatskiyKvartal residential complex became the first facility of this company to be fully built using information modeling.

Setl Group is one of the largest real estate developers in Russia, located in St. Petersburg, and is actively introducing BIM technologies into its projects. It has already applied information modeling in the implementation of the projects of the London residential complex and the Palacio residential complex.

In addition to housing construction, there are objects of national and international level, which were implemented using BIM technology: the Fisht Stadium and the Iceberg Winter Sports Palace, built for the Sochi Olympics; Domodedovo - 2 Airport in Moscow; Gazprom Arena and Volgograd Arena stadiums, built for the 2018 FIFA World Cup; Lakhta Center public and business complex in St. Petersburg. The construction of the coronavirus center in Golokhvastovo was implemented using BIM technologies in a month.

The spread of information modeling in Russia is very far behind more developed countries. For instance, about 70 % of companies in the UK have implemented BIM, in the US this number is 72 % , and many other countries, such as Finland, China, Germany, Spain and France, are actively using information modeling. In Singapore, BIM is used in the construction of cities.

### **Conclusion**

BIM is the future that has come in other countries and that is just coming to Russia. Despite this, projects of international level using information modeling have been implemented in Russia. BIM technology allows to reduce risks before construction, minimize costs, reduce the time of commissioning of the building, it is necessary to continue the introduction of information modeling in Russian companies.

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# **ЮРИДИЧЕСКИЕ НАУКИ**



**LEGAL  
SCIENCES**

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## **TOPICAL ISSUES OF LEGAL REGULATION OF ORGAN AND TISSUE TRANSPLANTATION IN RUSSIA**

### **Annotation**

The article deals with the implementation of the provisions of the Law on the "presumption of consent" for the removal of organs and (or) tissues of a person after his death. Unfortunately, the number of disputed cases of removal and disposal of human organs and tissues increases every year, which confirms the relevance of the study. In the work, it is proposed to improve the regulatory framework regulating legal relations in this sphere of legal relations subject to all the provisions of the specialized legislation and case law, allowing to observe balance of interests of society and the state, to provide all possible with stakeholders, the abuse of rights, and prevent future instances of arbitrary interpretations of law and other consequences.

### **Keywords**

Organ removal, organ transplantation, organ disposal, transplantation.

It should be emphasized that the ability to decide the fate of human organs and tissues today becomes essential, primarily for the protection of the patient's rights. [1, c.8]. Thus, the Law of 22.12.1992, No. 4180 - 1 "On transplantation of human organs and (or) tissues" (hereinafter referred to as the Law on transplantation) regulates public relations associated with the transplantation of organs and (or) human tissues. [7, c. 15]. Let's pay attention to Art. 8 of the Law on Transplantation, which provides for the "presumption of consent" for the removal of organs and (or) tissues of a person after his death. Let's cancel that the Constitutional Court recognized the "presumption of consent" as legal [3, c. 5].

It must be emphasized that this provision does not correlate with paragraph 1 of art. 5 of the Federal Law of 12.01.1996, No. 8 "On Burial and Funeral Business" (hereinafter referred to as the Law on Burial), which considers the expression of consent or disagreement with the removal of human organs and tissues [8, c. 24]. It should be noted that this, first of all, contradicts the "presumption of consent" for organ harvesting enshrined in the Law on Transplantation. The essence of the above boils down to the fact that the provisions contained in paragraph 1 of article 5 of the Burial Law and article 8 of the Transplant Law contain radically different provisions on the same object. In our opinion, the legislator needs to solve the problem of duality

The majority of citizens are not aware of the existing "presumption of consent", which, in our opinion, indicates a low level of legal literacy of the population. As an illustration of the above, we

present the results of an anonymous sociological survey conducted in one of the social networks as part of the study of this issue. As a result of the survey of 768 people, the following results were obtained: 65 % of the respondents do not know about the “presumption of consent” at all; 60 % of respondents would consent to the removal of their own organs and tissues after death; 88 % of respondents answered that legislation in the field of human organ and tissue transplantation requires reform [6, c. 10].

To resolve the contradictions that exist today in the legislation, we consider it necessary to offer the following options:

First, it is necessary to consolidate at the legislative level the system of “requested consent”, which, in our opinion, is the most effective. To do this, it is necessary to exclude from the Law on Transplantation the “presumption of consent” for the removal of organs and (or) tissues of a person after death, and the Decision of the Constitutional Court of 04.12.2003, No. 459 - O, shall be declared invalid.

Secondly, to consolidate at the legislative level the ability to officially fix the expression of the will of a person regarding the removal of organs and tissues. In our opinion, this can be solved by creating a unified national automated register of the will of citizens.

Contradictions in legislation should be gradually eliminated.

Article 8 of the Law on Transplantation, regulates the removal of human organs and tissues for good purposes - donation. Criminal uses cannot be ruled out. Such a case happened to citizen A, a student at a Moscow university. Seven organs were removed from the girl's body. Relying on the presumption of consent, which is enshrined in article 8 of the Law on Transplantation, the determination of the Constitutional Court of the Russian Federation, doctors and employees of the Ministry of Health of the Russian Federation did not give the girl's parents clear answers [4].

A similar case occurred in the case of a foreigner from the body, whose organs were removed on the territory of the Russian Federation [6, c. 3]. Thus, the current legislation allows the removal of organs even from foreigners. It should be noted that in the above cases, the court refers to the ruling of the Constitutional Court of December 4, 2003 No. 459 - O notes that the "presumption of consent" does not violate the Constitution. "

This judicial practice, in our opinion, confirms the existence of criminal organ and tissue transplantation.

The removal of human organs and tissues cannot be qualified under any article of the Criminal Code of the Russian Federation (hereinafter referred to as the Criminal Code of the Russian Federation). According to clause "m" of part 2 of article 105 of the Criminal Code of the Russian Federation, it is impossible to qualify an act, since it is already a question of withdrawal from a dead person. If we assume the idea of involvement under article 244 of the Criminal Code of the Russian Federation, then law enforcement officers need to perform a legal miracle and prove that the actions can be qualified according to this norm. In any case, the application of article 244 of the Criminal Code of the Russian Federation will have no preventive effect in practice. In view of the above, we consider it necessary to introduce into the Criminal Code of the Russian Federation a norm on liability for illegal removal of organs and (or) human tissues from a living or dead donor for criminal purposes.

As a conclusion, it must be said that if the reform of medical legislation is not carried out in the form of the introduction of criminal liability for the removal of organs and (or) human tissues for criminal purposes, as well as, the existing "presumption of consent" for the posthumous removal of

organs and (or) of human tissue, then our country will remain a legal supplier of donor organs for the black market.

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# **СЕЛЬСКОХОЗЯЙСТВЕННЫЕ НАУКИ**



**AGRICULTURAL  
SCIENCES**

## QUALITY OF SEED PROCEDURE OF BARLEY PLANTS GROWING ON SOILS CONTAMINATED WITH ZINC NITRATE

### **Annotation**

*The analysis of the research results showed that increased Zn concentrations in soils can negatively affect the quality of barley seed progeny and increase the frequency of cytogenetic disorders. Conversely, small concentrations can increase seed germination.*

### **Keywords**

*cytogenetics, zinc nitrate, barley, seed quality.*

Soil pollution with heavy metals, the most toxic chemical elements [1, 2, 3], is one of the main reasons for the decline in the quality of agricultural products. Zinc, as a heavy metal, belongs to hazardous substances of the 1st class [4] and due to its rapid accumulation in the environment it is also considered one of the most important pollutants [1]. Reaching toxic concentrations in plants, zinc negatively affects the growth, development, volume and quality of the crop. At the same time, the lack of zinc as a trace element necessary for plants negatively affects carbohydrate and protein metabolism, oxidative processes, the synthesis of chlorophyll, DNA and RNA, as well as the formation and development of generative organs of plants. [5, 6]. Since a lack or excess of zinc in the soil can become a limiting factor in determining the yield of agricultural plants and the quality of their seed progeny, it is important to determine the optimal and maximum allowable level of zinc in the soil. In this regard, the purpose of the presented work is to assess the effect of different concentrations of zinc in different types of soils on the progeny of barley seeds.

In the course of the study, the cytogenetic effect on the cells of the apical meristem of seedlings and the germination energy of barley seeds (*Hordeum vulgare* L., variety "Zazersky 85") obtained in a vegetation experiment on three types of soils contaminated with zinc nitrate was studied to varying degrees. Statistical analysis was carried out by methods of variation statistics in MS Excel.

In the presented study, it was found that the germination rate of barley seed progeny tends to decrease with an increase in zinc concentrations in soils ( $r = 0.51 - 0.59$ ) for all three studied options, but at low zinc concentrations in the soil (about 25 250 mg / kg), an increase in the germination rate is observed in seed offspring. On peat and sod - podzolic soil, this increase is statistically significant. An increase in the germination capacity of barley seeds obtained on soils with a low level of contamination can be explained by the fact that Zn in low concentrations is necessary for plant metabolism and becomes toxic only if its content exceeds the critical level for plants [6]. The use of the method of cytogenetic analysis made it possible to reveal a statistically significant increase in the number of chromosomal aberrations at high concentrations of zinc in the soil. At the same time, a statistically significant increase in the frequency of chromosomal aberrations in seeds grown on sod - podzolic soils begins at significantly lower metal concentrations than in seeds grown on chernozem or peat soil. This is probably due to the fact that the increased acidity characteristic of soddy - podzolic soils, a low content of organic matter and a

low volume of cation exchange in comparison with chernozem and peat soil, contribute to the greater availability of Zn for plants and its subsequent accumulation in toxic concentrations.

In general, the results of the study showed that low concentrations of zinc nitrate in the soil are not toxic to the offspring of barley seeds and can promote their better germination. High concentrations of zinc have a mutagenic effect on barley seedlings. Lower concentrations of Zn nitrate are toxic for barley seeds grown on sod - podzolic soils than for barley grown on chernozem and peat soil.

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## THE USE OF WHEAT GRAIN, SUBJECTED TO SELF - HEATING IN THE PROCESS OF BAKING

### Annotation

Bread is a very important product in the diet of the population. The quality of bread largely depends on the raw materials used in the production of bread. The main raw material of the baking industry is of course grain. Bread is currently baked mainly from wheat grain. Storage conditions are crucial in assessing the quality of grain that is being processed into flour. The studies have allowed us to evaluate the effect of self - heating on the quality of flour. For this purpose, we carried out test baking in the laboratory from the wheat grain of Vassa. The test baking allowed us to conclude that an increase in temperature during the process of storage dramatically reduces the

baking quality of grain, as a result, bread is obtained with low porosity and low organoleptic characteristics.

### **Kew words**

Bread, grain quality, wheat variety, organoleptic parameters.

Bread is one of the oldest products. The value of bread as a food product is determined by the fact that it contains all the essential components to ensure the normal functioning of the body. Bread 50 % meets the needs of the human body in carbohydrates, 30 % - in proteins, more than 50 % - in b vitamins, phosphorus salts, iron.

The concept of modern healthy eating provides that the main parameter to be satisfied with the daily diet is balance and diversity.

Nutrition is the most important physiological need of the human body. It is required for the continuous construction and formation of cells and tissues, the receipt of substances necessary for the human body to form hormones, enzymes and other regulators of metabolic processes. It is known that, metabolism, structure and functions of cells, tissues and organs are formed depending on the nature of nutrition [1].

Taking into account the importance of bread in human nutrition, a significant number of works are devoted to the study of the quality of bread at the Department of Technology of Production, Storage and Processing of Crop Products [2, 4 - 7].

Technological progress and man - made disasters have led to a sharp deterioration of the ecological situation, which adversely affects the quality of food consumed by man. This leads to a significant increase in known diseases and the emergence of new ones caused by an unbalanced diet. The deficiency of protein, complete mineral substances, dietary fibers, antioxidants and vitamins is noted in the last decade.

Every person should daily consume eight essential amino acids (valine, isoleucine, lysine, methionine, threonine, tryptophan, phenylalanine) and two partially interchangeable (arginine and histidine). The state of protein metabolism is largely dependent on the lack or absence of essential amino acids. The absence of at least one essential amino acid in food causes a negative nitrogen balance, disruption of the Central nervous system, growth arrest, and other serious clinical consequences. The lack of one essential amino acid leads to limited assimilation of others [3].

One of the important tasks of grain specialists is to ensure the safety of grain grown by the grain growers' labor.

During the process of storage physical and biochemical reactions continuously occur in the grain, they are accompanied by the release of heat leading to self - heating. Grain quality deteriorates in the process of self - heating after that there is a loss of dry matter mass. Temperature monitoring of grain in the process of storage allows to prevent adverse events and reduce losses. Therefore, the temperature of the grain is the most important characteristic in the process of storage. The lack of monitoring of grain condition and untimely held activities preventing bad influence on these processes result in decrease of its quality.

The purpose of our research was to study the effect of self - heating on the baking quality of Vassa winter wheat grain.

Self - heating Cases during the storage of grain can be as a result of rapidly developing physiological and biochemical processes in the grain mass of high humidity, and as a result of the large number of pests' influence on a long - stored batch of dry wheat.

Previously, we studied the baking advantages of Rufa winter wheat [3].

Vassa variety was developed by the method of individual selection from the hybrid population F4 - 314 / Crumb. Line P - 314 originated from Russa varieties with spontaneously - hybrid selection.

Middle - grade. The height of the plants is from 90 to 105 cm, the straw is strong and thick. The variety is coarse - grained and large wheeled. The weight of 1000 grains is 48 - 58 gr.

Trial laboratory baking bread was conducted to characterize the effect of self - heating on the baking advantages of Vassa winter wheat flour.

The quality of bread was determined by the humidity of the pulp ( % ), porosity ( % ), acidity ( $h^{\circ}$ ), specific volume (ml / 100g). Also we conducted the tasting evaluation.

The quality indicators of bread which was baked from the flour produced from the heating of grain, has reduced. Acidity increases almost in 2 times. The acidity index characterizes the quality of bread from the taste side.

There is also a significant decrease in porosity. If the flour of normal Vassa winter wheat grain bread is obtained with high porosity (68.4 % ), then from the heated grain bread is obtained with low porosity (46.7 % ). Accordingly, the specific volume of bread was 423 ml / 100g and 231 ml / 100g.

Organoleptically - defined indicators are the shape of bread, color and as it crusts, taste, smell, thickness of crusts, the condition of the bread pulp.

According to the organoleptic characteristics, the bread made from warmed grain, inferiors in all respects. The crust of bread is flat and cracked. Pulp is poorly baked, gray, with bad elasticity. The taste is sweet with a slightly malty smell.

Thus, the baking quality of flour obtained from grain subjected to self - heating significantly deteriorates.

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