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Le recueil comprend des articles scientifiques des participants du Forum Scientifique International des Universités, dont l'objectif est la présentation des résultats significatifs de la recherche dans le domaine des sciences humaines, de la nature et de l'ingénieur; la formation du niveau contemporain des connaissances scientifiques, de l'expérience de la transformation de la science théorique au champ de l'application pratique des innovations; la synthèse de l'expérience des recherches scientifiques et pratiques. Le forum est un instrument permettant d'établir des liens durables et d'échanger des données d'expérience entre les enseignants et les chercheurs des universités et les organisations scientifiques.

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THE CHOICE OF ORGANIZATIONAL MECHANISMS FOR THE IMPLEMENTATION OF CONVERSION PROJECTS BY ENTERPRISES OF THE RUSSIAN DEFENSE INDUSTRY[1]

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Over the past 5-10 years, enterprises of the Russian military-industrial complex have managed to significantly increase the production of the most modern types of weapons and military equipment as part of an increase in the volume of state defense orders. Re-equipment of all types and branches of the Armed Forces of Russia with modern military equipment and innovative technologies for conducting military operations in almost any conditions on land, water and in air is in full swing. The share of modern types of weapons and military equipment in the army is steadily growing and will reach the values established by the President of Russia and state rearmament programs in the next 3-4 years. That is why the enterprises of the Russian defense industry must converse their further development not only in the production of weapons and military equipment - this area of their activity will continue to remain the main one. But the gradual reduction of its volumes to those necessary to maintain the required level of combat readiness of the Armed Forces of Russia makes it urgent to reorient their activities to the implementation of conversion projects related to the production of high-tech civilian products.

Keywords: Russian military-industrial complex, enterprises, state defense order, high-tech civilian products, conversion projects, organizational mechanisms.

Introduction

In modern conditions, the Russian military-industrial complex (MIC) faces the need for accelerated reorientation of production capacities to implement conversion projects. The transition to solving this problem was

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largely predetermined by the successful implementation in the last 7-8 years of the rearmament of all branches of the Armed Forces of Russia with the most modern types of weapons and military equipment (TyWE). Due to this, only in the Air Force (AF) the share of modern weapons exceed 65%, and in general in the Aerospace Forces (ASF) it is 81.8% [1]. A major role in achieving such indicators was played by the State Defense Order (SDO), the implementation of which has been constantly growing in recent years and steadily exceeds 94-97% for various types of TyWE.

However, starting from 2021, the procurement volumes of modern TyWE models within the framework of SDO will gradually decrease. Such a development of events was envisaged by the Russian government during the formation of the State Arms Program (SAP) for 2011–2020. Given this circumstance, as well as the task set by the President of Russia in 2016 to increase the share of civilian products to 50% in the total production of MIC enterprises by 2030, the implementation of conversion projects should be considered in the broadest sense. In fact, in the next 10 years, the Russian MIC will actively integrate into the national economy. Approaches to solving this problem will be partially disclosed in this article.

Main part

At the same time, the enterprises of the Russian MIC were able not only to maintain a large part of their production and intellectual potential in comparison with enterprises in other areas of economic activity, but also the ability to remain leaders in the promising directions of development of the national economy. These areas include:

- implementation of breakthrough R&D and transfer of critical technologies;

- the availability of qualified specialists at MIC enterprises and the possibility of their transition to other sectors of the economy that produce high-tech civilian products;

- the development of cooperative ties through the formation of a system of high-tech corporations whose production activities are impossible without a high level of interaction between suppliers of all types of components, equipment and technologies, as well as attracting partners for the production of civilian products [2].

In modern conditions, it is quite obvious that the task of implementing conversion projects by MIC enterprises does not have an unambiguous solution, when each MIC enterprise will be indicated the output of which civilian products it will organize, using its available capacities, by what terms and to what level of volumes it will have release of civilian products.

In this regard, it seems appropriate to consider the enterprises existing in MIC, to distribute them according to the levels of development of specialization, and for each level to justify a set of organizational mechanisms for the implementation of conversion projects. Using the proposed approach, in relation to the possibilities of implementing conversion projects, all enterprises of the Russian MIC can be conditionally divided into three different-sized groups.

The first group includes enterprises whose production specificity, in principle, does not allow them to enter the markets for civilian products. This group includes all enterprises engaged in the production of products and components for the nuclear weapons complex, all types of missile systems, as well as special-purpose ammunition.

The second group includes enterprises whose production specificity allows them to easily reorient themselves towards the implementation of conversion projects and which already produce civilian products. At the enterprises of this group, the share of civilian and dual-use products is currently approaching 30%, and in 3-5 years it will be increased to 50% and higher. Obviously, the enterprises of the second group can engage in the implementation of conversion projects without significant problems, dynamically increasing their production of high-tech civilian and dual-use products in accordance with the demands of the market and potential consumers.

The third group includes enterprises where the share of civilian products as a rule does not exceed 10% of total production. Implementation of conversion projects at the enterprises of this group is possible subject to significant additional costs for their modernization and technical re-equipment by reorganization. Most enterprises of the Russian MIC belong to the third group. Naturally, with unreasonable attempts to enter the enterprises of this group on the markets of high-tech civilian products, they will encounter a lot of problems, and their large-scale modernization in principle is not possible, since the main production capacities of the enterprises of this group are intended for the production of military products, goods and components.

As you can see, even a brief analysis of the specialization of production at the enterprises of the Russian MIC showed that from this position they are not unique, since the MIC contains enterprises of all three groups. Therefore, an approach to solving the problem of a future reduction in SDO should be sought in the equivalent balance of the implementation of conversion projects with a wide range of activities that take into account the specialization of production at MIC enterprises.

In addition, taking into account the specialization of production at MIC enterprises helped to identify a very uneven situation in industry produc-

tion and enterprises on a MIC scale. Thus, a number of MIC enterprises are already fulfilling or are close to fulfilling the established targets for increasing civilian production output up to 30% by 2025 and up to 50% by 2030. However, for most enterprises, these guidelines are either unattainable in general, or seem to be irrational at this point in time. The presence of these circumstances allows us to form an unambiguous conclusion that it is more rational to set targets for achieving civilian output at the level of such integrated structures as high-tech corporations, since the combination of civil and defense competencies within the framework of one legal entity, in which the enterprise acts MIC seems to be insufficiently substantiated. Indeed, for large high-tech corporations in the implementation of conversion projects it is much easier to reorganize their structure in order to single out an existing or create a new specialized unit, the production activity of which would combine a number of areas that are not related to the main specialization of the production activities of the corporations themselves. It seems obvious that such structural units should combine the autonomous organization of their activities with the ability to use production assets and technologies of integrated structures.

For the enterprises of the first group, the specifics of the production activity of which is focused on TyWE production only, with a decrease in SDO volumes, support is necessary to maintain and increase TyWE export volumes. Implementation of conversion projects for this group of enterprises may consist in organizing the training of military specialists in the rules of safe operation and maintenance of acquired TyWE, as well as the implementation of service contracts for them according to one of two options: at specialized MIC enterprises in our country or at specialized service bases and repair in other countries (if any, as well as qualified specialists and certified repair kits of spare parts and other materials). Lack of attention to the implementation of TyWE sales contracts with after-sales service leads to the loss of a part of potential income due to insufficient service, and also negatively affects the reputation of our country as one of the leading players in the modern TyWE market. In addition, the enterprises of the first group through the production of the latest TyWE models create significant potential for the growth of Russia's share in the global arms market. However, the politicization of this market is so high that only large integrated structures, but not individual MIC enterprises, are capable of acting on it today, no matter what modern TyWE models they produce. The task of such a structure in the global arms market is to maintain neutrality and maintain business relations with as many countries as possible, who are potential buyers of Russian-made weapons. Its implementation

will allow Russia to maintain its position in the global arms market and keep TyWE markets of these countries open for itself. Finally, another direction in the implementation of conversion projects for the first group of enterprises should be a flexible approach to localization of production of individual systems, assemblies and components supplied under TyWE contracts in the purchasing countries. Partial localization of production should be based on the search for mutually beneficial compromises, for example, through the transfer of production from non-critical components to repair kits of individual components and assemblies in exchange for a greater presence of Russian weapons in the markets of these countries.

For large MICs of the second group, whose production activities are based on dual-use technologies (aircraft and helicopter manufacturing, production of jet engines, sophisticated electronic equipment, etc.), it seems appropriate to distinguish separate units in their structure with the implementation of marketing, sales and service functions service, and in some cases - production and development. As a rule, enterprises of this group have at their disposal modern TyWE production technologies, which, after necessary refinement, can be used to produce civilian products. With the competent organization of the implementation of conversion projects, the share of production of such products can be from 30% to 50% of the total production. The main obstacle for this group of MIC enterprises in the implementation of conversion projects is the significant difference and features of doing business with military and civilian products, as well as significant differences in the demand and supply in TyWE and civilian products in functional terms [3]. Therefore, for this group of MIC enterprises, it is required to form separate structural units endowed with the above functions. In addition, MIC enterprises of the second group, when implementing conversion projects and entering the markets of high-tech civilian products, need support in terms of promoting their products in these markets, primarily in terms of creating competitive conditions with other enterprises, including foreign ones, in the field of sales and after-sales services based on the conclusion of service contracts.

Finally, in the activities of MICs of the third group, which mainly use technologies for TyWE production, a specialization model based on specific competencies is presented, namely: the presence of a single customer represented by the Ministry of Defense; pricing is aimed at achieving a result - increasing the country's defense capability (costs plus), etc. As a rule, MIC enterprises of this group have significant diversification by TyWE types, however, their civilian production does not exceed 10%. The implementation of conversion projects at MIC enterprises of this group is

currently quite difficult due to the above factors and specific production features. But here there is a certain regiment of activity. Firstly, it is the organization of maximizing the use of existing production capacities by concluding contracts for the production of high-tech civilian products at fully unused lower processing facilities. The vertical integration of most of the MIC enterprises belonging to the third group leads to the fact that lower redistribution levels usually have the lowest load. As part of the implementation of conversion projects, it is advisable to withdraw these redistributions from the MIC enterprises and outsource them or create new specialized companies that can fully utilize the capacities of these redistributions by producing the necessary components for the production of TyWE and ensuring the release of high-tech civilian products. At the same time, the closest prospect of implementing conversion projects at the enterprises of this group is seen in the organization of contract manufacturing of products and components for civilian products at temporarily idle capacities of the lower stages of these enterprises. This approach will not require MIC enterprises to participate in the development of civilian products, nor the ability to sell them in non-traditional sales markets.

Conclusion

For the successful implementation of conversion projects in relation to all the above-mentioned groups of MIC enterprises, it will be necessary to ensure their financing, transfer of the latest technologies of MIC enterprises in the high-tech civilian products manufacturing sector, as well as the promotion of these products on the sales markets. For this, in June 2017, a specialized infrastructure was created within the framework of MIC in support of development institutes and partner organizations - NPO "Conversion", formed by combining a subsidiary of the Rostec Corporation of the National Informatization Center (NIC) and the Federal Center for Project Financing (FCPF) of Vnesheconombank [4]. The main activities of NPO "Conversion" and its complex of tasks include: implementation of conversion projects at MIC enterprises, conducting marketing research of markets for high-tech civilian products, determining market demand and supply for certain types of these products, finding ways to promote and implement of these products, the development of effective mechanisms for attracting private financing for the implementation of conversion projects by MIC enterprises, the development of a system of suppliers of products and components for MIC enterprises from among industrial enterprises of various forms of ownership, capable of working in the interests of MIC and sectors of the economy engaged in the production of civilian products.

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IMPLEMENTATION OF CONVERSION PROJECTS BY ENTERPRISES OF THE RUSSIAN DEFENSE INDUSTRY USING TOOLS FOR MODELING OF THE INVESTMENT VALUE OF REAL ESTATE[1]

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The purpose of the article is to reveal promising areas for the efficient use of investment resources of enterprises of the Russian military-industrial complex. An approach to changing the purpose of inefficiently used real estate objects of the military-industrial complex in the market is proposed. An economic and mathematical model toolkit has been developed to determine the investment value of inefficiently used real estate objects, which allows to increase the investment potential of enterprises of the Russian military-industrial complex and to ensure the possibility of its involvement in economic turnover as part of the implementation of conversion projects.

Keywords: conversion projects; real estate objects; investment value; model tools.

Introduction

In modern conditions, enterprises of the Russian military-industrial complex own large areas of land and other real estate (production buildings with obsolete equipment) that are not used efficiently and even stand idle in anticipation of government orders or the upcoming modernization. At the same time, in market conditions, property rights to land and other real estate are a significant investment resource. Obviously, as the real estate market develops, the value of land ownership rights will constantly increase, in contrast, for example, to the value of property rights to buildings and structures, which will decrease as they wear out. In addition, investments in buildings, structures and similar objects are at risk due to

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changes in market conditions, while investments in land are not exposed to such risk. All this allows us to consider land rights as one of the most important investment resources in terms of their use for the implementation of conversion projects.

Despite the active market transformations of the domestic economy, many enterprises of the Russian defense industry continue to own significant land plots, as well as other real estate properties, which for a number of reasons are used inefficiently.

Naturally, the Russian military-industrial complex and its enterprises are economically interested in either increasing the efficiency of using existing investment resources, either on their own, or to obtain additional economic effect in the form of additional investments from private investors involved in the implementation of conversion projects through the acquisition of inefficiently used property [1, p. 49]. In this situation, there is a need for additional research aimed at developing a systematic approach to assessing the effectiveness of the use of property in the form of investment resources available to the enterprises of the Russian military-industrial complex, as well as developing the model tools intended for this.

Materials and methods

The existing approaches and methods of property valuation in the form of land plots and other real estate objects existing in world practice cannot be used in modern Russian conditions because of the need to adapt them. In addition, they all have one more drawback that is significant for the purposes of our study, namely, they are all designed to determine the market value of real estate objects and, accordingly, do not take into account the specifics of calculating their investment value [2, p. 428]. Meanwhile, we are primarily interested in investment value, since it is not an impersonal quantity, and it is determined, as a rule, based on the requirements of a particular investor for investment and reflects his most likely behavior in the market. Thus, it is the investment value that reflects the relationship of a particular investor and a specific investment and is the very highest price that a potential investor is willing to pay for the property being valued, given the expected profitability and usefulness of this property for the implementation of a conversion project in the future.

Since the assessment of investment value is directly related to the assessment of the effectiveness of investments made in the implementation of the conversion project, we need to select the methodological apparatus and model tools that allow us to calculate the investment value of a particular property.

To calculate the investment value of real estate, it is advisable to use the income approach, the application of which can maximize the consideration of all internal and external factors affecting the investment value of a real estate [3, p. 152]. Therefore, the current cost of future income from the implementation of a conversion project in the future will be the basis for determining the investment value of inefficiently used real estate.

Valuation of an immovable property using the income approach is a technological sequence that converts (transforms) future benefits from the implementation of a particular conversion project in the future to the investor expected to receive income from its acquisition in whole or in part. In this case, the calculation of investment value is as follows:

1) the amount and time structure of expenses required to use the property in accordance with the most effective option is determined;

2) the size and structure of income generation over time is determined with the most efficient use of the property;

3) the value of the discount rate is determined, corresponding to the risk level of capital investment in the assessed property;

4) the value of the property is calculated by discounting all income and expenses associated with its future use in order to implement the conversion project [2, p. 487].

When using the income approach to assess the value of real estate, methods of capitalization of income and discounted cash flows are used. Below we will consider one of these methods, namely the method of discounting cash flows.

The essence of this method is expressed by the formulas (1)-(7):

$$Cinv = \sum_{k=1}^{n} \frac{(PGI_k - IS_k)}{1 + C_D{}^k} \quad (1),$$

where C_{inv} – investment value of the property;

PGI_k – potential gross income received by the investor in the k-th period at the selling prices of the share of the investment object existing in that period;

C_D – discount rate for the period;

n – number of forecast periods.

$$IS_k = (C_{cf} \times V_{inv,k} + C_{tk} \times V_{tk,k} + C_{la} \times V_{la,k}) \times (1 + i_{\text{rcw}})^k \quad (2),$$

where IS_k – volume of investments in the k-th billing period, k = 1, …, n, where n – number of billing periods;

C_{cf} – the amount of the cost of creating a similar object in market prices on the date of settlement;

C_{tk} – the costs of fulfilling the technical conditions for the re-equipment of the property located on the land acquired by the investor, determined similarly to C_{cf} or by expert means;

C_{la} – the amount of monetary compensation by the investor by local authorities for social, engineering and transport infrastructure (determined by local authorities);

$V_{inv,k}$, $V_{tk,k}$, $V_{la,k}$ – shares, respectively, of investment development, technical specifications and payments to local authorities from the total investment in the k-th settlement period;

i_{rcw} – average cost-raising coefficient of the cost of construction and installation and commissioning works for the billing period,%, determined expertly, or, for example, using inter-regional information and analytical bulletins.

$$PGI_k = S_{tp} \times V_{res,k} \times C_p^s \times (1 + i_{rpp})^k \quad (3),$$

where S_{tp} – the total area of premises in the property, m^2, is determined by the selected standard objects in which private investments were made;

$V_{res,k}$ – the share of the sale of the property (sale of premises) in the *k*-th settlement period, in%, in which private investments were made;

C_p^s – the average market value of the sale of 1 m^2 of premises of a real estate object, prevailing in a particular region at the time of settlement, rubles.;

i_{rpp} – the average cost-raising coefficient of the premises of the property for the billing period,%, determined expertly based on the analysis of the real estate market in this region; usually, $i_{rpp} \geq i_{rcw}$.

$$C_{1m^2}^{sp} = \frac{\sum_{i=1}^{m} C_{1m^2,i}^{sp}}{m} \quad (4),$$

where $C_{1m^2 i}^{sp}$ – selling price of 1 m^2 of premises of the *i*-th facility-analogue, $i=1,\ldots,m$;

m – the number of analog facilities used in the calculations, as a rule $m \geq 5$.

$$C_D = C_{rfrr} + P_{reir} + P_{ilr} + P_m \quad (5),$$

where C_D – discount rate;

C_{rfrr} – risk-free rate of return;

P_{reir} – adjustment for the risk of investing in real estate;

P_{ilr} – adjustment for the liquidity risk of real estate investments;

P_m – adjustment for the need for management;

$$P_{reir} = P_{rem} + P_{rms} + P_{rp} \quad (6),$$

where P_{rem} – real estate risk adjustment;

P_{rms} – risk adjustment in the market segment;

P_{rp} – risk adjustment for a particular property;

After calculating the investment value of the property in the manner described above when using the agreed set of rights to the property in the project, the determination of the share remaining for the enterprises of the military-industrial complex is carried out in two stages as follows.

Stage 1. Determination of the current investment value of a future real estate property by discounting the future value of the implementation of the conversion project on the date of its transfer to ownership by the date of the assessment at the discount rate for the period of construction, installation and commissioning.

Stage 2. Determination of the share remaining for the enterprises of the military-industrial complex in the cost of implementing a conversion project as the ratio of the value of the valuation of the property (contribution to the cost of the conversion project) to the current value of future investments in the property of the conversion project.

$$SH_{DIC} = \frac{C_{inv}}{C_{1m^2}^{sp}} \quad (7),$$

where SH_{DIC} – the value of the share of enterprises of the military-industrial complex.

The results of the study

The economic-mathematical model for assessing the effectiveness of investments in the implementation of conversion projects is represented by formulas (9) - (15), which use the following notation:

S_P – area of the property purchased by the investor;

K – total amount of equity of the investor;

R – need for investor credit resources;

R_0 – the upper limit on the total credit resource that can be raised for lending;

g – guaranteed rate of return that an investor can receive by making risk-free investments;

r – interest rate at which the investor can get the necessary credit in the financial markets;

d – share (sq.m,%) that the investor transfers to the enterprise of the military-industrial complex of the total area of the property acquired by the investor;

C_{1m^2p} – prime cost of 1 m² of the total area of the property;

C_1 – optimistic assessment of the price at which the investor hopes to sell 1 m² of the total area of the property;

C_2 – pessimistic assessment for the selling cost (unfavorable market conditions);

C_3 – conservative assessment of selling cost (neutral market conditions);

P_1 – assessment of the probability of sale at the cost of C_1 per 1 m² of the total area of the property;

P_2 – assessment of the probability of sale at a cost of C_2 per 1 m² of the total area of the property;

P_3 – assessment of the probability of sale at a cost of C_3 per 1 m² of the total area of the property;

SH_{DIC} – the area of the property that the military-industrial complex enterprises will receive from the investor in their property (their need) (specified in the course of iterative calculations).

For the introduced variables, the following relations are true:

$$g < \mathrm{r};\ R < R_0;\ P_1 + P_2 + P_3 = 1 \quad (8),$$

where P_1, P_2, P_3 – expert analysis.

Using the introduced notation, the model is formulated as follows:

$$\frac{(1-d)\times S_p}{C_{1m^2p}} \sum_i P_i \times C_i \to \max \quad (9),$$

$$d \times S_p = SH_{DIC} \quad (10),$$

$$R = S_p \times C_{1m^2p} - K \le R_0 \quad (11),$$

$$(1-d) \times S_p \sum_i P_i \times C_i - (S_p \times C_{1m^2p} - K) \times (1+r) > K \times (1+g) \quad (12),$$

$$\sum_i P_i = 1 \quad (13),$$

$$d > 0 \quad (14),$$

$$S_P > 0 \quad (15).$$

The model assumes that the duration (lag) of the use of investments for the implementation of the conversion project is equal to one year.

The required variables in the model – are *d* and *S*, and *D* is subject to refinement in the course of solving the problem.

The investor maximizes the expected income from the implementation of the conversion project (in the form of profitability) after the transfer of

part of the property from the enterprises of the military-industrial complex.

Constraint (10) - obviously, ratio (11) shows that the loans the investor needs do not exceed the credit resources available for this sector; restriction (12) shows that the expected proceeds from the implementation of the conversion project, minus the cost of repaying the loan, should exceed the expected guaranteed income; relations (13), (14), (15) are obvious.

The constructed model (9) - (15) is nonlinear, but it can easily be reduced to a linear programming problem. It's enough to indicate, that

$d \times S = X$, $(1- d) \times S = Y$.

For a given SH_{DIC} (the need of the enterprises of the military-industrial complex), the problem may not have a solution, i.e. according to his assessment of the expected market conditions, it is unprofitable for an investor to invest in a conversion project. Under these conditions, enterprises of the military-industrial complex need to revise the level of needs SH_{DIC}. For this, in the model on the right side of equation (10), SH_{DIC} is replaced with a new value of needs SH_{DIC_1} and $SH_{DIC_1} < SH_{DIC}$. After that, the optimization model is solved again. If a solution exists, then the process of searching for unknown d and S ends. If the solution does not exist, then SH_{DIC_1} is replaced by $SH_{DIC_2} < SH_{DIC_1}$ and the process cycle is repeated again until the first solution is received.

Conclusion

Thus, the calculations based on the constructed optimization model are carried out in an interactive iterative mode, when the governing bodies can adjust the course of the solution and achieve the solution of the problem by the method of successive approximations.

Providing private investors with a real estate object for the implementation of a conversion project, defense industry enterprises conclude contracts with them. In them, the share d (m^2,%), property transferred to investors for the implementation of the conversion project, is the main parameter governing the relationship between these business entities.

At the stage of development of the implementation of the conversion project, an initial estimate of d_0 can be determined based on current assessments of the parameters of the price situation in the market, attraction of credit resources, cost of construction, installation and commissioning, and profitability of investments. At this stage, an aggregated optimization model can be used. According to it, d_0 and S are determined, which are laid as preliminary parameters regulating the relationship between the parties.

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THE LEVEL OF IMPROVEMENT OF THE LIVING ENVIRONMENT AS ONE OF THE CRITERIA FOR THE ATTRACTIVENESS OF THE NORTHERN CITY

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Using general methods of scientific knowledge in various aspects, the article considers the socio-demographic situation in the city of Magadan and determines the level of attractiveness of the northern city for the population. The method of sociological survey based on quota sampling is used. The trends and declines in the resident population of the city of Magadan and the Magadan Oblast are identified, the main factors determining the migration mood of the population are identified.

Keywords: attractiveness of the territory; improvement; residential environment, northern city.

The modern market economy has a very specific mobility of resources: any resource can be quickly enough moved to the field of activity or to the territory where it will be used with a higher level of efficiency. This, of course, applies to people - the main resource of a market economy. Massive displacement of populations within and between states has become commonplace. People tend to live better, earn more income and, in pursuit of a higher standard of living, move with their families or singly from habitable places to other territories.

Moreover, mass migration of the population can be both a positive and a negative factor in the development of the territory. On the one hand, labor migration allows you to quickly fill the economy's labor demand (for labor-insecure territories), and emigration - to relieve tension in the labor market (for labor-surplus territories). On the other hand, the departure of people of working age entails the loss of reproduction of the population in the future for abandoned territories, a decrease in human and labor capital, and a decrease in economic potential in general. Many regions of Russia are faced with the problem of "aging" of the population, not because of

low birth rates, but because of the loss of the territory of a young population seeking to move to more developed central regions of the country or abroad. In addition, the mass arrival of immigrants from other regions of the country or from abroad can lead to an increase in social tension, as well as an outflow of funds outside the territory. And, as a consequence of all the above problems, it is possible to reduce the attractiveness of the territory for its permanent population.

Magadan Oblast - territorially one of the largest regions of the country, has significant reserves of non-ferrous and precious metals, hydrocarbons, land and water resources. And although the population of the region on a Russian scale is insignificant [7] (in relation to Russia, the share of the population of our region as of January 1, 2017 is 0.1%, and to the FEFD- 2.36%), the resource potential of the territory is quite large and significant both from the point of view of its current development, and the future perspective.

The city of Magadan - is the capital of the Kolyma Territory, a relatively young municipality that has existed for less than a century, but nevertheless has a rich history, traditions and socio-economic potential. This, of course, is the economic and social center of the Magadan Oblast. As of January 1, 2017, the population of the city is about 92 thousand people [7], and this is more than half of the population of the territory (63.4%). However, the population of Magadan, like the entire Magadan Oblast, has been steadily declining in recent decades (Fig. 1).

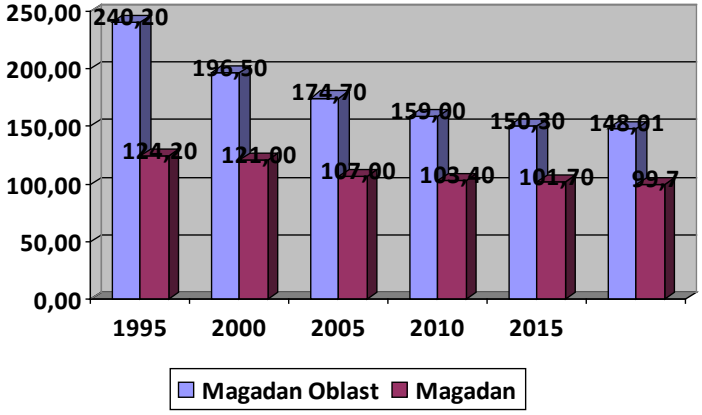

Fig. 1. - Dynamics of the population of the territory at the end of the period, thousand people

The negative balance of migration of the city and the region is mainly associated with the outflow of young people. People of working age leave the northern territories, moving to the central regions of the country, trying to arrange their life there, create a family and have children. A confirmation of this hypothesis is the almost unchanged number of pensioners over the entire period under consideration (Fig. 2).

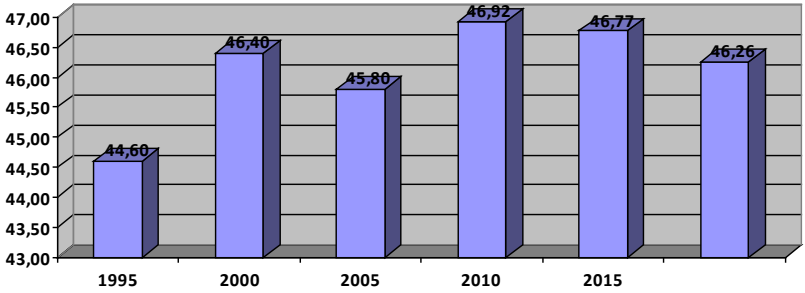

Fig. 2 - Dynamics of the number of pensioners of the Magadan Oblast at the end of the period, thousand people

In total, from 1995 to 2016, the population of the city decreased by 32.12 thousand people, or almost 26%. At the same time, in the region as a whole, over the same period, the population decreased by 94.6 thousand people, or 40%.

From this point of view, it seems interesting to determine what can affect the increase in the attractiveness of the territory of the northern city in the eyes of the young population, and how strongly the characteristics of the living environment (improvement of the city, its infrastructure, etc.) affect the level of attractiveness of the territory.

The attractiveness of the territory, as a socio-economic category, is a fairly young concept that emerged at the end of the XX - beginning of the XXI century. The concept of the attractiveness of the territory has not yet been clearly defined. In this area, the concepts of “image of the territory”, “national image”, “brand of the territory”, “reputation of the territory”, etc. are used [1, 2, 4, 9, 12]. Also, when characterizing the features of a territory (region, city), the concept of investment attractiveness is used, which is assessed by the totality of investment potentials and risks [5, 6, 8]. This approach is certainly important, but it allows you to assess the attractiveness of the territory only from a business perspective, not highlighting the attitude of the population to the place of work and residence, thereby narrowing the consideration of the issue to the position of firms, enterprises, organizations and losing sight of the opinions of households.

The decision to start relations with the territory for non-residents in one form or another begins to take shape with the image of the territory. For residents living and working in this territory, its attractive image is also of no small importance, since this in one way or another determines their life and business. We can talk about the positive emotions of residents, generated by an attractive image and a good reputation of the territory - feelings of fraternity, pride, ownership. At the same time, residents can receive other benefits from living, studying, working and doing business in a region with a good name [1].

In the framework of the study, the attractiveness of the territory was proposed to understand as the desire of economic agents to live, work and keep house in Magadan. In order to assess the attractiveness of the territory of the northern city for the population in 2016, a sociological survey of its residents from different age and social groups was conducted.

During the study, the quota sampling method was used [3, P. 202-204]. The total population was 85731 people - the population of Magadan aged 16 years and older [7]. The main signs of quotas were the age and gender of the respondents, according to whom it was decided to investigate a population of 278 people with a given probability of 0.95 and the value of the permissible average error of 0.06.

Of the total number of interviewed, the majority of respondents (about 70%) were either born or have lived in the city of Magadan for more than 20 years, i.e. they know the city well, have seen how it has changed over the decades and can give a fairly objective assessment of its attractiveness [11, P. 371].

The level of attractiveness of the city as a whole was estimated by respondents as follows (Fig. 3).

About 57% of respondents believe that over the past three years the level of attractiveness of Magadan has increased, and 42.4% disagree with this. Of the proposed criteria, respondents ranked the beauty of nature and its proximity to the city limits in the first place in terms of importance and impact on the general attractiveness of Magadan (the maximum significance level was set by more than 45% of the total number of respondents), in the second place - living with friends and relatives (38.8%), in the third - work (salary, career, etc.) (27.2%).

At the same time, assessing the characteristics of the city's living environment, slightly more than 61% of the respondents rated urban infrastructure (the presence on the territory of the city of entertainment facilities, shopping malls, sports facilities and clubs, medical and educational institutions, recreation areas and green areas, beauty salons and ateliers), as convenient and attractive for living, and 36% consider it to be uncomfortable [11, P.371].

Of the total number of respondents, more than 61.5% are going to leave the city from 1 year to 5 years, 12.6% are not going to move, and almost 26% said they are not going to leave, but that everything can change due to various circumstances. And such a survey result makes us think about the need to find effective tools that would be able to change people's intentions in the future to leave Magadan.

Describing the reasons why the city's residents are going to part with it, one can put on the first place graduation and getting a profession (23% of respondents), on the second place - moving to other regions of relatives and family (17.3%), purchase (completion of construction) housing in the central regions of the country is in third place (14.7%) (Fig. 4).

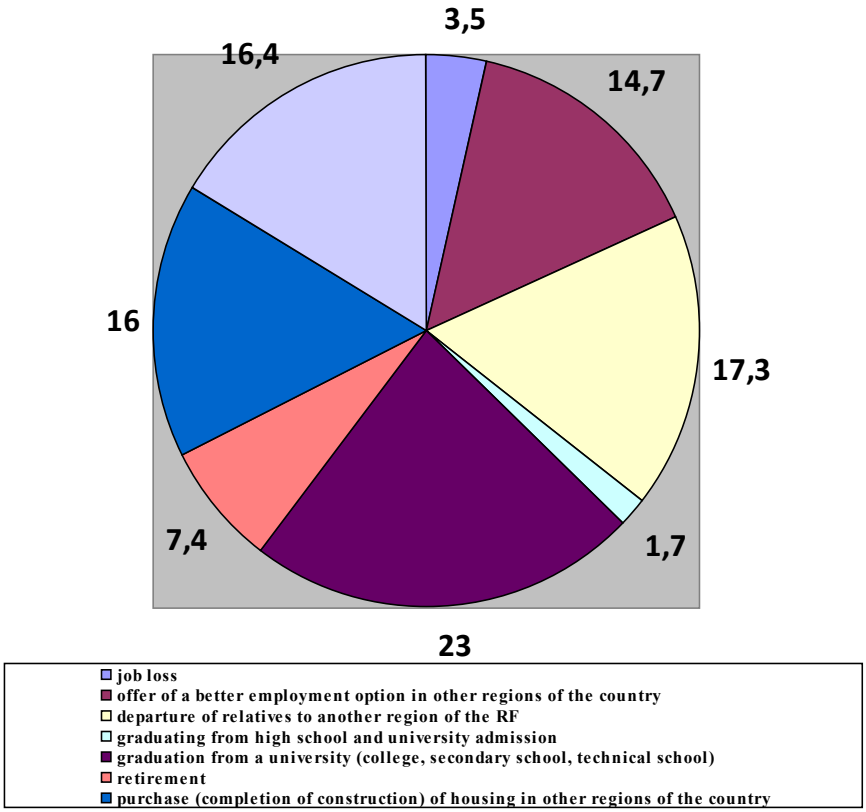

Fig. 4 - Reasons motivating the population to leave Magadan,%

In the framework of the survey, all respondents were asked what could affect their intention to leave the city of Magadan and whether such a change in their attitude towards living in this territory, and therefore assessing its level of attractiveness, is possible (Fig. 5).

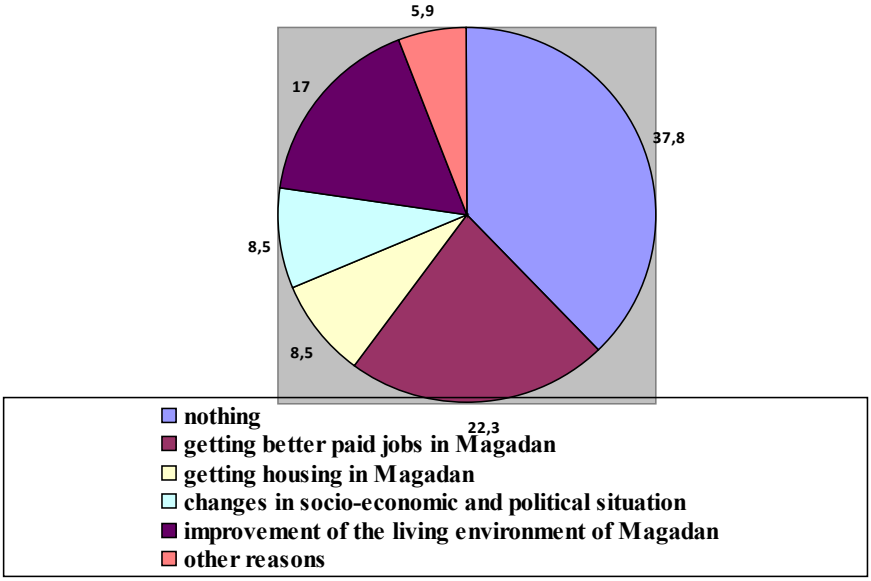

Fig. 5 - The reasons indicated by the respondents as a motive for changing the desire to leave Magadan,%

Almost 38% of respondents say that nothing will change their intention to leave. Just over 22% said that higher wages will affect their desire to stay and continue to work in Magadan and Magadan Oblast. And 17% of respondents indicated that improving the living environment of Magadan (improving the level of enhancement, development of social infrastructure) would change the assessment of the attractiveness of the city in their eyes and affect the desire to continue to live and work here.

The results obtained are all the more interesting and significant, since in the survey more than half of the citizens replied that when choosing their place of residence, they evaluated the level of improvement of the living environment of the area where the purchase of housing was planned, and in the future they also take this indicator to one of the first positions at the choice of their place of residence (57% of respondents) [10, P. 102].

Thus, the level of improvement of the living environment is a rather significant indicator of the attractiveness of Magadan, and targeted activities to create a favorable urban environment for the population, which is the essence of the state urban development policy, can affect the current attitude of young people to the city territory and change the emigration population of some potential " runaways of the North".

Territory improvement- the creation in any territory of amenities (facilities, infrastructure) for life, work and leisure for people (water supply, sewage, landscaping, roads, benches at stops and in parks, playgrounds, boulevards, etc.) [5, P. 45].

The development and effectiveness of improvement of the living environment, as a criterion for the attractiveness of the territory (region or city), allows us to assess the quality of life in the city (territory). Moreover, the general principle of the formation of residential territories is to ensure maximum convenience to the population in satisfying their socio-cultural and domestic needs with the rational use of resources and urban lands [6, P. 22].

Strengthening the attractiveness of the territory both for business and for the population is, first and foremost, the task of regional and municipal authorities. For this, it is necessary to develop a marketing strategy for the attractiveness of the territory, which will be aimed at increasing its attractiveness to people, the development of special features that guarantee the competitive advantages of this territory.

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INNOVATION ACTIVITY AS AN OBJECT OF ECONOMIC ANALYSIS

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The article considers the existing approaches to the definition of the concepts of innovative activity, innovative assets and innovative costs, on the basis of which these concepts are expanded and concretized.

Keywords: innovation, asset, intangible asset, innovation asset, innovation costs

In modern conditions, the Russian economy needs accelerated development of the innovation sector. In accordance with the Decree of the Government of the Russian Federation of 08.12.2011 № 2227-r "On approval of the Strategy for innovative development of the Russian Federation for the period until 2020." [2], "Forecast of the scientific and technological development of Russia for the period until 2030" (approved by the Chairman of the Government of the Russian Federation on January 22, 2014) [3] and other strategic documents in the field of innovative development in the coming years, a transition to a new type of economy based on the growth of investments in the renewal of industry, the creation of industries on a new high-tech basis, the development of scientific and technological potential, the creation of a skilled labor market and international integration.

In order to successfully solve the set tasks in terms of enhancing innovation and improving the material and financial resources allocated to this area, it is necessary to develop a system of information and analytical support that helps to shape a management strategy, from the micro level - innovative companies, to the macro level - management of state policy in the field of innovation. Improving the innovation management system is impossible without a serious scientific and theoretical component, on the basis of which a complex of methodological approaches and innovation management mechanisms is formed.

At present, scientific developments aimed at improving the method-

ological support of the accounting and analytical component are clearly not enough. In particular, the use in accounting and analytical practice of such fundamental concepts as innovative activity, innovative asset, innovative costs, etc. requires clear definitions, a description of their characteristics and species attributes, which allow identifying and evaluating innovative objects, recognizing the economic benefits of their use, form the optimal tax policy of an innovative company, etc.

Currently, neither in normative documents, nor in methodological developments of various departments, nor in publications of specialists there is an unambiguous definition of the concept of “innovative activity” - table 1.

Table 1 – Definitions of “innovation”

№	Author	Definition	Flaws in the definition approach
1	Rosstat	“Innovation activity - a type of activity related to the transformation of ideas (usually the results of scientific research and development or other scientific and technological achievements) into technologically new or improved products or services introduced on the market into new or improved technological processes or methods of production (transmission) of services used in practice "[1]	- According to the definition, the starting point is the transformation of an existing idea. However, the first stage of innovative activity is the emergence of an idea, which requires significant material and time resources, including financing the professional development of specialists of enterprises engaged in innovative activities, targeted and grant support to future specialists; - there is no economic target component in the definition, which can be expressed in direct or indirect economic benefits expected by the state, receiving GDP growth, budget revenues from the growth of tax revenues from the expansion of the innovative segment of the economy.
2	Federal Law "On Science and State Scientific and Technical Policy"	Defines innovative activity as “... activities (including scientific, technological, organizational, financial and commercial activities) aimed at implementing innovative projects, as well as at creating innovative infrastructure and ensuring its activities” [1]	The definition focuses on the implementation of projects, the stage of "the emergence of a scientific idea" is left out

[1]http://www.gks.ru/free_doc/new_site/business/nauka/ind_2020/pril3.pdf

Continuation of table 1

3	Ilyenkova S.D.	"Innovation activity is the activity of bringing scientific and technical ideas, inventions, and developments to a result suitable for practical use. In full, innovative activity includes all types of scientific activity, design, technological, experimental development, activities for the development of innovations in production and for their consumers - implementation " [9, p. 318].	
4	Gokhshtand A.D.	Defines innovative activity as "an activity that includes measures to transform ideas into a new product, into an improved product, into a new management organization approach. The innovative activities of the enterprise include a system of events, the essence of which is to use scientific, technical and intellectual potential in order to obtain a new product (service), new production technology or improved organizational solutions in enterprise management " [7].	
5	Demin D.I.	"Innovation should be considered as a focused and organized activity, consisting of a set of different types of work, interlinked into a single process for the creation and production of innovations" [8]	The individual stages of the creation and implementation of an innovative product may not be carried out as a "single process", but divided among several independent enterprises, each of which specializes in different stages (research, feasibility study, development work, implementation activities, commercialization and market promotion and etc.).
6	Berestova T.F.	"Innovation activity begins with the emergence of an idea in the minds of the subjects of innovation (both scientists and practitioners), i.e. with scientific activity. However, a full-fledged innovation process is a combination of procedures and means by which a scientific discovery or idea is transformed into innovation (novelty)" [6].	

In our opinion, clarifying the essence of the concept of "innovative activity", it should be formulated as follows. Innovative activity is a set of processes and procedures, the prerequisite of which are original scientific, technical, technological, organizational ideas, the implementation of which is aimed at creating intelligent objects that can bring economic and other direct or indirect benefits to various actors involved in the innovation process.

The implementation of innovative activities by the economic entity involves the formation of appropriate management objects - innovative assets that must be identified, evaluated, reflected in the accounting, management and statistical accounting system, in corporate and financial reporting.

Most of the innovative assets have signs of intangible assets (hereinafter - IA), the concept of which is often used interchangeably with the concepts of "knowledge assets" and "intellectual capital" in the[2] and domestic specialized literature. From an economic point of view, IA includes objects that do not have a physical form, but are measured in terms of value, the basis of which is the ability to generate future economic and other benefits for the copyright holder. It is also important that the IA have legal protection or other effective legal protection mechanism.

In international practice, IA usually refers to all legally registered rights with respect to the explicit and implicit privileges of a company or corporation that ensure the functioning of an economic activity and affect its effectiveness. However, not all benefits are legally formalized, which necessitates the differentiation of IA:

- legally executed and reflected in the asset of the balance sheet of the organization, that is, identifiable;

- not formalized legally - not identifiable and not reflected in the balance sheet, but having market value, the so-called internal goodwill (highly effective management, formed client portfolio, advantageous geographical location in relation to the markets for selling products or supplying resources).

There is also an IA accounting definition based on the costs incurred to create or acquire them, which is the same for any other asset. For example, in the UK, according to the Statement of Financial Accounting Principles (Chapter 4), "Elements of Financial Accounting" of the Accounting Standards Board (ASB) (paragraph 4.6), "Assets are rights or other means of access to future economic benefits controlled by an entity in the result of past transactions or events. "

[2]Based on the recommendations of the Royal Institute of Attorneys of Experts (RICS) on the valuation of intangible assets, first published in the RICS Guide "Valuing Intangible Assets" (RICS Machinery and Plant Faculty. UK, 2004). // "Assessment questions", №4, 2006

A similar definition is formulated in conceptual provision №6 “Elements of financial accounting” (paragraph 25) of the Financial Accounting Standards Board (FASB): “Assets are probable future economic benefits received or controlled by an entity as a result of past transactions or events.”

The International Financial Accounting Standards Board (IASC IASB) provides the following definition: “An asset is a resource controlled by an entity as a result of past events, from which it is expected that the entity will have future economic benefits.”

It should be noted that an innovation asset may be a fixed asset with signs of innovation, either created by the enterprise itself as a result of introducing its own or acquired innovative developments, or an acquired, ready-made asset of fixed assets with characteristic signs of innovation.

Thus, taking into account the signs and properties of assets enshrined in international financial reporting standards and asset valuation standards, innovative assets can be defined as controlled by the company and have a reliable valuation of the rights and privileges to use in production and other activities related to intellectual property, as well as objects of non-current and current assets produced with their help that can bring economic and other benefits.

Another important concept in the study of the effectiveness of innovation is “innovation costs”, without a clear identification of which it is impossible to objectively assess their feasibility, accumulate them for the initial and subsequent assessment of the value of a specific innovative asset. In the process of analyzing the financial and economic performance of innovative activities, costs are one of the main criteria, a comparison of the values of which with the economic benefits of innovative assets allows us to evaluate the prevailing and predicted indicators, on the basis of which the organization forms a policy in relation to various innovative projects.

An analytical review of Russian and foreign publications made it possible to summarize the main characteristics by which various authors define the concept of innovative costs. So, A.V. Ryadchikova, without giving a general definition, divides them into “current and capital” [10]. K.N. Abubakirova formulates the concept of costs of innovation as “... a manifestation of the business activity of an economic entity, the essence of which is the actual consumption of resources, measured in physical and cost terms, and motivated to obtain predicted economic benefits” [5]. According to K.S. Sayenko, innovative costs represent "the costs of implementing measures of scientific and technological progress with the allocation of cost accounting for the preparation, manufacture and development of new technology, accounting costs for the implementation of scientific and technological achievements" [11].

It should be noted that for accounting purposes there are characteristics of accounting objects that are recognized as costs (expenses) associated with innovative activities. In particular, according to Accounting Provisions 17/02 “Accounting for expenses for research, development and technological work” [4], expenses are recognized in accounting, subject to the following conditions:

- the amount of expense can be determined and confirmed;
- there is documentary evidence of the work (acceptance certificate of work performed, etc.);
- the use of the results of work for production and (or) managerial needs will lead to future economic benefits (income);
- the use of the results of research, development and technological work can be demonstrated.

It should also be noted that Accounting Provisions 17/02 Cost Accounting for Research, Development and Technological Work ”applies to research, development and technological work that relate to the development of non-current assets: fixed assets and intangible assets, at the same time, finished products and other types of innovations are not taken into account, which requires the use of accounting methods covering the innovative activities of the organization as a whole. At the same time, it is necessary to keep records of innovation activity separately for each innovation project, which in the future will provide an opportunity to analyze the economic efficiency of each such project. At the same time, it is necessary to establish a period of time during which the use of the results of the development of an innovative project will be considered an innovation, and, accordingly, the costs of their use will be considered as part of the innovative costs, and it is recommended that the concept of “preparatory work for the implementation of an innovative project” be introduced - the life cycle of an innovation before the direct implementation of an innovation project, from setting the goal of its implementation to approving a plan for a specific innovation project.

Summarizing the above, we offer the following definition of innovative costs: innovative costs are monetary costs incurred at all stages of the innovation life cycle, both for work carried out by the organization itself and for external research and development acquired from third-party organizations, with the results such works can bring economic and other benefits.

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PROBLEMS OF CHOOSING MODELS FOR THE FORMATION AND MANAGEMENT OF INVESTMENT PORTFOLIOS

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The paper considers the problems of choosing models for the formation and management of investment portfolios of professional and non-professional market players. A well-known fact is noted about the discrepancy between the initial premises of the classical portfolio theory, laid down in the works of Markowitz, Tobin, Sharp, and the conditions for choosing investment solutions in these markets.

Keywords: investment portfolio, portfolio structure, optimal portfolio theory, developing stock market.

The paper considers the models of optimal portfolios of Markowitz and Sharpe [1, 2] for a moderately aggressive investor (the predominant group of investors are unprofessional participants in the Russian stock market), which focuses on long-term investments and sustainable growth of investment capital. This category of investors allows the presence of a medium risk level in the securities portfolio.

The list of securities for portfolio formation as of January 3, 2020 included the most liquid securities of the largest and dynamically developing Russian issuers, the types of economic activities of which belong to the main sectors of the economy (Table 1).

Table 1

List of securities for portfolio formation [3, 4]

	Code	Security name	Av. monthly profitability %	Average purchase price, rub.
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	-0,088	118,89
2	ALRS	PJSC "Alrosa", JSC	-0,021	88,55

3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	4,968	1878,98
4	GAZP	PJSC "Gazprom", JSC	-0,022	175,12
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	6,884	13099,63
6	LKOH	PJSC Oil company "LUKOIL", JSC	-0,014	4810,65
7	MGNT	PJSC "Magnit", JSC	-0,061	4302,43
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	-0,173	100,97
9	MTSS	PJSC "Mobile TeleSystems", JSC	0,312	274,77
10	NLMK	PJSC "Novolipetsk Steel", JSC	-0,079	153,03
11	NVTK	PJSC "NOVATEK", JSC	0,755	1039,91
12	PHOR	PJSC "PhosAgro", JSC	0,161	2447,85
13	PLZL	PJSC "Polyus", JSC	0,250	5293,59
14	ROSN	PJSC "Rosneft" Oil Company", JSC	-0,096	399,31
15	RTKM	PJSC "Rostelecom", JSC	-0,121	72,43
16	SBER	PJSC "Sberbank of Russia", JSC	0,322	222,87
17	SNGS	PJSC "Surgutneftegas", JSC	-0,047	29,78
18	SU26223 RMFS6	OFZ 26223	0,213	96,58
19	TATN	PJSC "Tatneft", JSC	0,640	695,24
20	VTBR	PJSC "VTB Bank", JSC	-0,21	0,04

Here is a model of the optimal investment portfolio staged by Markowitz, taking into account risk restrictions for the period of securities ownership and the portfolio budget. The criterion is the maximum average monthly profitability.

When describing the model, we will use the following notation for variables and parameters:

i, j – shares from the pool of financial instruments of the investor; x_i – the number of shares of the i-th issuer in the portfolio (a positive integer); M – investor budget; σ_p^2 – portfolio risk (volatility) level for the

period of holding securities; c_i^0 – quotation of shares of the i-th issuer at the time of portfolio formation; $\frac{c_i^0 x_i}{\sum_k c_k^0 x_k}$ – share of the i-th asset in the integer portfolio; σ_{ij} – covariance of the i-th and j-th assets in the portfolio; r_i – average expected profitability on the i-th asset; r_{mp} - average monthly portfolio profitability.

$$\begin{cases} r_{mp} = \sum_{i=1}^{20} r_i \cdot \frac{c_i^0 x_i}{M} \to max; \\ \sigma_p^2 = \sum_{i,j=1}^{n} \frac{c_i^0 x_i}{\sum_k c_k^0 x_k} \frac{c_j^0 x_j}{\sum_k c_k^0 x_k} \sigma_{ij} \le \sigma_p^2; \\ \sum_{i=1}^{20} c_i^0 \cdot x_i \le M; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (1)$$

Here is a model of the optimal investment portfolio in the formulation of Sharpe, taking into account budget restrictions. The optimality criterion is the maximum average monthly profitability divided by risk for the period of ownership of securities.

When describing the model, we will use the following notation for variables and parameters:

i, j – shares from a pool of investor financial instruments; x_i – the number of shares of the i-th issuer in the portfolio (a positive integer); M – investor budget; σ_p^2 – portfolio risk (volatility) level for the period of holding securities; c_i^0 – quotation of shares of the i-th issuer at the time of portfolio formation; $\frac{c_i^0 x_i}{\sum_k c_k^0 x_k}$ – the share of the i-th asset in the integer portfolio; σ_{ij} – covariance of the i-th and j-th assets in the portfolio; r_i – average expected profitability on the i-th asset; r_{mp} - average monthly portfolio profitability.

$$\begin{cases} \frac{r_{mp}}{\sigma_p^2} = \frac{\sum_{i=1}^{20} r_i \cdot \frac{c_i^0 x_i}{M}}{\sigma_p^2} \to max \\ \sum_{i=1}^{20} c_i^0 \cdot x_i \le M; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (2)$$

Note: the average monthly profitability of the security for the analyzed period from October 1, 2017 to December 31, 2019 is considered as the

average expected profitability of the i-th asset.

We will build a model of the optimal Markowitz portfolio for a moderately aggressive investor with a small budget (10,000 rubles). The optimality criterion - the maximum average monthly profitability.

$$\begin{cases} r_{mp} = \sum_{i=1}^{20} r_i \cdot \frac{c_i^0 x_i}{M} \to max; \\ \sigma_p^2 = \sum_{i,j=1}^{n} \frac{c_i^0 x_i}{\sum_k c_k^0 x_k} \frac{c_j^0 x_j}{\sum_k c_k^0 x_k} \sigma_{ij} \le 3000; \\ \sum_{i=1}^{20} c_i^0 \cdot x_i \le 10000; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (3)$$

The structure and characteristics of the optimal portfolio are presented in tables 2 and 3.

Table 2

The structure of the optimal portfolio, calculated on the basis of the Markowitz model with a budget constraint (up to 10,000 rubles) [3, 4]

	Code	Security name	Number of securities in the portfolio	Share of securities in the portfolio,%
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	0	0
2	ALRS	PJSC"Alrosa", JSC	0	0
3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	0	0
4	GAZP	PJSC "Gazprom", JSC	0	0
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	0	0
6	LKOH	PJSC Oil company "LUKOIL", JSC	0	0
7	MGNT	PJSC "Magnit", JSC	0	0
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	0	0
9	MTSS	PJSC "Mobile TeleSystems", JSC	1	13,594
10	NLMK	PJSC "Novolipetsk Steel", JSC	0	0
11	NVTK	PJSC "NOVATEK", JSC	0	0

12	PHOR	PJSC "PhosAgro", JSC	0	0
13	PLZL	PJSC "Polyus", JSC	0	0
14	ROSN	PJSC "Rosneft" Oil Company", JSC	2	39,510
15	RTKM	PJSC "Rostelecom", JSC	0	0
16	SBER	PJSC "Sberbank of Russia", JSC	1	11,026
17	SNGS	PJSC "Surgutneftegas", JSC	1	14,735
18	SU26223 RMFS6	OFZ 26223	0	0
19	TATN	PJSC "Tatneft", JSC	1	34,396
20	VTBR	PJSC "VTB Bank", JSC	0	0

Table 3

Characteristics of the optimal portfolio, calculated on the basis of the Markowitz model with a budget constraint (up to 10,000 rubles) [3, 4]

Parameter	Value
Investments in the portfolio, rub.	2021,282407
Average monthly profitability,%	0,25958
Average monthly profitability, rub.	5,246913781
Risk for the period of holding securities, rub.	2846,917383
Average monthly profitability divided by risk (for the period of holding securities)	$9{,}1*10^{-9}$

We will build a model of Sharp's optimal portfolio of a moderately aggressive investor with a small budget (up to 10,000 rubles). Optimality criterion - maximum monthly average profitability divided by risk for the period of holding securities

$$\begin{cases} \dfrac{r_{mp}}{\sigma_p^2} = \dfrac{\sum_{i=1}^{20} r_i \cdot \dfrac{c_i^0 x_i}{M}}{\sigma_p^2} \to max \\ \sum\limits_{i=1}^{20} c_i^0 \cdot x_i \le 10000; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (4)$$

The structure and characteristics of the optimal portfolio are presented in tables 4 and 5.

Table 4

The structure of the optimal portfolio, calculated on the basis of the Sharpe model with a budget constraint (up to 10,000 rubles). [3, 4]

	Code	Security name	Number of securities in the portfolio	Share of securities in the portfolio,%
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	0	0
2	ALRS	PJSC"Alrosa", JSC	0	0
3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	0	0
4	GAZP	PJSC "Gazprom", JSC	0	0
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	0	0
6	LKOH	PJSC Oil company "LUKOIL", JSC	0	0
7	MGNT	PJSC "Magnit", JSC	1	60,739
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	0	0
9	MTSS	PJSC "Mobile TeleSystems", JSC	0	0
10	NLMK	PJSC "Novolipetsk Steel", JSC	0	0
11	NVTK	PJSC "NOVATEK", JSC	0	0
12	PHOR	PJSC "PhosAgro", JSC	0	0
13	PLZL	PJSC "Polyus", JSC	0	0
14	ROSN	PJSC "Rosneft" Oil Company", JSC	0	0
15	RTKM	PJSC "Rostelecom", JSC	0	0
16	SBER	PJSC "Sberbank of Russia", JSC	0	0
17	SNGS	PJSC "Surgutneftegas", JSC	0	0
18	SU26223 RMFS6	OFZ 26223	0	0

19	TATN	PJSC "Tatneft", JSC	4	39,261
20	VTBR	PJSC "VTB Bank", JSC	0	0

Table 5

Characteristics of the optimal portfolio, calculated on the basis of the Sharpe model with a budget constraint (up to 10,000 rubles). [3, 4]

Parameter	Value
Average monthly profitability divided by risk for the period of holding securities	$3*10^{-9}$
Investments in the portfolio, rub.	7083,403704
Average monthly portfolio profitability,%	0,21436
Average monthly portfolio profitability, rub.	15,18382954
Portfolio risk for the period of holding securities, rub.	612524,8472

Compare the structure of the resulting portfolios. The optimal portfolio in the formulation of the Markowitz model includes 2 ordinary shares of PJSC "Rosneft" and 1 common share of PJSC "Mobile TeleSystems", PJSC "Sberbank of Russia", PJSC "Surgutneftegas", "Tatneft" PJSC. The optimal portfolio directed by Sharpe includes 4 ordinary shares of PJSC " Tatneft ", 1 ordinary share of PJSC "Magnit". The resulting optimal portfolios differ in structure.

Investments in the portfolio calculated using the Markowitz model amounted to 2021.282 rubles, which is 3.504 times less than investments in the portfolio calculated using the Sharp model, the volume of which amounted to 7083.404 rubles. At the same time, the average monthly profitability of the optimal portfolio calculated by the Markovits model is 0.4522% higher than the average monthly profitability of the optimal portfolio calculated by the Sharp model, which amounted to 0.21436%. The average monthly profitability divided by risk for the period of ownership of securities in the Markowitz model was 9.1*10-9, and in the Sharpe model 3*10-9.

We will build a model of the optimal Markowitz portfolio for a moderately aggressive investor with a budget of up to 100,000 rubles. The optimality criterion - the maximum average monthly profitability.

$$\begin{cases} r_{mp} = \sum_{i=1}^{20} r_i \cdot \frac{c_i^0 x_i}{M} \to max; \\ \sigma_p^2 = \sum_{i,j=1}^{n} \frac{c_i^0 x_i}{\sum_k c_k^0 x_k} \frac{c_j^0 x_j}{\sum_k c_k^0 x_k} \sigma_{ij} \le 300\,000; \\ \sum_{i=1}^{20} c_i^0 \cdot x_i \le 1\,000\,000; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (5)$$

The structure and characteristics of the optimal portfolio are presented in tables 6 and 7.

Table 6

The structure of the optimal portfolio, calculated according to the Markowitz model, with a budget constraint (up to 100,000 rubles). [3, 4]

	Code	Security name	Number of securities in the portfolio	Share of securities in the portfolio,%
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	0	0
2	ALRS	PJSC"Alrosa", JSC	0	0
3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	19	42,758
4	GAZP	PJSC "Gazprom", JSC	0	0
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	0	0
6	LKOH	PJSC Oil company "LUKOIL", JSC	0	0
7	MGNT	PJSC "Magnit", JSC	4	20,612
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	0	0
9	MTSS	PJSC "Mobile TeleSystems", JSC	0	0
10	NLMK	PJSC "Novolipetsk Steel", JSC	0	0
11	NVTK	PJSC "NOVATEK", JSC	2	2,491
12	PHOR	PJSC "PhosAgro", JSC	0	0
13	PLZL	PJSC "Polyus", JSC	0	0
14	ROSN	PJSC "Rosneft" Oil Company", JSC	0	0
15	RTKM	PJSC "Rostelecom", JSC	0	0
16	SBER	PJSC "Sberbank of Russia", JSC	0	0

17	SNGS	PJSC "Surgutneftegas", JSC	0	0
18	SU26223 RMFS6	OFZ 26223	0	0
19	TATN	PJSC "Tatneft", JSC	41	34,139
20	VTBR	PJSC "VTB Bank", JSC	0	0

Table 7

Characteristics of the optimal portfolio, calculated according to the Markowitz model with a budget constraint (up to 100,000 rubles) [3, 4]

Parameter	Value
Investments in the portfolio, rub.	83495,128
Average monthly portfolio profitability,%	2,34879
Average monthly portfolio profitability, rub.	1961,1269
Portfolio risk for the period of holding securities, rub.	29453,595
Monthly average profitability divided by risk for the period of holding securities	$8*10^{-7}$

We will build a model of Sharpe's optimal portfolio for a moderately aggressive investor with a budget of up to 100,000 rubles. The optimality criterion - the maximum average monthly profitability divided by risk for the period of ownership of securities.

$$\begin{cases} \dfrac{r_{mp}}{\sigma_p^2} = \dfrac{\sum_{i=1}^{20} r_i \cdot \dfrac{c_i^0 x_i}{M}}{\sigma_p^2} \to max \\ \sum\limits_{i=1}^{20} c_i^0 \cdot x_i \le 100000; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (6)$$

The structure and characteristics of the optimal portfolio are presented in tables 8 and 9.

Table 8

The structure of the optimal portfolio, calculated according to the Sharpe model, with a budget constraint (up to 100,000 rubles). [3, 4]

	Code	Security name	Number of securities in the portfolio	Share of securities in the portfolio,%
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	5	8,258
2	ALRS	PJSC"Alrosa", JSC	5	0,615
3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	6	15,662
4	GAZP	PJSC "Gazprom", JSC	5	1,216
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	0	0
6	LKOH	PJSC Oil company "LUKOIL", JSC	2	13,366
7	MGNT	PJSC "Magnit", JSC	5	29,885
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	5	0,701
9	MTSS	PJSC "Mobile TeleSystems", JSC	5	1,908
10	NLMK	PJSC "Novolipetsk Steel", JSC	5	1,063
11	NVTK	PJSC "NOVATEK", JSC	5	7,223
12	PHOR	PJSC "PhosAgro", JSC	5	17,003
13	PLZL	PJSC "Polyus", JSC	0	0
14	ROSN	PJSC "Rosneft" Oil Company", JSC	5	2,774
15	RTKM	PJSC "Rostelecom", JSC	5	0,503
16	SBER	PJSC "Sberbank of Russia", JSC	5	1,548
17	SNGS	PJSC "Surgutneftegas", JSC	5	0,207
18	SU26223 RMFS6	OFZ 26223	5	0,671
19	TATN	PJSC "Tatneft", JSC	5	4,829
20	VTBR	PJSC "VTB Bank", JSC	6	0,0004

Table 9

Characteristics of the optimal portfolio, calculated according to the Sharpe model, with a budget constraint (up to 100,000 rubles). [3, 4]

Parameter	Value
Average monthly profitability divided by risk for the period of holding securities	$1,86*10^{-7}$
Investments in the portfolio, rub.	71984,0884
Average monthly portfolio profitability,%	0,87665
Average monthly portfolio profitability, rub.	631,049067
Portfolio risk for the period of holding securities, rub.	47137,09

Compare the structure of the resulting portfolios. The optimal portfolio according to the Markowitz model includes 19 depositary receipts of a foreign issuer for X shares 5 Retail Group N.V., 4 ordinary shares of PJSC "Magnit", 2 ordinary shares of PJSC "NOVATEK", 41 ordinary shares of PJSC Tatneft named after V. D Shashina. The optimal portfolio according to Sharpe's model includes 5 ordinary shares of PJSC Aeroflot - Russian Airlines, 5 ordinary shares of PJSC Alrosa, 6 depositary receipts of a foreign issuer for X shares 5 Retail Group N.V., 5 ordinary shares of PJSC Gazprom, 2 ordinary shares of PJSC Oil company "LUKOIL", 5 ordinary shares of the following companies: PJSC "Magnit", PJSC "Moscow Exchange MICEX-RTS", PJSC "Mobile TeleSystems", PJSC "Novolipetsk Steel", PJSC "NOVATEK", PJSC " PhosAgro ", PJSC" Rosneft "Oil Company", PJSC "Rostelecom", PJSC "Sberbank of Russia", PJSC "Surgutneftegas", PJSC "Tatneft", 5 OFZ 26223 and 6 ordinary shares of PJSC "VTB Bank". The resulting optimal portfolios differ in structure.

Investments in the portfolio according to the Markowitz model amounted to 83,495.1277 rubles, and according to the Sharp model - 71,984.0884 rubles. At the same time, the average monthly profitability of the optimal portfolio according to the Markowitz model is 2.349%, according to the Sharp model - 8.766%. The average monthly profitability divided by risk for the period of ownership of securities in the Markowitz model was $8*10^{-7}$, in the Sharp model $1.86*10^{-7}$.

We will build a model of the optimal Markowitz portfolio for a moderately aggressive investor with a budget of up to 1,000,000 rubles. The optimality criterion - the maximum average monthly profitability.

$$\begin{cases} r_{mp} = \sum_{i=1}^{20} r_i \cdot \frac{c_i^0 x_i}{M} \to max; \\ \sigma_p^2 = \sum_{i,j=1}^{n} \frac{c_i^0 x_i}{\sum_k c_k^0 x_k} \frac{c_j^0 x_j}{\sum_k c_k^0 x_k} \sigma_{ij} \le 300\,000; \\ \sum_{i=1}^{20} c_i^0 \cdot x_i \le 1\,000\,000; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (7)$$

The structure and characteristics of the optimal portfolio are presented in tables 10 and 11.

Table 10

The structure of the optimal portfolio, calculated according to the Markowitz model, with a budget constraint (up to 1,000,000 rubles) [3, 4]

	Code	Security name	Number of securities in the portfolio	Share of securities in the portfolio,%
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	0	0
2	ALRS	PJSC"Alrosa", JSC	0	0
3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	258	88,221
4	GAZP	PJSC "Gazprom", JSC	0	0
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	1	2,384
6	LKOH	PJSC Oil company "LUKOIL", JSC	0	0
7	MGNT	PJSC "Magnit", JSC	12	9,395
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	0	0
9	MTSS	PJSC "Mobile TeleSystems", JSC	0	0
10	NLMK	PJSC "Novolipetsk Steel", JSC	0	0
11	NVTK	PJSC "NOVATEK", JSC	0	0

12	PHOR	PJSC "PhosAgro", JSC	0	0
13	PLZL	PJSC "Polyus", JSC	0	0
14	ROSN	PJSC "Rosneft" Oil Company", JSC	0	0
15	RTKM	PJSC "Rostelecom", JSC	0	0
16	SBER	PJSC "Sberbank of Russia", JSC	0	0
17	SNGS	PJSC "Surgutneftegas", JSC	0	0
18	SU26223 RMFS6	OFZ 26223	0	0
19	TATN	PJSC "Tatneft", JSC	0	0
20	VTBR	PJSC "VTB Bank", JSC	0	0

Table 11

Characteristics of the optimal portfolio, calculated according to the Markowitz model, with a budget constraint (up to 1,000,000 rubles). [3, 4]

Parameter	Value
Investments in the portfolio, rub.	549505,13
Average monthly portfolio profitability,%	4,54077
Average monthly portfolio profitability, rub.	24951,754
Portfolio risk for the period of holding securities, rub.	299986,09
Average monthly profitability divided by risk for the period of holding securities	$1,5*10^{-7}$

We will build a model of Sharpe's optimal portfolio for a moderately aggressive investor with a budget of up to 1,000,000 rubles. The optimality criterion - the maximum average monthly profitability divided by risk for the period of ownership of securities.

$$\begin{cases} \dfrac{r_{mp}}{\sigma_p^2} = \dfrac{\sum_{i=1}^{20} r_i \cdot \dfrac{c_i^0 x_i}{M}}{\sigma_p^2} \to max \\ \sum\limits_{i=1}^{20} c_i^0 \cdot x_i \le 1\,000\,000; \\ x_i \in N, i = \overline{1,20}. \end{cases} \quad (8)$$

The structure and characteristics of the optimal portfolio are presented in tables 12 and 13.

Table 12

The structure of the optimal portfolio, calculated according to the Sharpe model, with a budget constraint (up to 1,000,000 rub.). [3, 4]

	Code	Security name	Number of securities in the portfolio	Share of securities in the portfolio,%
1	AFLT	PJSC "Aeroflot - Russian Airlines", JSC	30	0,671
2	ALRS	PJSC"Alrosa", JSC	30	0,500
3	FIVE	X 5 Retail Group NV, depositary receipts of a foreign issuer for shares	68	24,021
4	GAZP	PJSC "Gazprom", JSC	30	0,988
5	GMKN	PJSC "Mining and Metallurgical Company "Norilsk Nickel", JSC	2	4,926
6	LKOH	PJSC Oil company "LUKOIL", JSC	1	0,904
7	MGNT	PJSC "Magnit", JSC	42	33,972
8	MOEX	PJSC "Moscow Exchange MICEX-RTS", JSC	30	0,569
9	MTSS	PJSC "Mobile TeleSystems", JSC	30	1,550
10	NLMK	PJSC "Novolipetsk Steel", JSC	33	0,949
11	NVTK	PJSC "NOVATEK", JSC	35	6,843
12	PHOR	PJSC "PhosAgro", JSC	1	0,460
13	PLZL	PJSC "Polyus", JSC	15	14,928
14	ROSN	PJSC "Rosneft" Oil Company", JSC	30	2,252
15	RTKM	PJSC "Rostelecom", JSC	30	0,408
16	SBER	PJSC "Sberbank of Russia", JSC	30	1,257
17	SNGS	PJSC "Surgutneftegas", JSC	30	0,168

18	SU26223 RMFS6	OFZ 26223	32	0,581
19	TATN	PJSC "Tatneft", JSC	31	4,052
20	VTBR	PJSC "VTB Bank", JSC	129	0,001

Table 13

Characteristics of the optimal portfolio, calculated according to the Sharp model, with a budget constraint (up to 1,000,000 rub). [3, 4]

Parameter	Value
Average monthly profitability divided by risk for the period of holding securities	0,000000157
Investments in the portfolio, rub.	531910,366
Average monthly portfolio profitability,%	0,016319113
Average monthly portfolio profitability, rub.	8680,30558
Portfolio risk for the period of holding securities, rub.	103854,711

Compare the structure of the resulting portfolios. The optimal portfolio according to the Markowitz model includes 258 depositary receipts of a foreign issuer for X shares 5 Retail Group N.V., 1 ordinary share of PJSC "Mining and Metallurgical Company" Norilsk Nickel ", 12 ordinary shares of PJSC" Magnit ".

The optimal portfolio according to Sharpe's model includes 30 ordinary shares of PJSC Aeroflot - Russian Airlines, 30 ordinary shares of PJSC Alrosa, 68 depositary receipts of a foreign issuer for X shares 5 Retail Group N.V., 30 ordinary shares of PJSC Gazprom, 2 ordinary shares of PJSC "Mining and Metallurgical Company" Norilsk Nickel ", 1 ordinary share of PJSC Oil company" LUKOIL ", 42 ordinary shares of PJSC" Magnit ", 30 ordinary shares of the following companies: PJSC" Moscow Exchange MICEX-RTS ", PJSC" Mobile TeleSystems ", PJSC" Rosneft "Oil Company", PJSC "Rostelecom", PJSC "Sberbank of Russia", PJSC "Surgutneftegas", 33 ordinary shares of PJSC "Novolipetsk Steel", 35 ordinary shares of PJSC "NOVATEK", 1 ordinary share of PJSC PhosAgro, 15 ordinary shares of PJSC Polyus, 32 OFZ 26223, 31 PJSC Tatneft, 129 ordinary shares of PJSC VTB Bank.

The resulting optimal portfolios differ in structure.

Investments in the portfolio according to the Markowitz model amounted to 549505.132 rubles, and according to the Sharp model - 531910.366 rubles. At the same time, the average monthly profitability of the optimal portfolio according to the Markowitz model is 4.541%, according to

the Sharp model - 1.632%. The average monthly profitability divided by risk for the period of ownership of securities in the Markowitz model was $1.51*10^{-7}$, in the Sharpe model $1.57*10^{-7}$.

Conclusion and findings

A comparative analysis of the optimal portfolios of moderately aggressive non-institutional investing agents calculated on the basis of models with Markowitz and Sharp criteria showed:

- structures of optimal portfolios calculated by alternative criteria of profitability and risk differ and this difference grows with the growth of the investment budget, which, in our opinion, is connected with the "simplified" structure of the models used, which do not take into account any restrictions on the liquidity of assets included in the portfolios, nor features of the Russian stock market, such as: high entry-exit barriers, transaction costs of market operations, the presence of short positions, etc.;

- "classical" G. Markowitz's model is more adequate to Russian conditions, as it more accurately responds to the composition of the initial (supporting) portfolio and changes in the investor's budget (which is noted by the non-linear nature of the change in profitability with changing the budget).

Thus, for developed stock markets, investment models are applicable, with both single and combined criteria. For developing, low liquid and limitedly efficient markets, the advantage should be given to models with single criteria and an extended system of restrictions characterizing the features of the functioning of these markets.

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FINANCIAL CONTROL AND AGENCY RELATIONS PROBLEM AT CNPC - PROBLEMS AND POSSIBLE SOLUTIONS

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The report addresses financial control issues at CNPC (China). The principles of building financial control of the company, their evolution, problems of agent relations are analyzed. Recommendations are offered on improving the financial management and financial control of the company, in order to improve its effectiveness and solve problems of agency relations. Among other things, the development of digital platforms for financial control of the company, the adoption of the Code of Corporate Ethics, the expansion of the number of shareholders, the attraction of Chinese and foreign investors, increased company transparency and improved financial control of operations are proposed.

Keywords: problem of agent relations, system of performance indicators, financial control

1. Introduction

One of the central problems of financial theory is the problem of agent relations[1]. In theory, company managers should act as agents of the owners, but in practice there is often a conflict of interest. Back in 1932, Berle and Means showed that companies with a large number of minority shareholders created abnormally large opportunities for managers to act in their own interests.

Managers use the separation of ownership from management rights in their interests and often solve their own problems at the expense of the company, providing themselves with abnormally high rewards, significant hospitality expenses, as well as “golden parachutes” in case of dismissal and even liability insurance in lawsuits from minority shareholders. The problems associated with this behavior of managers manifested them-

[1]Brealey R., Myers S., and Allen F. Principles of Corporate Finance.- 2010, McGraw-Hill, NY, 10th edition.

selves vividly in the USA in 2007, during the bankruptcy of the Chrysler and General Motors companies, when the top managers of these companies, which brought them to bankruptcy, received significant rewards, at the expense of taxpayers, since The US government was forced to buy out these companies in order to prevent catastrophic consequences for the economy and citizens.

In addition, managers are usually more interested in increasing the size of the company than in increasing the value of shares. In companies where managers are more dependent on shareholders (for example, private), the problem of agency relations is less acute, but in companies owned by the state or public companies where there are not enough large shareholders. In order to achieve the coplanarity of the goals of managers and shareholders, shareholders constantly increase managerial remuneration - for example, between 1980 and 1994 the remuneration of CEOs in the United States increased by about 3 times in real terms, and between 1994 and 2001 doubled[2].

A common solution to the problem of agent relations is usually seen in a combination of positive incentives for honest behavior (for example, optional forms of remuneration of managers)[3] and negative signals punishing dishonest behavior - for example, strengthening financial control, tightening the code of corporate ethics and at the state level - tightening corporate legislation (for example, Sarbanes-Oxley Act in the USA, passed in 2002).

In some countries, such as China, Russia, Norway, etc., there are superlarge state corporations for which the problems of shareholder control over managers are of a special nature.

One of the most striking examples of such a company is CNPC[4]. This company is a monopolist in the Chinese market for oil and petroleum products and it is almost wholly owned by the state, but not only (and not so much) at the level of the central government, but at the level of provincial governments. Next will be considered the unique problems of this company and possible solutions.

2. CNPC financial management system platforms

To solve problems with several levels of management, long capital chains, low internal management efficiency and high capital costs, CNPC has created a financial management system with goals, planning and continuous innovation. This management system can be summarized as an integrated approach based on concentration of accounting, concentration of assets

[2]Tirole J. The theory of corporate finance, Princeton University Press, 2006

[3]Koller T., Goedhart M., Wessels D. (McKinsey & Company). Valuation: Meas-uring and Managing the Value of Companies, 2008

[4]CNPC > Press > Publications > Annual Reports > 2017. 2018 · 2017 · 2016 · 2015 · 2014.

and concentration of debt in the parent company.[5] At the same time, using the electronic platforms of joint financial management and financial holding operations management using technical means and data analysis support, six major transformations of financial management were implemented: centralized management for authorization management, administrative control for the allocation of resources in the market, control from adoption decisions in the parent company before making a decision in the unit, supporting the transformation of cost accounting into value creation, the transformation of functional management into joint management, the transformation of actual supervision into source management.[6]

Integrated budget management

CNPC implements a three-tier comprehensive budget management system "Group Headquarters - Professional Industry Companies - Regional Companies" in accordance with the principle of "unified management, hierarchical responsibility"[7].

Thus, the headquarters of the group gives out indicators of the budget proposal to professional industry companies, and then professional industry companies give out indicators of the budget proposal to regional companies, regional companies report budget projects to professional industry companies, and professional industry companies report budget projects to the headquarters of the group.

n accordance with the management idea of "intensive, specialized and integrated" management[8], 10 professional branches have been created in the management of the production and operational business, and all activities of the group of companies are divided into four main areas: exploration, production, processing and marketing. CNPC uses a three-level integrated budget management system and applies the principle of "unified management and hierarchical responsibility" to achieve the overall budget goals of the group company. The goal is to transform the principles of financial management of CNPC from centralized management to management through authorization. The objective is to expand the independence of the group companies in order to provide greater flexibility and efficiency in financial management.

[5]"Finance and Accounting" journal. 2018 (22). Innovative practice of financial management system. Yang Huahong, Zhang Zeyyu See comments above.

[6]"Finance and Accounting" journal. 2018 (22). Innovative practice of financial management system. Yang Huahong, Zhang Zeyyu.

[7]"Accounting Research" journal. 2015 (07). Construction and implementation of the financial control system of an enterprise. Liu Huiping.

[8]"Technology Advisory Bulletin" journal. 2006 (14). On the discussion of the integrated budget management of groups of enterprises in China. Fang Yi.

In formulating the comprehensive goals of budget management, it is recognized as necessary, first, to conduct a comparative analysis in the same industry, refer to the advanced level of the same industry, pay attention to price changes in the domestic and foreign oil and gas markets and analyze the changes, and secondly to conduct a comprehensive analysis of resource taxes.

Changes in influencing factors, such as pipeline transport prices and refined oil exports, in accordance with the characteristics of various business sectors, led to the need to formulate scientific and sound budget indicators and gradually transfer the financial management of the group company from administrative control to the allocation of resources in the market.

To ensure the strategic development goals of the company and optimize production factors, the company's budget indicators should follow the following four principles: the total investment is associated with the net cash flow from operating activities, the increase in investment is associated with the return on investment. Also, the goals of production, delivery, sales, reserves and efficiency are interconnected, and salary growth is associated with improved KPIs.

KPI-based campaign support

The group company has created a contract system based on key performance indicators (KPI) for a reasonable assessment of annual budget indicators.[9] Key performance indicators are the strategic goals of the company that can reflect their driving factors and changes in their core operations so that senior management can understand the reasons for the changes in key factors that affect cost. At the same time, regional companies and professional branches can determine their own performance indicators and the weight of each indicator in accordance with the actual situation of their budget goals.

Budgeting - budget analysis and management of the company's budget execution process

The CNPC Budgeting Platform includes a budget execution analysis report system, analyzes budget execution on a quarterly and annual basis, and issues an analysis report. For projects whose budget indicators differ by more than a certain percentage, it is necessary to highlight the reasons for the differences and propose a correction.

In addition, in the aspect of budget execution control, a benefit analysis database was also created to implement the complete project management process included in the group's investment plan, invested funds and gener-

[9]"Urban Problem" journal. 2012 (12). New index system for evaluating the effectiveness of energy management services contracts. Zhu Dajian, Cao Liping.

ated assets and capital.

To implement the CNPC budgeting platform, it was necessary to formulate an accounting manual covering the entire business of the group company. A Guide to the financial reporting process was prepared and key business rules were finally revised to form the Group's Accounting Guide. On this basis, a new "Standardization Guide" was developed, including more than 45,000 standardized codes and more than 200,000 customer information codes, as well as a "User Guide", which laid the foundation for the use of a platform that ensures the implementation of centralized accounting.

Concentration of funds

The characteristics of the changes in the centralized fund management of the group company are mainly reflected in the following three aspects:

(1) A single digital platform (system) of treasury budget execution is created. The group company and its subsidiaries adopted two sets of models for centralized fund management until 2014 and accordingly adopted two fund management platforms. In order to increase the effectiveness of centralized fund management and further improve the efficiency of fund use, the group company has created a single large treasury fund management platform.

(2) With the creation of the treasury fund management platform, the fund management model for subordinate companies has also changed accordingly: the income and profits of companies in various regions were previously transferred to the headquarters of the group. The ownership of these funds belongs to the headquarters of the group. Since 2014, the parent company of the group has proposed the concept of "centralized joint management" to provide regional companies with more operational autonomy and have 70% of the right to use the funds provided. If subordinate enterprises want to carry out investment activities, they can apply for funds directly from the group headquarters in the same way as in accordance with the previous model. However, now they need to make decisions based on the amount of funds at the group's headquarters and on the basis of competition with other projects. This will help optimize the distribution of funds as a result of choosing the most effective investment projects.

(3) The management of cash flows and the reserve of liquid resources occupies an important position in the centralized management system of liquid resources funds of the parent company of the group. Currently, the group company has an annual plan for a liquid resources fund, a monthly plan for a liquid resources fund, a weekly plan for a liquid resources fund, and a cash fund day plan that forms a system with preliminary planning, process control and subsequent monitoring. He puts the entire economic

activity of the company under the control of the treasury and financial management.

Debt concentration

Based on the annual capital budget, CNPC headquarters determines the financing plan, uses the company's comprehensive loan to unify external financing, and applies the unified debt and repayment method of debt management. In addition, companies in any region are prohibited from investing, borrowing or guaranteeing without permission from the headquarters, which avoids the general credit risk of the group company.

Financial holding operating platform and joint financial management platform

As a professional financial management company, the parent company of CNPC has a financial company, which is a platform for integrating the financial business of the group, investing in equity, supervising financial assets, and managing and controlling financial risks. It currently manages a number of subsidiary financial companies and other financial business companies.

The financial company initially created a business structure that uses its own digital platform and provides comprehensive professional financial services for group companies and subsidiaries in areas such as centralized management of domestic and foreign funds, cheap debt financing and centralized management of commercial insurance.

CNPC digital platform development

The construction of the Group's financial informatization began in 1995 and has gone through three stages of unification, centralization and integration, and is currently moving towards the stage of sharing. The company of the group created a financial information system with independent intellectual property rights, promoted the standardization, centralization, informatization and internationalization of financial work, carried out the transformation and modernization of the financial management methods of the group company and effectively supported the digital platforms “integrated”, “three centralized” and “the work of the financial system management ".

At the same time, the regime of building a digital platform “Internationalization of design ideas, localization of development and implementation” was adopted to reduce costs, and on this basis a financial separation is carried out to further restructure, optimize and simplify financial and business processes to achieve financial processes and conduct business.

3. CNPC financial control system challenges

Theoretically, CNPC financial management should, in the first place, be in line with the trends of the time, emphasizing the important role of the

board of directors, financial control, and increasing emphasis on incentives and financial control measures in order to jointly manage stakeholders. Secondly, CNPC financial management should be in line with China's national circumstances and promote the inheritance of best traditions (dating back to Kon-Fu-Dzu) and economic management reform. The form of joint stakeholder management with shareholders as a center corresponds to the Chinese economic system and international trends and meets the development needs of CNPC.[10]

Thanks to CNPC's unique system of property rights, the real control over the enterprise belongs to local government, and the Chinese Government is only a leader setting standards for management and financial control. Since the interests of local self-government and the general interests of a country may vary, the implementation of financial management cannot be subordinate to local self-government.

Without the implementation of state financial control measures, local government officials in their private interests may abuse the control over the work of a subsidiary.

CNPC so far lacks an ideal mechanism for financial control of trusted agents that would prevent excessive inappropriate consumption of financial resources on the ground, would prevent insufficient disclosure of information and serious outflow of assets, which actually increases the cost of a trusted agency.

Due to lack of financial control, it is difficult for heads of subsidiaries to be fair when they comply with ethical standards of conduct and very often they violate them and make decisions that are unfavorable for the company.

Company management - conflict of interest problems caused by the excessive financial power of individual managers.

If we assume that each financial management entity in the company controls others and the entities help each other, then such a financial management structure will be beneficial to interested parties and at the same time maximizing the interests of shareholders will be achieved.[11] However, in the CNPC, the financial power of some senior executives is overly concentrated in some of their functions, is not subject to proper control, and as a result, the balance between centralization and decentralization of governance is violated. This situation actually leads to a conflict of interests and makes control over the entire group more subjective, depending not on the logic of a market economy, but on the logic of private interests. Such

[10] Influencing factors and countermeasures of financial management amid CNPC's mixed property reform. Wei Jiyun.

[11] "Materials of the 2010 annual Henan Metal Society Conference." 2010. Problems and countermeasures of financial management of a group of enterprises. Gao Hui.

an excessive concentration of power does not contribute to the efficient distribution of the company's financial resources, and in the most serious cases it damages the interests of the CNPC as a whole and even destroys the company's living space.

Staff incentive and restraint mechanism is not perfect

The problem of internal control of operators (employees and affiliated organizations conducting operations on behalf of the company) is the most serious. CNPC needs to create a more scientific, efficient, and systematic mechanism for evaluating operator productivity to measure and evaluate the true results of their operators. In addition, it is necessary to improve the current incentive model for operators in order to create a more effective incentive mechanism that would incentivize operators and the Code of Ethical Conduct, the violation of which would entail serious sanctions (up to criminal prosecution).

4. measures to improve CNPC financial management

Diversification of capital, attraction of Chinese and especially foreign investors.

Diversification of shareholders, especially by attracting foreign capital, can help improve the quality of financial control and the effectiveness of the company. In addition, attracting foreign direct investment in certain CNPC subsidiaries can help attract new technologies and improve the company's international cooperation, increase its competitiveness in foreign markets (the company is a monopolist in the Chinese domestic market).

CNPC can fully attract funds from outside, including foreign investors, by encouraging foreign and Chinese private investment, transferring capital to ensure the viability of state-owned enterprises.

Also, government shares owned by enterprises may be offered for sale on the Shanghai and Hong Kong exchanges, after appropriate procedures and permits. At present, there are problems of a high concentration of own shares in enterprises, which impede the improvement of their efficiency and have not been resolved in any way.

In addition, the structure of CNPC's share capital can be changed accordingly, especially with respect to state-owned shares, so that shareholders can have certain mutual interests within the enterprise, but at the same time they remain subject to financial control by the parent company.

Increase the coefficient of managers shares ownership

In order to achieve a better match between the goals of the company's managers and the interests of CNPC shareholders, it would be right to increase the coefficient of managers holding shares, including by issuing options for company shares in the interests of managers. This is in line with

international best practice and, as a result, the interests of managers would be better aligned with the interests of CNPC.[12]

At the moment, CNPC has a problem regarding agent relations - the control powers of operators (including managers) are too large, so they have the opportunity to infringe on the interests of shareholders and improve their own interests. The ownership ratio of operators' shares can be moderately increased, which is an effective measure to stimulate financial control and better manage the company. To a certain extent, this is close to the concept of stakeholders in Europe, but at the same time control can be implemented by changing the ownership structure.

Stock options can effectively connect managers' wages with the common interests of enterprises, combine benefits and performance results, and therefore they will pay more attention to long-term strategy measures.

Improving disclosure of information

Improving the quality of information disclosure plays an important role in maintaining the capital market and helps stakeholders make decisions, and also solves the problem of asymmetry of information between different users of information. CNPC complies with disclosure laws and continually improves disclosure. However, the accuracy, completeness and timeliness of the information disclosed still needs to be improved.

First of all, it is necessary to increase the requirements for compliance with IFRS reporting principles. Among 38 specific accounting standards, there are special disclosure requirements: today, CNPC can take into account cost savings for enterprises, while not ignoring the requirements of the rules, ensuring that the information complies with the rules, and ensuring that accounting standards play a positive role in comprehensive protection.

Internal financial control

Complying with the relevant financial management regulations, CNPC has completed the construction of an internal control system at the enterprise that facilitates the operation of the enterprise and the collection of relevant data. However, on certain issues (the provision of false information, unsafe assets, transactions with affiliates, etc.), inadequate management and control capabilities of the company's operators still remain.

[12]"Modern economic information" journal. 2017 (20). Problems and countermeasures in the environment of internal control of enterprises. Guo Yangbin.

L'APPLICATION DU TABLEAU DE BORD PROSPECTIF DANS LA COMPTABILITÉ ANALYTIQUE INTERENTREPRISES

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L'article révèle le champ terminologique de la coopération interentreprise, du système de comptabilité de gestion interentreprise, ainsi que les sens de la mise en oeuvre de l'analyse du niveau de coopération interentreprise avec le tableau de bord prospectif modifié Norton-Kaplan.

Mots clés: coopération interentreprise, sécurité économique, indicateur, tableau de bord prospectif, comptabilité de gestion interentreprise.

Dans le contexte de la brièveté des relations économiques, la question du maintien des avantages compétitifs à long terme est au premier plan, principalement par l'effet synergique de la coopération commerciale. C'est la compétitivité qui est le critère principal de la sécurité économique d'une entité économique ou d'une communauté de ces entités.

La coopération interentreprises – CIE) est un système de relations organisationnelles, fonctionnelles et de processus entre les entités économiques, unies par des objectifs mutuellement bénéfiques communs, qui s'obtiennent par l'effet synergique d'un partenariat à haut niveau de culture d'entreprise, sur une base volontaire et confidentielle [4]. Les principes à noter sont à la base des relations interentreprises:

La cohérence est la presence d'une relation étroite, d'unité et d'harmonie entre la vision et la mission des entités de la CIE.

Équilibre - le rapport optimal des ressources (moyens, outils) et du résultat obtenu à leur aide.

Focalisation sur des tâches qualitativement importantes - prioriser le travail visant à prévenir une situation de crise, plutôt que de travailler dans des conditions de crise.

L'efficacité de la coopération dépasse les sommes de l'efficacité des membres de la coopération. Flexibilité, adaptation et amélioration.

Portabilité - la mobilité des moyens de mise en œuvre de l'interaction. Autogestion par les centres de responsabilité.

Du point de vue de l'approche systématique de la coopération interentreprises, il est pertinent de souligner les éléments des relations interentreprises:

1. Le processus de coopération interentreprise est un processus complexe de la réalisation des opérations, des fonctions, des activités de gestion des entités de coopération (entités individuelles opérationnelles, unités fonctionnelles, organisations) pour obtenir le résultat grâce à l'effet synergique de la coopération.

2. Les entités de la coopération interentreprise - les organisations, leurs unités structurelles, les exécutants individuels, les unités communes impliquées dans le processus de coopération interentreprises.

3. L'objet de la coopération interentreprise est l'activité intra-organisationnelle et inter-organisationnelle des participants à la coopération.

4. Méthodes, outils et moyens de coopération interentreprise basés sur le principe de l'effets synergique.

5. Le niveau de coopération interentreprise est un ensemble de caractéristiques comprenant l'environnement d'affaires du partenariat, la culture d'entreprise, le degré de confiance des relations entre les participants à la coopération.

6. Assurer la coopération interentreprise - systèmes communs d'information et de communication, le soutien informatique et analytique, et organisationnel (y compris la rationalisation de l'organisation du système) et le processus d'optimisation du système présent (y compris l'attraction des éléments nouveaux, activités ou fonctions).

Les principes de la coopération interentreprise sont à l'origine de la nécessité objective de mettre en place un système efficace de comptabilité, d'analyse et d'information pour les activités de coopération interentreprise. L'analyse théorique des documents scientifiques a permis de formuler la définition suivante: le système de comptabilité et d'analyse de gestion interentreprise est un ensemble de composants comptables, informatiques et analytiques fonctionnant sur la base de la comptabilité de gestion et de la base informatique de la coopération interentreprise. La définition explique la nécessité objective de combiner les systèmes comptables et analytiques des partenaires dans un processus unique, où la comptabilité de gestion est une base de fonctionnement du système.

La comptabilité de gestion interentreprise est un type d'activité dans le cadre de la coopération interentreprise, qui assure l'information aux entités de l'interaction pour planifier, analyser, gérer et contrôler les activités de la coopération en général et de l'entité économique individuelle pour la croissance et le développement, le maintien de la sécurité économique du système de coopération interentreprise.

L'objectif principal du système inter-organisations de gestion de la comptabilité est une préparation et une présentation à l'autorité de coordination d'une coopération interentreprise, de l'information complète sur l'état courant, cible et prévision, le fonctionnement d'une coopération interentreprise, en général, et dans le cadre des entités économiques et de production différentes, des unités et des centres de responsabilité). Les objectifs principaux de la comptabilité de gestion interentreprise pour le développement stable de la coopération interentreprise sont:

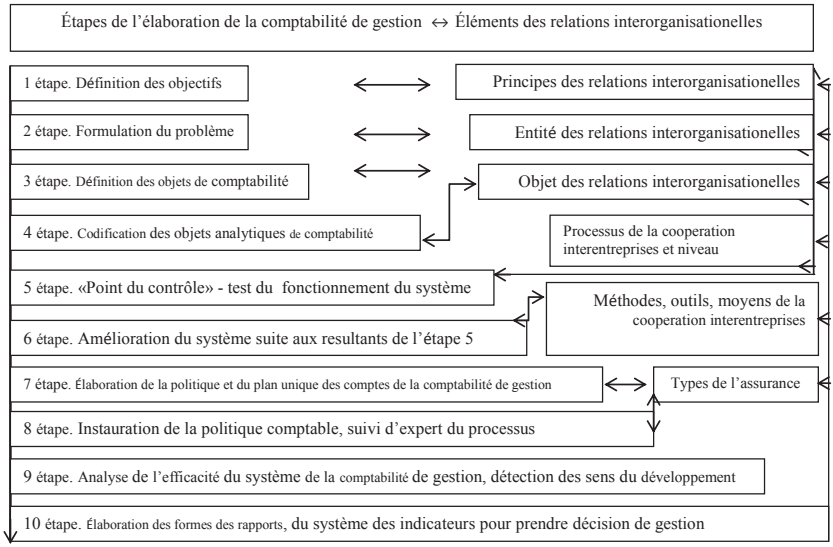
1. Définir des exigences communes et des approches méthodologiques, des buts et des objectifs pour la gestion du système de coopération interentreprise.

2. Assurer et coordonner les activités, la mise en œuvre d'un ensemble d'activités, de normes et d'objectifs de coopération interentreprise, de blocs d'affaires et de membres du communauté.

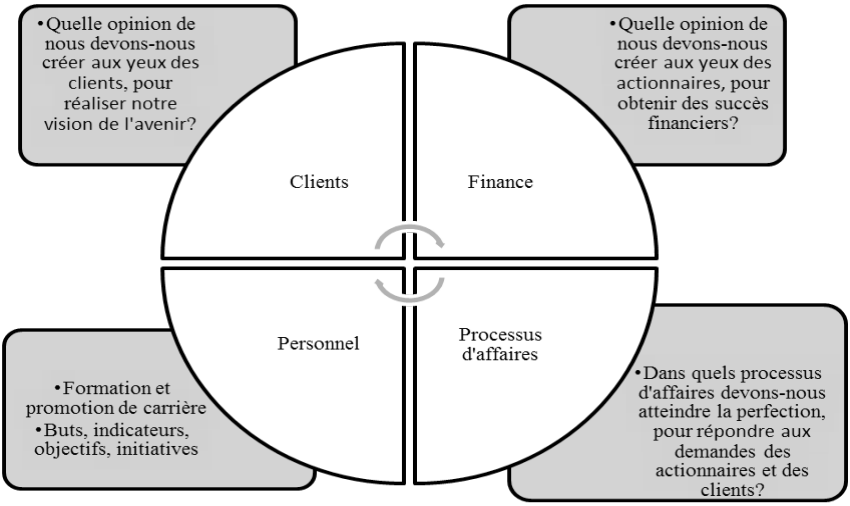
L'algorithme la comptabilité de gestion de la coopération interentreprise développé par l'auteur contient la dernière étape – le développement des formes des rapports et des outils analytiques de la base d'information de la comptabilité de gestion interentreprise. Le processus de construction de la comptabilité de gestion en relation avec les éléments de la coopération interentreprise est représenté à l'image 1.

Le schéma représenté sur l'image 1 suggère la relation entre la dernière étape de l'algorithme de la mise en place de la comptabilité de gestion interentreprise avec tous les éléments du système de comptabilité interentreprise. À cette étape, outre le développement de formulaires des rapports, un sous-système d'indicateurs est en cours de création. Ce sous-système est un système souple et efficace d'objectifs et d'indicateurs interdépendants qui évoluera suivant le développement de la coopération interentreprise. Le groupe des indicateurs devrait être conforme aux principes et aux objectifs de la communauté des entreprises, décrire le fonctionnement des centres de responsabilité, des objets individuels de coopération interentreprise, des outils et des méthodes, et évaluer le processus de coopération interentreprise par les niveaux.

La conception du système d'indicateurs dans le cadre de la comptabilité de gestion au niveau de la coopération interentreprise repose sur les caractéristiques inhérentes au tableau de bord prospectif Norton-Kaplan (image 2).



Img. 1. Processus de l'établissement de la comptabilité de gestion interentreprise et liens avec les éléments du système de coopération interentreprise (source: auteurs)



Img. 2. Modèle du tableau de bord prospectif Norton-Kaplan [1]

Les méthodes de L. Meissel [2] et Norton-Kaplan [1] ont été intégrées pour construire le tableau de bord prospectif et ont été développées sur quatre aspects principaux - financier, client, interne, formation et croissance. Chaque indicateur reflète les buts et les objectifs, les indicateurs et les initiatives, établit un lien entre les objectifs et les moyens de les atteindre [1].

Le système d'indicateurs et l'analyse de leur relation, et de l'ordre du calcul et des tendances permettent d'effectuer un diagnostic de l'état de l'intégration des activités des membres d'une coopération interentreprise, de définir des objectifs, élaborer des plans d'intégration et d'évaluer leurs résultats. La description des indicateurs caracterisant des composantes de chaque niveau de l'intégration des activités de l'organisation est ci-dessous. La carte de la construction du tableau de bord prospectif de la coopération interentreprise reflète les sens principaux de l'évaluation du fonctionnement de la communauté des entreprises.

Les indicateurs financiers sont mis en évidence dans le cadre du concept du tableau de bord prospectif – bloc finance. Les indicateurs de l'attitude des clients répondent aux exigences du bloc – clients. Les indicateurs de l'organisation des processus d'affaires - révèlent les sens du concept Norton-Kaplan - processus d'affaires. Les indicateurs du capital humain répondent aux exigences de la réflexion sur l'aspect client. La dernière partie de la stratégie (Indicateurs des relations avec les membres de la coopération interentreprise) est due au fait que le système d'indicateurs de la coopération interentreprise doit refléter les spécificités du niveau d'organisation des partenaires. La méthode présentée est de nature générale et son application devrait être accompagnée d'une application sur un groupe particulier des entités, en fonction de l'activité desquels des valeurs indicatives sont établies pour les indicateurs sélectionnés. Les domaines d'évaluation de la coopération sont présentés dans le tableau 1.

Tableau 1 – Sens de l'évaluation de la coopération interentreprise

Bloc	Groupe des indicateurs
Indicateurs financiers	Financiers généraux
	Financiers spéciaux
	Spéciaux d'investissement
	Spéciaux fiscaux
Indicateurs des relations avec les clients	Croissance de la clientèle
	Stabilité des relations avec les clients
	Niveau du service
	Rapport du prix et qualité

Indicateurs de l'organisation des processus d'affaires	Réactivité
	Qualité
	Efficacité
Indicateurs du personnel	Composition et flux du personnel
	Efficacité d'investissement dans le personnel
	Motivation
	Conditions de travail
	Activité innovante
Indicateurs des relations interentreprises	Efficacité de coopération

Grâce aux méthodes de recherche économique, les centres de responsabilité recueillent l' information provenant de sources externes et internes. Le traitement et l'analyse ultérieurs de l'information sont effectués à l'aide de méthodes d'analyse de régression, d'expériences, d'observations, d'évaluations d'experts, de travaux de groupes de discussion, de simulations de scénarios et de situations. Le système de comptabilité de gestion avec les résultats de prévision permettra d'élaborer des programmes d'activités prioritaires visant à atteindre les objectifs définis dans l'étape 1 de l'algorithme. Nous développons un groupe d'indicateurs dans le premier domaine "Finances".

Les indicateurs financiers sont à noter:

1. Indicateurs financiers globaux: part du chiffre d'affaires pour les projets de coopération conjoints de chaque partenaire; valeur ajoutée économique; coefficient de croissance économique soutenue; rentabilité des ventes.

2. Indicateurs financiers spéciaux: ratios de liquidité, ratios d'activité, ratios d'indépendance financière.

3. Indicateurs d'investissement spéciaux: le coefficient d'activité d'investissement des partenaires et de la coopération en général; le coefficient de retour sur investissement, le coefficient de rentabilité des investissements, le coefficient de renouvellement des immobilisations.

4. Indicateurs spéciaux fiscaux: la dynamique des contrôles fiscaux et des mesures de contrôle fiscal pour les partenaires, le non-respect des obligations fiscales, le renforcement de la charge fiscale, la charge fiscale (par rapport à son niveau dans l'industrie), le risque de suspension forcée.

Le deuxième groupe des indicateurs est le groupe des indicateurs des relations avec client détailé dans les domaines.

1. Croissance de la clientèle: croissance du nombre de clients exclusivement pour les activités interentreprises; croissance du volume des ventes dans le segment du marché; croissance du volume des ventes des résultats des activités interentreprises dans le segment de marché; indicateur de croissance du volume des ventes; rentabilité du client, nombre de concours remportés (unités par mois).

2. Durabilité des relations avec les clients: degré de différenciation des ventes, leadership, nature des relations avec les clients, proportion de clients cibles, efficacité des activités recommandées, ventes croisées; pourcentage de revenus provenant de l'utilisation d'un produit présent à la suite de relations interentreprises; rentabilité du produit par les clients.

3. Indicateurs du rapport qualité-prix des produits: place sur le marché par rapport qualité-prix; coûts propres par rapport aux coûts des concurrents; coûts indirects; différence de portée du prix unitaire de la vente d'un produit; rapport prix-coût optimal.

4. Indicateurs du niveau de service après-vente: niveau de rejet; délais minimum et maximum d'exécution de la commande; leadership sur le marché; respect des délais contractuels; indicateurs d'exécution des commandes individuelles.

Le bloc suivant est les indicateurs de l'organisation des processus d'affaires détailés par directions.

1. Réactivité: durée du traitement de la demande, temps moyen de réponse à l'échec de la mise en œuvre du processus métier, temps moyen de prise de décision de gestion (final).

2. Qualité: le nombre de réclamations, de la qualité de l'environnement des processus d'affaires, la portée de la durée de recevoir de la rétroaction sur demande, l'augmentation de la productivité, l'investissement dans l'organisation des processus d'affaires; la proportion des processus d'affaires avec des écart du plan; le degré de satisfaction de processus; le nombre de projets exécutés dans les délais; la place dans le rating de secteur; le niveau d'utilisation des outils logiciels dans les activités des employés.

3. Efficacité: proportion du coût d'exécution du processus d'affaires dans le coût moyen de l'effet de sa mise en œuvre; coefficient d'automatisation.

Le dernier bloc du modèle Norton-Kaplan est un groupe d'indicateurs caractérisant le personnel et la formation détailés par directions.

1. Composition et mouvement du personnel: rotation du personnel, âge, formation, composition professionnelle, proportion du personnel passant à la concurrence, proportion de projets innovants réalisés.

2. Efficacité des coûts du personnel: différenciation des valeurs estimatives des tests des employés, augmentation de la productivité des investissements dans le personnel, ampleur de l'effet des activités des employés.

3. Motivation: nature des relations avec les employés, taux d'absentéisme; proportion de personnel n'ayant pas de violations de la discipline du travail; degré de satisfaction salariale.

4. Conditions de travail: part des coûts de rémunération dans la part totale des coûts; présence de maladies professionnelles et de blessures au travail: niveau d'automatisation du travail

5. Activité d'innovation: Nombre de propositions d'innovation; nombre d'initiatives mises en œuvre; niveau d'utilisation des technologies innovantes par les employés.

Nous avons examiné les groupes d'indicateurs conformément aux blocs mis en évidence dans l'image 2. Vue de la spécificité des activités de coopération interentreprise, il convient de mettre en évidence un domaine supplémentaire «Indicateurs des relations avec les membres de la coopération interentreprise », où l'objectif principal est d'évaluer l'efficacité du partenariat. Le problème principal de cette évaluation est l'évaluation des effets de synergie. Pour les activités interentreprises, il est proposé d'évaluer l'efficacité de l'organisation du partenariat avec les indicateurs à noter:

1. Évaluation de la réactivité des processus d'affaires. Un indicateur synthétisant de l'estimation de la durée de fabrication des produits dans le cadre des activités interentreprises est le Coefficient d'urgence pour l'exécution des commandes (COP), qui est calculé selon la formule à noter:

Cet indicateur caractérise la rapidité, la qualité des processus d'affaires des partenaires, ainsi que l'efficacité de la coopération. La valeur doit être 1, c'est-à-dire que toutes les commandes sont exécutées dans les délais prescrits.

2. Évaluation de l'automatisation des processus d'affaires. L'indicateur suivant, caractérisant le développement des formes de service et offrant le plus de commodité pour les clients, est le coefficient de progressivité des formes de service (CP), qui est calculé selon la formule à noter:

La valeur doit être d'au moins 8,5, c'est-à-dire que tous les 85% des commandes sont effectuées avec des formes progressives de coopération.

3. Évaluer le degré de satisfaction du client. Dans le processus d'analyse complète des conditions de service, une attention particulière doit être accordée à l'évaluation qualitative de la satisfaction des clients par le mode de fonctionnement de l'organisation, l'éthique et l'esthétique du service, l'emballage des produits; l'apparence du personnel de service; la culture de la parole et de la communication. L'évaluation de ce secteur est possible avec l'utilisation d'enquêtes et de tests qualitatifs [3].

4. Évaluer le degré de satisfaction des entités de la coopération interentreprise avec l'organisation du partenariat, ce qui est également possible grâce à l'application du questionnaire et à son évaluation par des experts.

Le sens économique du développement du cinquième secteur consiste aux faits: il est important de maintenir un équilibre dans tous les domaines de coopération interentreprise et de s'efforcer à l'amélioration de tous les indicateurs économiques. L'évaluation de la satisfaction de la structure interentreprise présente par les parties prenantes externes aussi que par les entités internes est essentielle pour le développement et le fonctionnement stable des partenaires.

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THE SINGULARITY OF AMERICAN LAW[1]

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The article is devoted to the distinctive features of the US legal system within the common law "family". Attention is drawn to the specifics of American case law and the special role of the US Constitution. The conclusion is made about the singularity of modern American law in comparison with its "progenitor" – English law.

Keywords: American law, common law, precedent, the US Constitution, statute law.

American law in legal comparative studies is traditionally referred to as the common law family, as well as its "progenitor" - English law. Among the characteristic features inherent in a given family, as a rule, the following are distinguished: common law, by its nature and content, is a "judicial right"; the main source of law is judicial precedent; common law has a "casual" character (case law); the almost complete absence of codified legislation; there is no classical division of the right into private and public; giving increased role and significance to procedural law in comparison with substantive law; a rather high level of independence of the judiciary in relation to all other state authorities, etc. [1, p.629].

These features are in one way or another inherent in all countries that are members of the common law family, but it is no accident that at present, along with the terms "Anglo-Saxon", "common" law, the concept of "**Anglo-American**" **legal family** has begun to be used. By analogy with "Roman-German" law, this term emphasizes, *on the one hand, that American law has its roots in English, and on the other, it is gaining more specificity compared to it, standing out in an independent legal system within the framework of a single common law family.* As Ch. Osakwe rightly notes, on many issues of modern comparative studies, the discrepancy between the law of England and America is deeper than that between Roman and

[1]The topic is being developed under the RFBR grant 20-011-00794A, "State-legal systems of the contemporary world".

German law in the Roman-German legal family [2, p. 71]. The singularity of American law is determined by a number of factors.

In its development, American law went through several stages, in each of which its relationship with English law changed. According to the principle of the Calvin case formulated in 1608, the English colonies in the territory of the modern USA fell under the influence of the common law of England. However, this principle already contained one significant limitation: the common law of England is applied in the colonies only "*to the extent that its norms correspond to the conditions of the colonies*" [3, p.270]. But the whole problem was that the norms of English common law (created by feudal society and for feudal society) completely did not correspond to the living conditions of the American colonies. In addition, there were practically no lawyers - specialists in the field of English common law. The situation changed somewhat in the XVII century in connection with the improvement of the living conditions of the colonists. There is a trend in favor of a wider application of common law, since they see in it a connecting link between everything that is English in America, against threats coming from the French colonies - Louisiana and Canada. After the conquest of political independence at the end of the XVII century by the United States, the *idea of independent American law* arose and became popular. And although the struggle between supporters of common law and adherents of codification ended in a triumph of common law, which, according to David, was a "triumph of tradition", nevertheless, this struggle greatly contributed to the fact that the common law of the USA acquired a specific, different from England's common law character: "The United States remained a common law country in the sense that it generally retains the concepts, way of thinking and theory of sources of English law; however, US law has a special place in the common law system: it has features that give it originality and often bring it closer to the Romano-German legal system ... "[Ibid., p. 272-273].

*Most clearly the features of American law are manifested in the system o*f its sources. According to American lawyers, United States law has two initial sources:

- common law (case law, judge made law);
- legislative law (legislation, written law) [4, p.2].

As already noted, the **case law** system came to the United States along with the first English immigrants. However, at present it is very different from English.

Firstly, in England from the XIX century to the present day there is a

fairly strict precedent rule (stare decisis) that obliges English judges to adhere to decisions made by their predecessors. As a general rule, a court (in case law) is bound by its own decisions, decisions of courts of equal jurisdiction and decisions of higher courts (this is the essence of the strict rule of precedent). In this case, mandatory precedents create only decisions emanating from higher courts. The precedents of the lower courts are *persuasive* [5, p. 99]. As the English professor A.L. Goodhart rightly remarked: “An English judge is a slave to the past and a despot of the future, he is bound by the decisions of his predecessors and binds the generations of judges who will inherit him” [Cit. By: 6, p. 242].

In the United States, from the very beginning the precedent rule had its own specifics: unlike the English courts, the *US Supreme Court and the state supreme courts were never unconditionally bound by their own decisions* and could thus change their practice. The higher the position of the court, the less it is bound by precedents. So, all decisions of the US Supreme Court and most decisions of the federal district courts of appeal are published and are precedents for subsequent similar cases; in the states, as a rule, only decisions made by appeal are precedents for later cases, while decisions of lower courts made in the first instance are only convincing [4, p.12, 15].

A second feature of US case law is that US states are sovereign, and the *stare decisis rule is within the jurisdiction of the states only within that state’s judiciary.* The US judicial system includes, on the one hand, federal courts, and on the other, state courts. Each of the highest courts of the states, like the US Supreme Court, by themselves, independently of each other, determine their attitude to the precedent and thereby develop their own special rules for its application [7, p.41]. The result is a "plurality" of isolated jurisdictions of individual states. While the existence of an independent case law system in each state has been recognized for a long time, debates regarding the recognition of the federal case law system in American literature are still ongoing. At present, the principle formulated in the 1938 decision in the case of the Erie Railway Company against Tompkins: “Except for matters governed by the federal Constitution or laws of Congress, the law that should be applied in certain cases is firmly rooted in American law.” individual state law. The question of whether this right is formed by the state parliament in a legislative act or in a decision of the State Supreme Court does not concern the federal authorities. Federal common law does not exist ”[3, p. 281-282]. At the same time, American law is one, since the systems in the states have already become identical in many respects, they tend to be uniform.

Thirdly, the specificity of US case law lies in the nature of its relation-

ship with statutory law. Although common law plays a primary role in the United States, as in England: the law does not make sense until it is interpreted by the courts; nevertheless, *laws still have a greater share in the US legal system than in England*. The modern American judicial law combines the foundations of the English tradition and new legislative motives, which also gives uniqueness to American law. Judges act within the framework of laws passed by the US Congress or state legislature, interpreting these laws to the extent necessary (creating so-called precedents for interpretation). If the judicial conflict is not regulated by any legislative act, then the judges rely on the previously adopted judicial decision on this matter. It is the existence of written statutory law and its significant role that distinguishes American law from English in many respects and brings it closer to Romano-German law.

"Legislation" as a source of US law, according to American scholars, includes **constitutions, statutes and administrative rules** that form a certain hierarchical system depending on their *importance, degree of certainty,* and *duration* [4, p.2]. These three forms of "written" law exist both at the federal level and at the state level.

Central to the US regulatory system is the United States Constitution. The US Supreme Court, and with it the highest courts at the state level, has long recognized that the US Constitution is not such a law as "all others." It is the basic law of the country, which determines the very foundations of society; the expression of a social contract that unites citizens, and the legitimation of power "[3, p. 300]. This document has existed for more than two hundred years, but the foundations of politics enshrined in it still have the same force as two hundred years ago. Until now, the US Constitution is considered one of the most stable in the world.

Statutes - ordinary or current laws - specify the basic provisions of the Constitution in order to ensure compliance with the rights guaranteed by it. "Administrative regulations" are adopted by executive authorities and form in conjunction with other administrative acts (instructions, orders, etc.) the so-called administrative law. R. David noted that this right is "semi administrative - semi judicial in nature" and accordingly consists not only of normative legal acts, but also of judicial and administrative precedents [3, p. 304-305]. Administrative rules can be defined as regulatory decisions adopted by administrative bodies and aimed at interpretation, specification of the main provisions of the statutes, although often these rules essentially replace laws, regulating issues subject to legislative resolution.

The hierarchy of normative legal acts implies their non-contradiction to

each other and the conformity of administrative rules to the statutes and the Constitution, and the statutes themselves - to the Constitution. The US Constitution has the highest legal force. In England, the establishment of the principle of the supremacy of parliament, unlike European countries, did not entail the establishment of the rule of law. Because of this, the English legal system never knew and does not know the hierarchical subordination of sources of law, headed by law [8, p. 79].

The US states also have a hierarchy of legal acts similar to the federal one: they have their own constitutions, statutes, administrative rules that do not contradict the federal one. In other words, all US regulatory legal acts can be divided into *federal acts and acts of federal subjects (states)*. The US Constitution enshrines the principle that the law falls within the competence of the states, while federal laws can be adopted only on certain issues identified in the Constitution (the tenth amendment to the US Constitution, adopted in 1791). Therefore, the scope of state law, especially on civil law, criminal law, the judiciary, is much wider than that of federal law. Each state, as a rule, has its own laws on civil, labor, criminal and procedural law, although American lawmakers seek to make them more or less uniform. In England, which is a unitary state, there is no such classification of normative acts.

The role of legislation in the system of sources of US law is much more significant than in England due to several factors.

Firstly, it is important to note that, unlike England, the United States did not have a period when law was formed solely by judicial decisions. Both in the colonial period and after gaining independence, the laws of the United States always had laws at both the federal and state levels.

Secondly, *the Constitution has always been and remains the pinnacle of the US legal system, the highest link in the hierarchy of its sources.* "In relation to general law, as well as in relation to legislation, the Constitution acts as the main, dominant factor influencing their nature and the nature of relations between themselves, as well as between the sources that form them in the form of laws, on the one hand, and court decisions - precedents - on the other "[8, p. 82]. The US Constitution, as well as the state constitutions, serve as "peculiar standards of lawmaking, scriptures, which can be interpreted by the court and which everyone must follow" [8, p. 83]. At the same time, however, the American Constitution itself has always been quite flexibly interpreted by the US Supreme Court. Lord Wright emphasized: "On the whole, it is clear that the strict rule of precedent observance does not fit the interpretation of the constitution, which must meet the changing circumstances of society and public poli-

cy. Words that are reasonable and fair at one time can become false and harmful at another. " [9, p.25]. At the same time, the Constitution cannot be considered on a par with other laws aimed only at "supplementing or clarifying the law of judicial practice", since the US Constitution is the basic law of a country in which "common law itself finds its force" [3, p.299].

In England, the Constitution of which has a complex, unsystematic character and is not presented in the form of a single written act, the existence of such a rigid hierarchy of constitutional and ordinary laws, as well as ordinary laws and other sources of law, was never envisaged. Due to the lack of a written constitution in England, the laws in it cannot be recognized as unconstitutional. And since such a provision may lead to a conflict of statutes, in order to avoid this, the English legal system establishes "the presumption of priority of a later law over an earlier one" [10, p. 74].

The presence of the Constitution as a single written act is associated with another important specific feature of the US legal system - the establishment and application of *the principle of judicial control over the constitutionality of laws*. The US Supreme Court and the state supreme courts are empowered to consider laws from the perspective of their consistency or inconsistency with the Constitution, and in the event of such inconsistency, these courts actually "invalidate" the law in question as an "unconstitutional" act, which makes the laws more dependent on court decisions. Although, according to the traditional English doctrine of precedent, the law, in turn, can cancel the precedent. In England, however, there is no system of judicial control over the legislative process and the legislation itself. No court can overlook the legal force behind statutes adopted by parliament. This follows from the principle of "sovereignty of the British Parliament" [See: 8, p. 78-79].

In general, American legislative law, as an alternative to case law, is intended to *formalize and systematize legal norms* both already developed in the bowels of case law and born in the process of legislative bodies. US statute law should be considered "not as a primary legal phenomenon, but as a focused reflection of judicial and administrative precedents that exists in parallel with them. As such, the main requirement for the legislation is the systematic nature of the legal material, which excludes or minimizes the gaps in law and ensures the completeness of the will of the legislative bodies." Researchers emphasize the importance of *codification of US law* as a way to overcome the shortcomings inherent in the case law of this country [11]. US federal statutes are published in the form of the United States Code, consisting of 50 sections, each of which is devoted to a particular branch of law or a large legal institution (for example, there

are sections "Congress", "Patents", "War and National Defense", etc.). Special editions of the U.S. Code are also issued in the United States, with references to key court cases and other material relevant to each paragraph. Thus, the United States Code Annotated is practically a working text of American law that plays a reference role on the whole range of sources of law.

Among common law countries, it is in the United States that codification is most widespread. A number of codes have been adopted here (civil, criminal, civil procedural, etc.), covering federal or state law, although these codes are very different from European ones. The codified nature of legislation is another peculiar feature that distinguishes American law from English, the main form of systematization of which is consolidation.

You must also consider the specifics of the law of individual US states. So, in the state of Louisiana, the former French and Spanish colony, *the legal system is mixed.* It includes elements of case law, but relies more on legislative practice. Louisiana law partly dates back to the ancient Roman tradition, and more specifically takes its roots from the Napoleonic code of laws adopted in France in 1804. Judges in this state are not required to follow a precedent, but are guided by the relevant statutory rule.

Thus, despite the common roots, English and American law are currently significantly different from each other. The main features of American law include the following:

- although American law is basically case-law, the rule of precedent (stare decisis) has never been so harsh as in England;
- american law is developing at two parallel levels - the federation and the states (in fact, in the USA there are 51 legal systems - 50 in the states and one federal, although they strive for uniformity), which determines, firstly, the precedent rule is valid within the judicial system of each individual state; secondly, the presence of federal and state law;
- more significant than in England, the role of regulatory acts led by the US Constitution and the strict hierarchical subordination of by-laws to laws, state acts to the federal; The US Constitution has supreme legal force both in relation to statutes and in relation to precedents;
- greater degree of codification and overall systematization of American law, in contrast to the casuistic nature of English law;
- establishment and application of the *principle of judicial control over the constitutionality of laws*, which is absent in English law.

In addition, certain differences exist in the branches of American and English law, for example, in constitutional and administrative law (in the USA there are various kinds of administrative commissions that are not

typical for England), in land law (in England it is more conservative and complicated), in labor law (American unions are different from English trade unions), in banking, procedural and others. K. Osakwe highlights such features of American law, also testifying to the "Americanization" of English law, as the peculiarity of American legal terminology; features of the American system of legal education and professional training of lawyers; features of the American structure of the legal profession and licensing of lawyers; exaggerated hope for jury trials; “Litigious paranoia”, that is, the exaggerated role of lawsuits in the American legal culture, especially in the field of tort law; the exaggerated role of the court in resolving social, philosophical, moral, scientific and technological issues of modern society, etc. [2, p. 71].

Of course, the above differences between English and American law cannot be absolutized. After all, both legal systems have a common foundation, and this is very significant. It is not by chance that England and America are called two countries, “divided” by a common language and common law [2, p. 71]. Nevertheless, American law is on the path to strengthening its identity and developing its uniqueness in the framework of a single common law family.

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L'INSTITUTION DU TEMOIGNAGE DANS LA PROCÉDURE PÉNALE DE LA RUSSIE PRÉ-RÉVOLUTIONNAIRE: GENÈSE ET VALEUR POUR L'ACTUALITÉ

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Malgré les tentatives d'instaurer dans le système juridique russe contemporain des elements de l'Empire russe, la connaissance de ses réalités est evidemment insuffisante, ce qui rend la suite des recherches de l'institution du témoignage actuelle pour son amelioration grace à la methode historique et juridique dans le cadre de l'approche diachronique de l'étude des matériaux. L'auteur est venu à la conclusion que les appels actuels de se detacher du principe de l'évaluation des preuves selon la conviction interne des juges représentent la regression et un élément des formes précoces de la procédure pénale, dont les éléments sont difficiles à combiner dans la même procédure pour tous les pays, où on essayait de conserver et employer telles structures.

Mots clés: témoin oculaire, vidok, témoin auriculaire, posloukh, témoin, perquisition totale, immunité testimoniale.

Il nous semble très important d'étudier des étapes de la formation et du développement de l'institution de témoignages du point de vue historique et juridique, dont la nécessité est acceptée par la plupart des chercheurs soulignant l'importance de l'examen des questions juridiques en vue de la rétrospective historique qui permet de prendre compte de l'expérience nationale de la formation de ce phénomène, représentant, dans notre pays, les caractéristiques issues des spécificités de la situation socio-politique du XX siècle, après laquelle la tradition juridique de l'Empire Russe à l'arrivée des bolcheviks au pouvoir et à la formation de l'Union Soviétique a été radicalement interrompue. Maintenant, la connaissance des réalités impériales laisse à désirer, même dans l'environnement professionnel des historiens, pour cette raison pour qu'il soit possible de discuter la question de l'emprunt de l'expérience de la réglementation juridique de l'Empire Russe et de la réception de ses institutions juridiques,

il est nécessaire d'avoir une idée correcte d'eux. Nous avons déjà détecté l'interprétation erronée des constructions du système juridique de l'Empire Russe, avec l'analyse dans notre travail des tentatives d'introduction de la figure procédurale de l'avocat à la procédure civile contemporaine, comme il était déjà indiqué dans notre travail [1].

Les questions de la position procédurale d'un témoin dans la procedure pénale contemporaine ne manquent point de l'attention des chercheurs [2;3;4], dans un certain nombre de travaux, les auteurs produisent une comparaison des règlements du droit de procédure pénale nationale avec les règles de la réglementation de procédure pénale des pays étrangers [5], il existe assez beaucoup de travaux différents au niveau scientifique consacrés à la réglementation de la disposition procédurale du témoin dans certains pays étrangers [6]. Nous connaissons certains travaux, où telles questions sont inclues dans quelque chapitres ou paragraphes et sont examinées par les auteurs avec plus ou moins de détails [7;8;9]. Il existe un nombre des œuvres dans lesquelles les témoignages du point de vue historique et juridique sont étudiés dans la structure d'autres moyens de preuve [10] et des preuves [11]. Une brève excursion de cette question est normalement présente dans les manuels de procédure pénale. Cependant, il n'existe pratiquement point de travaux scientifiques contemporains consacrés particulièrement à l'étude de la figure procédurale du témoin dans la législation pré-révolutionnaire. Les études intégrales consacrées particulièrement à la réglementation juridique de la position du témoin dans la législation pré-révolutionnaire ne sont pas actuellement suffisantes. L'analyse le plus détailé de la réglementation juridique du statut procédural du témoin se trouve dans les travaux des chercheurs pré-révolutionnaires: Y.I. Barchev, S.I. Viktorskiy, L.E. Vladimirov, M. V. Doukhovskiy, P. V. Makalinskiy, V. K. Sloutchevskiy, V. D. Spassovitch, G. S. Feldchtein, I. Y. Foynitskiy. Le travail fondamental du scientifique procéduraliste soviétique M.A. Tcheltsov-Beboutov “Cours de droit de procédure pénale soviétique. Des essais sur l'histoire de la cour et de la procédure pénale dans les États esclavagistes, féodaux et bourgeois” porte un intérêt incontestable [12].

En utilisant la méthode historique et juridique, dans le cadre de l'approche diachronique, qui permet de retracer l'histoire de la formation et du développement de l'institution du témoignage dans notre pays dans les époques historiques différentes, on peut noter que, en tant que personnage procédural, le témoin existait déjà dans l'ancienne Russie. C’est à partir de cette période qu’il faut commencer à étudier l’institution du témoignage, et non pas lorsqu’elle a acquis des caractéristiques analogues à celles du droit procédural contemporain. Le terme "témoin” a apparu beaucoup plus

tard, et à l'époque de la naissance il s'appelait par deux termes: "vidok[1]" et "posloukh[2]". Leur fonction principale dans la procédure, qui n'était pas alors divisé en pénal et en civil se differait: si le posloukh devait témoigner du caractère et de la réputation de l'accusé, le vidok était un témoin spectateur et donnait l'information sur les événements déclarés précités comme illicites dans les actes de droit coutumier. Bien que le posloukh puisse décrire ces événements ayant de l'information à leur sujet, ce qui a conduit au mélange terminologique de ces figures aux yeux des chercheurs contemporains, bien que dans le cadre réglementaire et juridique, leur confusion avec l'éviction du terme «vidok» n'ait eu lieu qu'au XVIe siècle.

La confusion terminologique au niveau de la confusion a apparue, à notre avis, pour deux raisons, premièrement, toute l'expérience historique et juridique de l'état ancien, selon les bolcheviks, n'était pas adaptée à la construction d'un état de «nouveau type», à cet égard, elle était peu étudiée au stade initial de la construction socialiste, mais les chercheurs pré-révolutionnaires ont fait des essays d'identifier ces deux types des temoins, ce qui peut être expliqué par les fautes possible dans les manuscrits des actes russes anciens, au tort des copistes et / ou du fait de la synonymie présente alors bien que fautive à tel moment.

L'institution du témoignage évoluait au fil des siècles et sa réglementation juridique peut être divisée en plusieurs périodes:

1. période domoscovienne;
2. période moscovite;
3. période Petrovskiy;
4. période de réforme.

Notre étude ne confirme pas l'opinion très répandue selon laquelle le droit russe ancien a emprunté les règles de la législation antique sur les témoins et leur témoignage. Il y a une certaine similitude avec les vérités féodales barbares d'Europe occidentale, mais elles sont mieux élaborées, ce que nous associons à l'influence directe de la tradition romaine, contrairement à son influence indirecte à travers Byzance sur nos sources de l'époque féodale. Il est intéressant qu'au début de la période moscovite, non seulement, la confusion des formes procedurals de posloukh et vidok a eu lieu, mais un nouveau moyen de la collecte de preuves sur la réputation et la manière de vie de l'accusé – perquisition totale, qui a bien duré jusqu'à la seconde moitié du XIX siècle, et même laissé ses éléments dans la legislation déjà améliorée et réformée, jusqu'à la même période il y avait un grand nombre d'éléments le système formel Petrovskiy de la preuve et des critères des témoins de bonne qualité.

[1]témoin oculaire
[2]témoin auriculaire

En général, nous sommes d'accord avec certains chercheurs (par exemple, M. Spassovitch), qui parlent de l'addition graduelle des règlements juridiques dans la réglementation légale du statut juridique du témoin des époques différentes, formant une contamination particulière et utilisés ainsi, jusqu'à ce que sous l'influence des idées libérales et du progrès social, entièrement preparé, le nouveau droit de procédure d'Alexandre II est venu à sa succession, qui était progressistes meme pour son époque, mais aussi dont les éléments peuvent être demandés à l'époque contemporaine.

Cependant le principe de la conviction intime du juge lors de l'évaluation des preuves et la constatation des faits inclus à l'objet de la preuve de l'affaire, typique de cette forme de procédure pénale, agirait correctement seulement à l'existance de la cour véritablement indépendante et à la sujétion des juges qu'à la loi. C'est pour cela qu'il faut lutter et défendre ces principes. C'est pourquoi, lorsqu'au cours de débats publics on essaient de rejeter ce principe, invitant à rendre la cour à l'évaluation de la preuve par la loi, et pas de la conviction intime des juges, des gens ne réalisent pas qu'ils appellent à régresser, et ce n'est pas la faute de ce principe, que la conviction intime de certains juges est formée à la base d'autres critères et exigences qui demeurent au delà des attitudes légitimes de l'étude et l'évaluation des preuves. Il faut noter que même les procéduriers pré-révolutionnaires soulignaient que le pouvoir de la répression pénale n'est appliqué que dans la mesure appropriée, lorsque les conditions de son application sont comprehensible et claires, et que le verdict de la cour se refère à la réalité et ne contredit pas le sens de la justice.

En raison du bon fonctionnement du droit procédural national, une grande partie du droit procédural contemporain a été empruntée de la doctrine procédurale de l'époque, ainsi que des règlements de la législation progressiste réformée, dès les principes à la procédure d'interrogatoire des témoins. Il faut noter également que la noblesse dans la législation Petrovskiy, la position publique et le haut statut social déchargeaient de la visite personnelle de la cour par tels témoins, ce que même dans la seconde moitié du XIXe siècle était considéré comme des vestiges de caste, rudimentaires à l'époque de la formation du procès sans caste et égal pour tous. Il est intéressant que la Cour Suprême contemporain de la Fédération de Russie a également accordé une telle opportunité [13], légitimant le mépris à quatre reprises par I. Setchine des exigences de la cour d'assister à un interrogatoire en tant que témoin dans l'affaire A. Oulioukaïev [14]. Telles circonstances sont perçues douloureusement par la société et interprétées comme un essai de renaissance du régime féodal ou des éléments, mais seulement dans les cas où l'information est médiatiquement diffusée. Dans

les cas où la société n'est pas au courant des certains règlements législatifs, il n'y a pas de résonance sociale active. On rarement sait, suite au niveau bas des connaissances juridiques, que le Code de la procédure pénale de la Fédération de Russie dans la version actuelle, par rapport au Code de la procédure pénale de la RSFSR de 1960, le principe de l'égalité devant la loi et la cour, présent dans la loi Fondamentale russe, n'est plus fixé comme le postulat principal. Il faut noter que le chapitre 52 «Caractéristiques de la procédure pénale concernant certaines catégories de gens» du Code de procédure pénale de la Fédération de Russie établit dix catégories de personnes à l'égard desquelles, en raison de leur position publique, un régime spécial de procédure pénale doit être appliqué.

Cependant, ce qui est maintenant certainement perdu, et ce qui était strictement pris en charge plus tôt tout au long de l'histoire de l'état russe et en ce qui concerne le témoin, et même en ce qui concerne l'accusé – ce sont des critères de réputation. Il faut noter que le posloukh était interrogé par rapport à la réputation de l'accusé, lors de la perquisition totale, lors de l'enquête de personnes intermédiaires, la réputation du témoin était également importante pour qu'il puisse être considéré comme un témoin crédible. Cette caractéristique de la preuve, que la validité et la fiabilité appliquée au temoignage tout au long de l'histoire du développement de l'institution du témoin était inextricablement liée à sa personnalité et interprétée par les entités qui administraient la justice, positivement ou négativement, suite de ses caractéristiques personnelles et de la réputation ou de l'espace dans la structure des preuves formelles.

Une société construite selon le principe élitiste hiérarchique, des mécanismes d'autorégulation d'entreprise inclus, et une censure éducative et culturelle pour avancer l'échelle sociale, et ne pouvait pas imposer d'autres critères.

La perte des critères élitistes et la transition à la construction de la société en 1917, basée sur les principes égalitaires, les caractéristiques de la biographie de certains représentants du parti des bolcheviks, la perception de l'élément pénal comme socialement proches, et pas de représentants de l'underground, et au cours de la phase initiale l'embauchage direct de cet environnement du personnel pour l'appareil révolutionnaire répressif nouveau, le stratocide des strates cultivés, au contraire, ont conduit non seulement au lancement des mécanismes de la sélection négative et du regroupement de la nomenclature selon le principe de la fidélité simulée, mais aussi à la destruction des mécanismes d'entreprise de l'auto-organisation de la société et, à la perte au niveau de la perception pratique de ses représentants individuels du concept d'honneur et de la conscience de l'importance de la réputation. L'une des conséquences, dans les

conditions de l'énoncé du principe égalitaire est devenu une manifestation de respect particulier pas aux qualités individuelles et personnelles et de réputation de l'individu, mais à sa position publique, ce qui a conduit à la distribution des privilèges par rapport à ça. Dans une certaine mesure les règlement du chapitre 52 du Code de procédure pénale de la Fédération de Russie peuvent être considérés, évidemment, comme une manifestation particulière de ce processus complexe.

V. A. Ilyine, dont patrimoine artistique important, à plusieurs reprises, était souligné par le Président de la fédération de Russie V.V. Poutine [15], a proprement noté que «la santé publique du pouvoir signifie la mise volontaire à la noblesse: au patriotisme, à la conscience, à l'honneur, au loyauté, au service» [16], ce qui entraîne automatiquement l'importance de la restauration de la réputation des critères et de leur valeur pour l'état. Mais bien que les mécanismes de réputation soient importants, leur rétablissement dans le droit procédural ne peut être séparé de leur rétablissement dans la société. Cependant, personne ne sait comment le faire, au niveau de l'establishment russe, il n'y a même pas encore de déclaration discursive de ce problème.

Ainsi, la théorie des preuves, où le témoignage joue un rôle majeur, est d'une grande importance pour le droit procédural pénal, dans lequel le droit de preuve est un sous-secteur. L'importance de la preuve est très grande: en fait, leur établissement et leur évaluation dans le cadre de la procédure constituent son essence, permettant d'établir des faits recherchés dans l'affaire. Les caractéristiques essentielles du processus lui-même dépendent de la façon d'estimation de la preuve par l'entité qui exerce la justice, et de la force qu'ils possèdent. Sur le territoire de notre pays on distinguent les processus d'accusation, de recherche (Inquisition) et de procédure contradictoire. Dans le premier d'entre eux, la cour n'a pas cherché la vérité dans l'affaire et ne l'a pas évalué selon la conviction interne, mais s'occupait de l'évaluation des espèces des preuves détectées et mises à sa disposition, y compris des témoignages.

La base du processus de recherche était un système des preuves formelles, conçu d'empêcher ou au moins limiter l'arbitraire judiciaire, par la fixation de leur hiérarchie dans la loi, cependant, en s'engageant excessivement et en suivant mécaniquement telles prescriptions législatives, la cour pour des critères formels (deux témoignages crédibles constituent la preuve parfaite, les témoignages des membres du clergé en tant que témoins ont plus de valeur que ceux des civiles, etc), déchargeait des criminels d'une responsabilité, même qu'à la certitude de leur culpabilité, s'ils révélaient suffisamment d'esprit en fournant des preuves nécessaires, qui étaient d'une grande valeur et importance pour la cour.

Réalisée lors du processus de la réformation à l'époque des grandes reformes du XIXe siècle, la transition de la législation de procedure russe à la forme controversée d'un processus, avec son principe fondamental de l'évaluation des faits et des preuves présentées pour leur établissement selon la conviction interne du juge, afin de déterminer la culpabilité/ l'innocence de l'entité dans la commission de l'acte illicite, est le principe progressif même pour son époque, et le seul possible maintenant. Dans les pays qui essayaient de passer de processus de recherché à la procédure pénale, dont la structure combinait de la conviction interne du juge dans l'évaluation des preuves formelles et la théorie des preuves négatives, c'est-à-dire celles qui étaient niées par certaines caractéristiques selon le critère de l'authenticité, en théorie, ont échoué, parce que les caractéristiques individuelles des situations particulières telles qu'aucune théorie, précisément structuré et logiquement construite qu'elle soit, on ne peut pas prévoir toutes les nuances de vie.

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TO THE ISSUE OF DEVELOPMENT OF CREATIVELY GIFTED CHILDREN IN A PRE-SCHOOL EDUCATIONAL ORGANIZATION

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In this article, the authors focused on development of gifted children in pre-school educational organizations. There have been the concept of "giftedness" considered in the article; the types of giftedness identified; the factors of development of giftedness at this age determined. The article focuses on the work of a teacher of preschool educational organizations to work with creatively gifted children of pre-school age; and forms and methods of development of gifted children of preschool age in a preschool educational organization; principles to be followed by a teacher for a development of gifted preschoolers.

Keywords: giftedness, creative giftedness, pre-school children, preschool educational organization

At present, more than ever, the problem of gifted children development is in the center of society's attention. Today there are quite a lot of publications that touch on the topic of giftedness of children of different ages. This is connected with the need of society for an extraordinary, nonstandard personality.

At the same time, we can state that there is still no general understanding of the nature of giftedness. Some scientists believe that all children are talented, while others understand giftedness as a gift that is given from above.

Today, more and more attention is paid to the early identification of a particular type of giftedness of children, and to the issues of education and upbringing of such children. We would like to note that in pedagogical literature, only certain aspects of different types of gifted children of preschool age are considered.

Many scientists, such as: D.B. Bogoyavlenskaya, N.S. Leites, A.M. Matyushkin, B.M. Teplov, A.G. Petrovsky, S.L. Rubinstein, and others, were engaged in issues of giftedness.

A number of scientists (D.B. Bogoyavlenskaya, Yu.D. Babayeva, A.V. Brushlinsky, N.S. Leites, AM. Matyushin, etc.) consider the concept of "giftedness" as a systematic, developing quality of psyche during life, and which determines a possibility of achieving exceptionally high results in one or more activities in comparison with other people [3; 10].

I.E. Yemelyanova defines the phenomenon of "giftedness" not only as a gift of nature, but rather as a purposeful process of developing certain inclinations, abilities, and personal qualities that may be hidden in individual children, but which must be developed and revealed through creating a favorable environment and inclusion in activities [5].

B. M. Teplov considers "giftedness" to be "a qualitatively peculiar combination of abilities, which determines a possibility of achieving more or less success in performing a particular activity" [9, p. 5].

According to T. N. Dzhumagulova and I. V. Solovieva opinions, a gifted person is a bright individual in its various manifestations [4].A. I. Savenkov in his book notes that a gifted child is a child who stands out for bright, obvious, sometimes outstanding achievements (or has internal prerequisites for such achievements) in a particular type of activity [12].

S. L. Rubinstein writes: "General giftedness is not only a prerequisite, but also the result of comprehensive development of an individual [11, p. 129].

M. A. Kholodnaya identifies six types of giftedness: 1) smart; 2) brilliant students; 3) creative (creative individuals); 4) competent; 5) talented; 6) wise [15].

L. S. Vygotsky noted creative activity from the position of human activity, in which a person creates something new, regardless of whether it is a thing of the external world or "a known construction of mind or feelings" that live and are found in the person [2, p.5].

According to N. N. Morozova, creative giftedness is expressed in nonstandard thinking, in a special, often different view of the world [3].

A. M. Matyushkin considers a creative type of giftedness. He notes the relationship between development of giftedness and a creative potential of a child. He considers giftedness as a manifestation of a person's creative potential. He's writing: "...you can't talk about giftedness at all. You can only talk about being gifted for something, for some activity..." [7, p. 29-33].

A. M. Matyushkin also notes that creative abilities of a person appear very early. The most intensive period of its development is 2-5 years. At this age, foundation of a personality is laid, and it already manifests itself [6; 8].

We agree with the opinion of L. V. Trubaychuk that " specifics of a pre-school age is that development of giftedness is carried out under the influence of a significant the other" [13, p.6].

I would like to note that pre-school childhood is not only a period of rapid development of all mental processes, but also a period of development and formation of abilities, formation of personal qualities, development of universal moral values by a child, his social adaptation in society, development of rules of behavior in society.

Development of giftedness in this age period is due to a number of factors:

1) natural inclinations:

2) socio-cultural environment in which a child is located, which he transforms and develops;

3) activities that a child implements;

4) child's activity in this activity.

Gifted children of pre-school age, who are able to show creativity, demonstrate outstanding abilities in one area, as a rule, do not differ from their peers in all other respects. However, giftedness covers a wide range of individual psychological characteristics. Often gifted children are distinguished by high curiosity and research activity. Gifted children demonstrate an increased concentration on something; they show perseverance in achieving their goal and final result. But they must also be taught to manage their time, organize their space, and develop social interaction skills.

We agree with the opinion of D. B. Bogoyavlenskaya, who notes that "speaking about development of giftedness it is necessary to create conditions for formation of internal motivation of activity, orientation on an individual and a system of values" [4, p.5-13]. We also agree with the point of view of V. D. Shadrikov, who notes that value of giftedness consists of determining creative efforts that lead a person to obtain a final result, i.e. to acquire a certain product [16].

There is an opinion that creatively gifted children do not need any help from adults, attention and guidance. But as practice shows, these children, due to their individual and age characteristics, are most sensitive to assessments and comments from adults.

E. Nikolaeva focuses on the fact that it is necessary to develop children's abilities from early childhood, but the actions of parents should take place "on time". Parents, in her opinion, should be sufficiently attentive and should be able to compare actions that he reproduces today with those that he did yesterday [9, p. 7]. In this regard, I would like to add that it is parents who can create an effective support in development of their child, because it is parents who know their child like no other.

Today, in the world of information technologies, a teacher acquires great demands from the society , in particular a teacher of a pre-school educational organization. A teacher should have not only professional skills and abilities when working with gifted children, but also have personal characteristics. A teacher of a pre-school educational organization when working with creatively gifted children should also possess such qualities as creativity, tact, self-control, goodwill, openness, etc.

The development of a creatively gifted child is influenced by several factors: a) place of residence; b) financial status of parents; C) health of a child; d) gender.

Creative giftedness is manifested and formed in activity. It is important to include a pre-school child in a pre-school educational organization in various activities. This, in turn, will allow you to avoid early specialization, and will allow you to manifest all inclinations and inclinations that are inherent by a child.

For the development of creative giftedness of children of pre-school age teachers of pre-school educational organizations should adhere to the following principles: a) scientific principle; b) the principle of visibility and clarity; c) the consistency principle; g) the principle of accessibility; d) the principle of transparency; e) the principle of activity; g) principle of individual approach.

There are also general principles that a pre-school teacher should use when working with creatively gifted children: a) the principle of developing and educating learning; b) the principle of individualization and differentiation in learning; C) the principle of the age capabilities of a preschool child taking into account; d) the principle from simple to complex.

It is necessary to respect a personality of a child of pre-school age on the part of adults, both parents and educators.

The teacher, as well as parents, should remember about self-esteem of a gifted child. Self-esteem can be either high or low. If we are talking about high self-esteem of a gifted child, we want to note that a child is characterized by: knowledge of his/her capabilities and abilities; rarely pays attention to words and reactions of adults; difficulties and problems in communicating with peers and adults. If we are going to talk about low self-esteem, we would like to draw attention to the fact that a child is usually not confident in himself/herself and his/her abilities; needs support from adults, and first of all from parents.

A creatively gifted children have a right to expect that their abilities and abilities will find understanding and support from their parents. In this matter, parents need to be honest with their child, not to project their own interests and inclinations, especially those that they could not implement themselves.

In this regard, we would like to note that a correct reaction to the actions and behavior of a creatively gifted child on the part of parents and teachers of pre-school institutions is necessary. After all, it is a positive attitude on the part of adults that serves as a factor for creative development of a child.

When organizing educational activities with children of pre-school age teachers of pre-school educational organizations should take into account characteristics of peculiarities of the space where classes for development of creative abilities in children are held, i.e. atmosphere and environment must correspond to a theme and type of a lesson. Children should be able to move freely in space, which should be equipped with all the necessary materials, which a child can use in their work.

Forms of development of creatively gifted pre-school children: group and individual classes.

The form of conducting classes on development of creative talent of pre-school children in a pre-school educational organization can be both traditional and non-traditional. But regardless to a choice of the form of a lesson, a teacher of pre-school education should pay attention to safety of children in a group: to explain children rules and safe methods of work, the order of placing tools and materials on the table.

A pre-school teacher should give a child with a creative gift freedom to choose activities and methods of actions.

In their activities, teachers of pre-school education can use practical methods of working with children to develop creative abilities: a) exercises as a repeated practical exercises and mental actions by a child; much attention is paid to creative exercises; b) the game method.

Among visual methods used by a teacher, first of all, we will mention observation, which involves viewing drawings, paintings, filmstrips, etc. Among verbal methods we would distinguish: stories, retelling, conversation, reading literature.

Great attention is paid to construction of entire system of teaching creatively gifted pre-school children fine arts: drawing, modeling, construction, applications. Via visual activity, a pre-school child, in particular a creatively gifted child, learns about the world around him/her, learns elements of social reality, and also learns to convey his/her feelings, impressions and thoughts.

We would like to focus on such an issue as creative imagination, which is necessary for manifestation of creativity. For example, we would like to consider this aspect on the example of children of senior pre-school age in pre-school education, because children of this age should be able to navigate situations in which objects, images, signs, etc. are transformed by the time they enter school.

To develop creative imagination of older pre-school children, you can use the following methods:

- first, the enrichment of child's life experience via reading fairy tales, short stories, viewing illustrations in books, etc.

- second, ask children to draw what they saw, what they experienced, etc.;

- third, encourage drawings and modeling according to a plan, if necessary, initially discuss a planned plot with the child;

- fourth, encourage children to write fairy tales, stories, poems;

- fifth, use the possibility of children using all sorts of constructors, etc.

Also, a pre-school educational organization should also provide working with parents to develop creatively gifted children. In this direction, we can distinguish such forms of work as: joint creative projects of parents and children, master classes for parents.

Thus, we adhere to the opinion of I. E. Yemelyanova and understand "giftedness" as a purposeful process of developing certain inclinations, abilities, and personal qualities that may be hidden in individual children, which must be deployed, disclosed via creation of a favorable environment and inclusion in activities.

A gifted child is distinguished by bright, obvious, sometimes outstanding achievements or has internal prerequisites for this in a particular type of activity.

Creative giftedness is something that manifests itself in a non-standard vision of the world, in unconventional thinking.

Natural inclinations, socio-cultural environment in which a child is being brought up, which he transforms and develops; activities that a child implements;a child's personal activity – these are factors that affect development of giftedness in children, in particular-children of pre-school age.

The form of conducting classes with creatively gifted children of pre-school age in pre-school educational institutions can be traditional or non-traditional; group or individual. Using a variety of methods makes it possible to maintain a child's good performance in the classroom. It is necessary to give a of pre-school child with a creative talent freedom in choosing activities and ways of action.

Much attention is paid to fine arts in construction of a system of training, education and development of creatively gifted children of pre-school age in pre-school educational institutions.

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THE TECHNOLOGIES OF PERSONALITY-ORIENTED LEARNING IN THE RUSSIAN POST-GRADUATE SCHOOL

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The article discusses the problem of technology of personality-oriented learning in post-graduate school. The implementation of technologies of personality-oriented learning is an urgent need for the Russian post-graduate education since it satisfies demand for highly trained specialists and contributes to their competitiveness in the labor market. The authors offer a project-oriented method as a promising pedagogical technology of personality-oriented education (learning).

Keywords: educational process, subjects of the educational process, pedagogical technologies, personality-oriented learning, project method.

The implementation of personality-oriented learning technologies in the Russian system of post-graduate school is primarily related to the urgent need for highly trained specialists. The policy of implementing quality training, expanding the space of educational technologies and opportunities contribute to high competitiveness of the university in the market of educational services as well as graduates in the labor market.

The modern society of information is constantly transforming and disrupting; hence it needs specialists having enough intellectual capital and who can think systematically, creatively, independently, be flexible in their thoughts and building logical conclusions. Such abilities allow to comprehend large amounts of information, make informed decisions and bear responsibilities for desired outcomes.

The educational process of post-secondary learning is a holistic and dynamic system. A high-quality education is the ultimate goal of this pedagogical activity.

Accordingly, the educational process can be considered as a focused activity on training, education, personality development through organized training and cognitive processes in conjunction with self-education which reinforces the absorption of knowledge and hones related skills at a level no lower than the established federal government's educational standards.

Given that the modern society demands highly skilled, mobile specialists with specific professional competencies who can resist stress, able to properly articulate themselves and make responsible decisions and bear related responsibilities, the educational process of post-secondary education should be focused on the formation of a moral personality capable of learning, analyzing, predicting, selecting and standing up to difficult life situations. The creation of such a specialist through a university is possible using personality-oriented learning technologies in the educational process of post-graduate school.

In the Russian system of post-graduate education, a special attention is paid to the didactics of personality-oriented technologies and realization of its necessity in the educational process.

It is important to consider the methodological system of personality-oriented learning at micro- and macro-technologies [5].

The micro-technology of personality-oriented learning is a joint model of educational and pedagogical activity of designing, organizing and conducting the educational process. The concept of personality and the basic approaches to its study are in the centre of this model. The concept of personality is a fundamental general psychological problem. It is customary to understand it as a stable system of socially significant traits that characterize an individual as a member of a society or community.

The macro-technology of personality-oriented learning reflects a scenario and individual trajectory of the professional activity of educators and students, directed at the implementation of the methodological training system for a specific discipline (course), in which the favourable conditions for self-education, self-realization, creativity are created, taking into account the specifics and individual psychological features of the involved.

The personality-oriented learning is based on the most important principles of pedagogy: self-actualization, individuality, subjectivity, choice, creativity and success, trust and support [4].

Currently, the scientific interest is focused on one of the most promising pedagogical technologies – the project (design) method. This technology of the educational process contributes to the development of the student's personality and intellect to such an extent that the student is able not only to think independently and critically [3], but also to generate new ideas. This method as one of the pedagogical technologies of personality-oriented learning forms and supports the positive motivation of the student to cognitive activity [1].

The project method is a complex, system-based, complex-organized activity implies different levels. The level depends on learning by the subject of educational process the following components:

- operational-technological (scheme 'problem – idea – organization – realization);
- cognitive (scheme 'design – realization – reflection);
- outlook-based (learning the procedure of self-identification – value-based self-definition in socio-cultural project);
- each level corresponds to the relevant approach to project-making, including socio-technical, socio-cultural and humanitarian.

Socio-technical approach reflects the minimal level of subjectivity of its implementers, because the problem formulation and an idea of its solving lay beyond their competence. It mean impossibility of the results achieving in activities by usual means.

Socio-cultural approach includes two key principles: cultural framework and communication (dialogue-oriented activities). The key characteristics of such project – the existence of cultural prototype and the students' capability to relate their activity, its goals, means and results with reflection while describing the project. In other words, to reflect the own activity, to recognize it fully.

The essence of humanitarian approach lies in fact that the participants of the project seek to find and realize the key value – a vocation. It's necessary for participants to interact with teachers, that plays a role of the collective subject of project-making. The problem has dual character – on the one hand, it's necessary to support some value, that lays in the foundation of chosen socio-cultural project, on the other hand, there is a contradiction between a desire to realize some ideal value and the current position of student as a subject of project-making, the conscious necessity to change this position.

There are several different conceptions in Russian education system.

The first is based on pedagogical works of John Dewey. The project method was created in the US at the beginning of the XX century. The

origins of the project method lies in idea of humanist school in philosophy and education, with the works of American philosopher and pedagogue John Dewey and his student V.H. Kilpatrick. The method implies the actualization of personal interest of student to the particular disciplinary knowledge, motivated by goal-seeking activities and emerging obstacles during them.

The second conception is based on methodology typical for developed countries of Europe and USA based on 'project management' as a practice of social change. The project-making is individual-oriented and is considered as the independent activity of student, with the key goal of problem-solving, theoretical or practical one, while the problem is a resulting product that can be seen, recognized, applicable in real practical activity.

The third school is based on tradition of Russian scientific thought, that is reflected in the works of many Russian outstanding scholars, such as V.I. Vernadskiy. The aim of this conception is to develop educational programs and projects on the base of research activities of students. The key rationale is applying the scientific way of cognition for the development of independent actions capabilities in contemporary world. Scientific inquiry is oriented towards reaching a new knowledge, while learning-research one has the aim of studying methodology of organization of scientific research.

The use of pedagogical technologies of personality-oriented training, such as the project (design) method, allows to satisfy the need for high-skilled specialists, contributes to their competitiveness in the labour market and, most importantly, forms an independent, systematic, flexible and critically-thinking specialist who is able to make informed decisions and bear responsibilities.

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LES AVANTAGES ET LES INCONVÉNIENTS DE L'ENSEIGNEMENT EN LIGNE AUX GRANDES ÉCOLES RUSSES

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L'objectif de l'article est d'analyser l'expérience des grandes écoles russes d'essayer l'enseignement en ligne pendant l'épidémie de la COVID-19. On compare les points forts et les points faibles de ce système et donne des recommandations pour rendre le processus de l'éducation plus efficace.

Mots clefs: enseignement en ligne, motivation, communication, éducation, resources numériques, autonomie.

L'enseignement à distance, également appelé e-learning, est une forme d'enseignement qui s'adresse à un public large et touche des domaines variés. Il ne se déroule pas dans un établissement scolaire et est réalisé sans la présence physique d'un professeur. Plusieurs structures proposent des formations à distance. Les conditions d'inscription et le coût peuvent varier en fonction de l'organisme choisi [3].

En choisissant ce type d'enseignement les étudiants se préparent normalement à ses traits spécifiques.

Les services universitaires en charge de l'enseignement à distance ont pour mission de diffuser les contenus de connaissances à leurs étudiants et de les accompagner tout au long de leur processus de formation. L'étudiant travaille à partir des ressources qui lui sont fournies et bénéficie de dispositifs d'accompagnement divers selon les types de formations et les établissements. Les moyens de communication entre l'étudiant et les équipes enseignante et administrative, qu'il s'agisse du transfert des contenus des cours ou des services d'accompagnement, s'appuient sur des outils variés (courrier postal, Internet, téléphone, fax…). Le contenu et l'organisation des études peuvent varier d'une université à l'autre (nombre de regroupements et suivi pédagogique, type d'envoi des cours, coûts, modalités d'examen…). Il n'est en général pas nécessaire de résider à

proximité de l'établissement choisi pour s'y inscrire. Cependant vous serez sans doute amené à vous déplacer au moins une ou deux fois pour des regroupements et les examens [1].

En raison de la pandémie toutes les écoles et les universités sont fermées pour minimiser les risques et arrêter la propagation de la COVID-19.

À partir du 14-15 mars on a recommandé à toutes les universités de passer au format de travail à distance… Si nous prenons les universités subordonnées au ministère des Sciences et de l'Enseignement supérieur, qui sont situées en Fédération de Russie, 100% d'entre elles sont passées au format de travail à distance avec les étudiants [4].

Dans ces conditions tout le monde est obligé d'essayer l'enseignement en ligne, même si on n'y est pas tout à fait prêt. Analysons les avantages et les inconvénients du nouveau système de l'enseignement. Cela nous permettrait de non seulement améliorer le travail à distance, mais aussi de comprendre auxquels moyens de l'enseignement à distance on peut recourir pour rendre le processus de l'enseignement ordinaire plus efficace.

Poursuivre des études à distance, partiellement ou totalement, c'est possible grâce aux ressources numériques, et ce, dans de nombreux domaines d'enseignement [2].

Les formations à distance ont bien souvent recours aux nouvelles technologies de l'information et de la communication, en particulier pour assurer un tutorat en ligne [2].

D'abord il faut énumérer les moyens auxquels on recourt pendant la période de l'enseignement à distance.

Chaque université en Russie a choisi ses propres logiciels et applications pour continuer le processus de l'éducation. En générale nous pouvons les diviser en 4 groupes:

- moyens de communication (par exemple WhatsApp)
- logiciel qui permet d'organiser des classes virtuelles (per exemple zoom)
- moyens d'échange de travaux écrits (e-mail)
- ressources d'information (pages internet, dictionnaires en ligne etc.)

Tous ces moyens ont rendu nos cours presque les mêmes comme avant le confinement. Selon les avis de quelques étudiants, la qualité de l'enseignement a augmenté. D'autres attendent avec impatience la possibilité de rentrer dans la salle d'étude pout reprendre les activités habituelles.

Après avoir analysé les avis des professeurs et des étudiants nous avons pu définir les avantages et les inconvénients de l'enseignement en ligne.

Parmi les avantages de l'enseignement en ligne on peut nommer:

1. Individualisation de l'enseignement. L'échange constant de messages a permis de poser plus de questions et d'obtenir les explications du professeur ce qui a aidé les étudiants ayant des problèmes, à son tour à se sentir plus sûr psychologiquement.

2. Liberté du choix. L'enseignement à distance a donné la possibilité de choisir l'emploi du temps, l'heure et l'endroit du travail.

3. Plus d'autonomie.Les devoirs utilisés au cours du e-learning étaient orientés plutôt vers la recherche de l'information, la synthèse et l'analyse. La plupart du travail a dût être accompli par l'étudiant lui-même d' une manière autonome.

4. Plus d' indépendance. Malgré les délais à respecter, les étudiants ont obtenu la possibilité de gérer leur temps, de ne pas venir à l'université, de plus dormir et de mieux se reposer.Ce qui a donné de bons résultats.

5. Créativité. Cette situation a favorisé la créativité des professeurs qui ont dû inventer des devoirs originaux pour stimuler les étudiants, en même temps les étudiants sont devenus aussi plus créatifs en faisant leurs devoirs individuels.

6. Plus de motivations. Certains étudiants ont noté qu'ils s'acquittaient des tâches habituelles plus volontairement en se sentant moins contrôlés.

Néanmoins, beaucoup de professeurs et d'étudiants ont eu beaucoup de problèmes pendant la période de l'enseignement à distance, parmi lesquels:

1. Manque d' interaction. Sans la possibilité de venir en classe et de rencontrer des collègues certains étudiants se sentaient abandonnés et stressés.

2. Moins de communication. Discuter en classe a provoqué le sentiment de l'isolement.

3. Trop de travail écrit. C'est non seulement le problèmes des étudiants qui doivent écrire beaucoup, mais aussi des professeurs obligés de passer des heures à corriger les travaux.

4. Impossible de contrôler le résultats. Plusieurs étudiants sont devenus de vrais hackers, en trompant le système de contrôle. Contrôler certaines activités des étudiants est devenu presque impossible.

5. Autodiscipline. Pour faire des études en lignes il faut être hyper-discipliné, ce qui n'est pas le cas de certains étudiants.

6. Manque de motivation. L'absence de nécessité d'assister aux cours provoque de temps en temps l' absence de motivation.

Par suite, nous essaierions de proposer des conseils pour améliorer l' enseignement en ligne.

Premièrement, on peut utiliser des outils tels que des tableaux de messagerie, des conférences vidéo pour donner aux élèves l'impression qu'ils parlent à des personnes réelles.

Puis, il faudrait augmenter le nombre de devoirs en groupes. La collaboration en groupes favorise la communication entre les étudiants et imite le travail en classe traditionnelle.

En plus, il vaudrait mieux déterminer strictement les délais pour chaque devoir pour stimuler les étudiants.

Aussi on peut utiliser des manuels numériques et des applications permettant de corriger les testes automatiquement. Ainsi nous pouvons diminuer le temps de correction.

L'expérience de l'enseignement en ligne nous a fait regarder un peu autrement le processus de l'éducation. Voilà les spécificités de l'enseignement en ligne, qu'on peut utiliser en classe:

- donner plus d'autonomie aux étudiants, en favorisant leur travail individuel,
- plus de devoirs créatifs
- la possibilité de choisir de prendre la décision pour être plus motivé.
- utiliser les ressources numériques (les sites internet, vidéo etc.)
- utiliser des applications pour se préparer aux testes
- continuer à utiliser le logiciel (4 groupes de logiciels qui aidaient lors du télétravail peuvent être également utilisés en tant que de nouveaux outils parallèlement au travail en classe)

Dans les conditions de notre système plutôt classique où les étudiants sont trop guidés par les professeurs cette expérience semble positif et utile. L'enseignement en ligne nous a permis de nous orienter vers l'étudiant, d'être plus flexible, laisser les étudiants suivre leurs propres rythmes, leur rendre plus indépendants. Il nous semble logique de considérer cette expérience comme la possibilité de s'adapter aux nouvelles conditions de la vie, d'apprendre de nouvelles manières d' interaction, de devenir plus proche aux étudiants.

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TO THE PROBLEM OF DISTANCE LEARNING

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The article considers the controversial issues of the organization, of course, relevant to date, distance learning. In addition to the undeniable advantages of the educational process based on computer and information technologies, the article focuses on the unresolved problems of online learning, related to the inability to fully realize the non-verbal means of interaction between teachers and students and to provide energy exchange between the subjects of the educational process. The most unclaimed elements of the non-verbal system of interpersonal interaction in the organization of distance learning, in our opinion, should include its specific forms such as eye contact and physical contact inherent in the tactile-kinesthetic system of informational-personal communication. Along with energy exchange, it is these components of interpersonal interaction that, in the opinion of the author, largely explain the influence of the personality of the teacher in organizing the educational process.

Keywords: information technology, distance learning, online learning, interpersonal information interaction, non-verbal aspects of information communication

The paradigm of knowledge-based education that emerged in Europe more than 10 centuries ago and provides the One-fit-all approach (the educational system is oriented towards the average schoolchild), has undergone significant changes at the turn of the XX and XXI centuries. The basis of these changes is not only the emergence of a new pedagogical paradigm based on the recognition of the individuality of the child, the formation and development in them of the desire for self-expression and creative search, but also the emergence of educational computer systems. The first logical system is considered to be the "Logic-Theorist" program, whose work was first demonstrated in August 1956 [3].

Since then, the number of teaching computer systems has grown immeasurably, and the concept of “Lifelong Learning” announced in the global educational space urgently requires students and teachers to be able to work remotely using training programs based on modern computer and information technologies. A significant role in the development of the distance learning process was played by the current pandemic and, associated with it, the regimen of self-isolation. Students, schoolchildren, teachers and parents were urged to master the technical means of modern information technologies, which were previously used occasionally in the educational process. At the same time, the task of methodological support of the educational process arose before the subjects of the educational information environment. Under the methodological support of information technologies in the field of education is understood as “the most effective organization of the educational process on the basis of modern information technologies” [6, p.297]. At the same time, the widespread forced use of modern information technologies, often unprepared and chaotic, negatively affected the learning outcomes. As indicated at the time by Yu.R. Mukhina, the basis for using ready-made educational computer technologies should be methodological complexes that rely on “federal state educational standards and other state regulations, as well as educational and methodical complexes in disciplines and not contradict them. This component is the basis for the competent and effective use of computer technology in the learning process ”[6, p. 297]. Today, recognizing the general existence of such a base, it is necessary to note the technical imperfection of a number of educational platforms used in the Russian Federation, and the lack of psychological and technological readiness of both students and teachers, especially the older generation of the teaching staff, to use these platforms. Nevertheless, the influence of information technology on the formation of the domestic education system is inevitable, since the capabilities of these technologies greatly simplify the process of transfer, assimilation and control of knowledge. The area of application of computer systems, the Internet, and such wireless networks as Bluetooth and Wi-Fi is growing. The growth of "smart" devices such as smartphones, tablets, televisions, and tiny devices as part of the Internet of Things is growing rapidly. The national project "Education" is being prepared, which will function as a single educational platform within the Russian Federation. Artificial intelligence is actively being introduced into the process of group learning. For example, it is used to recruit groups of students with the same level of knowledge, organize web conferences, conduct lectures and seminars, online meetings, presentations, etc.

Among the various areas of use of information technology in the learning process, the following can be identified: presentation, perception and processing of information [13], the collection, storage and systematization of educational material; modeling of objects, processes and phenomena; work with electronic encyclopedias, dictionaries, textbooks, training programs and developing computer games; receiving and posting information on the Internet; computer control of knowledge [6]. In our opinion, the most problematic part of the learning process, based on the use of information technology, is the stage of transmission and receipt of information, which in real time involves the active interaction of the teacher and the students. As a number of researchers have noted, relations are a structural element of interaction. And, although interaction and attitude are not reducible to each other, we note that a theoretical and empirical analysis of these processes can proceed only in their inextricable unity and taking into account their mutual influence on each other (V.N. Myasishchev, A.A. Bodalev, B. F. Lomov). Living emotions, ideals, values, the teacher's conviction behind the procedure for presenting new material is what largely determines the nature of the interaction and relationships of the teacher-mentor and students, and what online learning cannot fully provide. However, this does not exhaust the depth of the stated problem, since the interaction that occurs exclusively with the activity of two subjects of the educational process is not only a verbal act, but also a nonverbal form of information transfer.

The problem of interpreting non-verbal aspects of interpersonal interaction as a means of transmitting information has been actively developed since the 60s of the last century (J. Fast, M. Krichli, C. Morris, A. Piz, I.N. Gorelov, G. A. Kovalev, V. A. Labunskaya, A. A. Leontiev, B. A. Uspensky and other). A little later, there were works devoted to the study of the role of non-verbal communication in pedagogical activity (V.A. Kan-Kalik, G.A. Kovalev, L.M. Mitina, N.D.Nikandrov, E.A. Petrova, M.M. Rybakova, Yu.V. Senko, V.E. Tamarin, and others). To date, it has been proven that the non-verbal component of communication between the teacher and the students is in some cases more informative and effective than the verbal.

According to literature data, in information communication, the ratio of verbal and non-verbal components is correlated as a percentage of 35% to 65% (R. Birdwissl, A. Meyerbian and others). Moreover, as A. Meyerbian established [8], only 7% of information is transmitted using words. Due to sound means, first of all, voice intonation, - 38%. And nonverbal means of communication transmit 55% of the information. According to A. Piz [9] himself, 97% of information is perceived by us using non-verbal signals.

Somewhat different data are given in the works of domestic researchers. So, according to Kukushkin, the amount of information received through the non-verbal channel is from 60 to 80% [4, p. 248]. The data of T. P. Usoltseva and T. G. Grigorieva [14] indicate that through gestures you can transmit up to 40% of the information. The same 40% of information transfer M.M. Rybakova assigns intonation to speech in adult communication and adds that when communicating with children, the influence of intonation increases [11]. Although the indicator of the non-verbal component in domestic studies on the problems of non-verbal communication is somewhat lower than in foreign ones, it nevertheless remains either predominant or equivalent in relation to verbal means of communication. “Body language is more truthful than the language of words” - Horst Rückle rightly observes (12, p. 9).

As follows from literary sources, in the works covering the problem of non-verbal aspects of interpersonal interaction, different terminology is used: "non-verbal intercourse", "non-verbal communication", "non-verbal behavior". Therefore, it was advisable to find the most accurate definition reflecting the essence of this phenomenon and showing the relationship of the indicated definitions. In our opinion, the most accurate is the definition of V. A. Labunskaya, according to which “non-verbal communication is a type of communication that characterizes the use of non-verbal behavior and non-verbal communication as the main means of transmitting information, organizing interaction, forming an image and concept of partner, exercising influence on another person ”[5, p.102].

Among the numerous classifications of non-speech communication components within the framework of this article, the classification of M. R. Bityanova is of particular interest [1]. Depending on the sensory channels of information, the author distinguishes between optical and acoustic communication systems. Without dwelling in detail on the characteristics of each of them, we note that in addition to gestures, facial expressions, postures, gait, etc., one can attribute such a specific form of nonverbal communication as eye contact to the optical communication system. In addition, according to M.R. Bityanova, another system, which the author calls kinesthetic (tactile-kinesthetic), has informational value. It includes physical contact in the form of touches, stroking, patting, shaking hands and allows you to emphasize the emotional side of interpersonal communication, despite the fact that its impact is limited by a number of sociocultural, status, age and gender factors. All of the above elements of the designated systems of non-verbal communication are partially or fully absent in online learning.

And finally, another, little studied, not fully understood and therefore largely controversial aspect, absent in online technologies. We are talking about energy exchange between subjects of interpersonal interaction, which has recently been recognized as one of the basic human needs [7,10,12].

Thus, recognizing the undoubted advantages of information technology as a means of obtaining information and controlling knowledge in the learning process, we should recognize their extreme inconsistency in the implementation of the non-verbal aspect of the transmission of this information and the complete absence of the energy exchange process between the teacher and students. Although it is these components of interpersonal interaction that largely explain the influence of the personality of the teacher in the organization of the educational process.

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THE WORLD OF CHILDREN IN CHINESE LITERATURE

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The least studied area of world fiction is children's literature in China. This is evidenced by the increased interest of Russian literary scholars and translators in the works of modern Chinese literature over the past two decades. A similar picture coincides with global trends: in the beginning of the XXI century, children's literature became one of the most significant segments of the market for fiction publications. The article presents a brief excursion into the history of the development of Chinese literature for children; the world of children is revealed by means of artistic expression.

Keywords: fiction, children's literature of China, the world of children, Chinese writers.

Over the past decade, activities have intensified in the translation into Russian of the works of art by contemporary Chinese writers. In the ever-increasing stream of literature translated from Chinese into Russian, the works of Chinese writers stand out in particular, in which the original world of Chinese children is revealed to Russian readers by artistic means.

Children's literature - is a special artistic world, in the creation of which the authors of works use expressive means as a kind of "key", necessary for understanding the world of children hidden from the adult world, as a "guide in the maze" of the child's consciousness and thinking. The world of childhood in the context of the "artistic world of children" is ontologically determined by the sequence of changing events, in the field of which the potentials for existential perception and experience of children surrounding reality are deeply hidden. Revealing the inner world of a child in a work of fiction, writers reproduce the personality-activity and axiological nature of personality formation [6]. The main parameters of the "inner world", according to D. Likhachev, have "their own meaning, artistic space and time, "psychological world", social structure (different view of the author and the real social structure), "moral side", the relationship

between the environment and the characters, connection with the spiritual or everyday environment" [3, p. 76-79, 83-86].

The idea of the "artistic worlds" of works of art is closely connected with the national tradition of studying spiritual culture that emerged at the end in European culture of the XIX century. This era became the "starting point" for the beginning of research in literature and in the philosophy of the inner world of man by explaining the world through the human "I" and revealing its multidimensional nature, describing the mobile and contradictory nature of man (searching for meanings, describing feelings and doubts, asking about the essence of being etc.). A natural continuation of the search for the internal foundations of the essence of the human soul is an interest in *the world of childhood* - in the framework of this article we imply the artistic reality created by the writer, described from the point of view of the child. The main dominant of the "world of childhood" is its "axiological component", since the child's free view of reality on stereotypes and ideological norms creates a position in relation to the outside world that allows the author to structure the event world of the work in a special way, checking the relevance of moral values in society through value -motivated child's attitude towards them, determine the degree of their truth.

It is these components of the world of children in the fiction of Chinese writers of XX – XXI that we will interpret in this article.

The typology of the artistic world of childhood can be divided into three groups: the first – works *directly addressed to children* – literature that carries out a cognitive and educational mission using the language of artistic images; the second group – literary works addressed to children, in which they are *told about the life of their peers; the third group* – autobiographical works in which the authors *describe their childhood*, most often presented in *chronological order*. In the framework of this article, we will consider the second and third groups of literary works as the most expressive for illustrations.

Plunging into the artistic world of children, a discourse arises: is this an adult invasion of the territory of childhood or is it a study of the territory of childhood? We are inclined to believe that if a work of art is autobiographical or has traces of some autobiographical, then in this case we can talk about the author's research reflection. In another case, when a writer creates a work within the framework of censorship or an "ideological order" of his era, we can talk about an "invasion" of the world of childhood, since the author's pen supports the diverse stereotypes of that society, which is the main background of the narrative (gender and value attitudes, national traditions and customs, etc.).

The history of the formation of children's literature itself in China is not very long. Chinese literature, being the oldest in the history of mankind, is almost four thousand years old. Its occurrence is allegedly dated to the XVIII century BC. Among the classical works of ancient China, there were no books specially written for children, or depicting them. However, traditional Chinese literature has always been didactic and has educational and upbringing functions. The Confucian texts that the children comprehended as their first books were “The Canon of filial piety” (“孝經” - “Xiao Jing” composed in the 4th – 2nd century AD represents a collection of teachings that Confucius addressed to his beloved disciple Zeng -Zi (曾子)). The book “Twenty-Four Examples of Filial Piety” (“二十四孝”), presumably compiled by Guo Jujing (郭居敬) during the Yuan Dynasty, developed the basic tenets of the “Canon of Filial Piety”. Not only the full text of this work has been preserved, but also engravings depicting the stories described, which have similar names.

A feature of Chinese literature was that it created several Confucian books specially adapted for children (at the same time they served as textbooks and were also obligatory for memorization): “Three Words” (“三字经” - “San Tzu Tzing”), “Thousand Words” (“千字文” - “Qian Zi Wen”), “One Hundred Surnames” (“百家姓” - “Bai Jia Sin”).

In the years 1922-1937 the first magazine for children “The World of Childhood” was published in China (Ertun Shijie - 儿童 世界). Its author Zheng Zhendo [郑振铎] - literary critic, writer, and public figure. The magazine published children's stories, tales, poems, including foreign writers translated into Chinese.

After 1949, children's literature became the most important tool for ideological education for the new government, at the center of which were the principles of communist morality, the ideas of patriotism, the struggle for freedom and justice. Heroes of literary works had pronounced ideological characteristics. The subjects of works for children reflected the most important events in the life of young China: the historical past, the pioneer movement, and life. Examples of such literature were the works of Gao Yu Bao [高玉宝] “I want to study” (“我 要 读书”), Ke Lan and Zhao Zi [柯 岚， 赵子] “Immortal Wang Xiao He” (“不朽 的 王小 和")， Lu Da Zhong [卢大容] “The day I was in prison with my dad” (“我 和 爸爸 一起 坐牢 的 日子”), Chu Cheng [楚 成] “The Secret of the Ruined Temple” (“毁毁 之 谜”), Bai Hua [白桦] “Bamboo Whistle” (“竹 哨”), Sun Jik Qi [孙子孙] “Little Cow Chief.” (“小 母牛 领袖”), Ma Feng [梅 凤] “Han Mei Mei” (“韩梅梅”), Bian Zu Fan [边 祖 凡] “Useful work” (“一件 有益 的 事”), Zhang Yu Dae [张裕 大] “Bricks”, Jun Qi [君 琦] “Who is the killer?” (“谁 是 杀

手?"), in which, as an example for imitation, the images of ideal children are described.

In the middle of the 20th century, Lin Haiyin [林海音], a memory novel "The Old Time in the Southern Suburbs", 城南旧事 ((1960) appeared, which became one of China's most prominent writers. Written in the first person, the novel allows the reader to perceive everyday life through the prism of the child's worldview. The novel was translated into 7 languages, including English, German, Japanese and Russian.

Since the 80s of XX century in China, the flowering of children's literature began. During this period, many prominent children's writers appeared, such as Ye Shentao [叶圣陶], Bin Xin [冰心], Cao Wenxuan [曹文轩], Shen Shishi [沈 石溪], Yang Hongying [杨红 樱], Zheng Yuanjie [郑元杰], etc., whose work revealed to the readers the world of children.

As noted by the famous Chinese literary critic Chen Xiaoming in the book "Trends in Contemporary Chinese Literature", during this period many outstanding works were written that told about children, about the process of their growing up and their further fate [11]. Among the best works of this period are "Little Orange Lantern" ("小橘 灯") Bin Xin [冰心], "The Distant Origins of the Yellow River" ("遥遥 黄河 源") Chen Li [陈丽], "The Wind Blowing from the Wilderness" ("从 山野 吹来 的") Xia Yuzhi [夏有志], "Give me my cutter" ("我 要 我 的 雕刻刀") Liu Jianping [刘建 屏], "Dangerous roll" ("险滩") Zhu Xiaoeng [朱小文], "Scarecrow" ("稻草人") Ye Shantao [叶圣陶], "The Jackal and the Wolf" ("红 豺") Shen Shishi [沈 石溪], "Tang Xiaosi in the bay of the ships sailing tomorrow" ("西小 西 在下一次 开船 港") Yan Wenjing [严 文 井], "100 Secret Senses" ("百 种 秘密感官") by an American writer of Chinese descent (writing in English) Tan Enmei [谭 恩 美], etc. Many of these works have not yet been translated into Russian and are not familiar to Russian-speaking readers.

The most famous author of books on children can rightly be called the modern Chinese writer Cao Wenxuan, the winner of thirty literary prizes, (including G.Kh. Andersen (2016)). The writer created vivid, expressive and psychologically sharp stories about the fates of village children: "The Thatched House" ("草 房子"), "Bronze and Sunflower" ("青铜 葵花"), "Symi" ("细 米"), "The great book of the king. Part I. The Little Shepherd" ("大王 书" 第一 部 "黄 琉璃"),"The Great Book of the King. Part II Scarlet Lantern" ("大王 书" 第二部 "红 纱灯") and some others.

The description of the childhood of the main characters also occupies a significant place in a number of outstanding works of modern Chinese literature (which cannot be attributed directly to children's literature). Such are the novels by Mo Yan (莫言) "Big Breasts & Wide Hips"

("丰乳 肥臀") and "Tired of Being Born and Dying" ("生死 疲劳"), his autobiographical novel "Changes" ("变"), a novel Xi Lisha (邝 丽莎 - an American writer writing in English under the name Lisa Xi) "Snow Flower and the Secret Fan" ("雪花 秘 扇"). Despite the fact that these writers live in dissimilar countries and have different cultural experiences, their works clearly show the author's emotional attitude to the events of the heroes's life in childhood: in one case, this is some distance from the author's deep emotions ("Big Breasts & Wide Hips"), in the other - sympathy and empathy ("Change"), in the third - irony, sarcasm and humor ("Tired of Being Born and Dying"), in the fourth - lyrics of feelings ("Snow Flower and the Secret Fan").

In his novel Symi, Cao Wanxuan defines the attitude of adults to children, thereby immediately drawing the boundary between their worlds: *"Children cannot determine who is telling the truth and who is not <...> Adults either do not specifically respond so that the children do not worry, or do not pay any attention to them, remaining indifferent to their questions <...> Children in their hearts understand that they should not expect to be taken seriously..."* [9, p.14].

The heroine of the story, Dai Houin, indignantly asks her mother: "*In your opinion, children quarrel only over goodies and toys? - Asked Houin quickly. "You just underestimate us." We, like you, think a lot. We are future students of the eighties, and you are of the fifties, we are thirty years apart! Therefore, you do not understand us, you consider us children"* [1, P.242].

The nature and appearance of children is described by Chinese writers using a variety of everyday, portrait details, which are often accompanied by value judgments and moral reflection: "*This name was rustic. Children from the village of Damaidi did not understand why the city girl was given a village name. Kuihua was a neat and well-educated girl, but too thin*" [9, p. 9].

"Lined up in a row and holding hands, the girls went down to the river. The water reflected their fine figures and pretty faces. All have large noses with a hump and large, pale, fleshy ears, the same as those of the mother" [5].

Often, writers with good humor present to the reader their heroes: *"Tu means bald, so the boy was nicknamed. A long beautiful neck served as a support for a perfectly smooth head, on which there was no hair, not even a small scar. <...> Realizing that the children like to touch his head, Tu He began to regard her as a jewel and henceforth did not allow anyone to touch her"* [10, p.5-6].

"*The third Snotty needs to constantly monitor his nose, because as*

soon as he is distracted, the snot immediately goes outside. When he is deeply involved in something or thinks about something, they can flow through his lips, which he does not notice until someone tells him about it, and then, pulling up his stomach, he pulls them back with force" [9, p.15].

Often, authors, describing the appearance of children, immediately set the tone and script for the future fate of their heroes: *"Qingtong's high temperature persisted for five days. When she returned to normal, the baby's condition improved. But during this time he lost a lot of weight, and his already huge eyes began to seem even larger. Soon, his relatives found that their child had stopped talking, became mute."* [8, p.22-23; 32].

"Bandaging has changed not only the shape of my feet, but also my character, and it seems to me that this process, in some strange way, has been going on all my life. It turned me from an obedient girl to a decisive girl, then from a young woman who unquestioningly complied with the requirements of her husband's parents, to the most influential woman in the county who achieved compliance with the strict rules and customs of village life <...> the cruelty with which the bandages pressed my "golden lilies, "penetrated my heart, and it clung to resentment and injustice so tightly that I could no longer forgive those I loved and who loved me" [7].

From almost the first pages, the reader enters the special art world of children, in which the images of Chinese children, their life and fate, their inner world are vividly presented: "*His world (Qintong – T.D.) was different from the world of other children from the village. For half a day he could look at the clean bottom of the reservoir, where the mollusk crawled so slowly that it seemed that it was not moving at all"* [8, p.13].

The signs of this world are manifested in the recognition of historical time: the life of Chinese children is portrayed as realistically as possible, in all its difficulties and problems: *"Kuihua was a neat and well-educated girl, but too thin. She had no mother. Her mother died two years ago due to illness. The father had to go to the school of personnel workers, so he was forced to take the girl with him and move with her to the area of Damaidi village. <...> No matter where her father went, he always took Kuihua with him."* [8, p.9].

Chinese writers are particularly interested in the topic of growing up children, the changes that occur in their lives and affect the formation of character, the formation of thinking, and attitude to life. The world of children in the works of modern Chinese writers (in contrast to those published in the middle of the XX century) becomes existentially filled: the text expressively and psychologically subtly describes the experiences of children: *"After breaking up with dad, my mother began to call me not Huan-*

huan, but Hanhan - chagrin. She still took care of me, tried to feed, dress, but was no longer so affectionate. I was no longer her "treasure", "fragrant flower", I became her Sorrow. Then I realized what loneliness is. Who says kids don't think about death? Moreover, I was no longer a child" [1, p.44].

Early childhood fears are described in Bin Xin's "Letters": "*I remember, once in a dream, I heard a miserable voice of a beggar and decided that they took my mother. I was covered with cold sweat from fear, my face and lips turned blue, from crying I could not say anything. I ran out of my room, fortunately, someone kept me. And long after that, when I fell asleep, my mother stayed near my bed."* [See.: 2].

In the autobiographical story of Lin Hailing, the reader discovers the girl's deepest experiences: "*Adults say - this one's crazy, that one's a fool. This one's a liar, that one's a burglar, but I can't figure out how to tell them apart.*" [4, p.220].

Cao Wanxuan, the master of deep existential descriptions of the world of children, from the first lines sets up the reader for the special inner world of the little heroine: *"The girl was lonely. Her loneliness was similar to that which a bird experiences in the vast expanses of the sky, for a long time not seeing its relatives. She soars alone in the sky, and only having seen wings in the distance, splitting the air, she emits a joyful cry."* [8, p.6].

The recognition of the children's tragedy from the lips of the main character of the novel Lisi Xi "Snow Flower and the Secret Fan" sounds piercing: *"I never thought about whether I was happy in childhood, and whether this time was fun. Like an ordinary girl, I lived in an ordinary family, in an ordinary village. I did not know whether it was possible to live differently, and did not worry about it. But I remember the day when I bean began to think of everything that surrounds me.*" [7, p.14].

A detailed description of the daily life of children, home environment, life in the village, daily events in the family helps the reader visualize the way of traditional Chinese life (often the scene is a village in which patriarchal principles are preserved): *"Parents thought that their child knew his name, that was enough. Therefore, children played, tore grass for pigs or grazed sheep and ducks. Some children have not been in school for years. So they reached ten years, then they grew up and already realized that if they did not go to study now, they would never achieve anything. <...> People said: "You grew up without school, but you do not need to blame your parents for not giving you the opportunity to study." So the parents determined the child's future."* [8, p. 78].

Lisa Xi describes the family life of her heroine in this way: *"My native home was typical: a two-story building, facing the south. <...> There were*

no windows in our main room, so in the warm season we kept the doors open - for access of light and air. The rest of the rooms in our house were small, the ground was trampled earth <...> our animals lived in the house with us." [7, p.12-13].

In recollections of her childhood in the suburbs of Beijing, Lin Hailing writes: *"When I was seven or eight years old, entertainers with" talking boxes "walked down the streets and alleys of Bepin <...> First, the seller of" night hyacinths came in. Women bought "night hyacinths" with pleasure, hung in the bedroom, filling the room with fragrance. <...> Next came the trader of light bulbs <...> Finally, the one I was waiting for the most was coming <...> I flew home like on wings and persuaded my mother to call the owner of a "talking box" to us."* [4, p.149].

Confucian traditions of reverence and respect for parents, reproduced in the works, are expressed through the thoughts of children, a description of their behavior and reactions to the words and deeds of adults*: "As a child, I liked to bow to adults: they gave me small coins or simply praised me. But once I was so tired of these nods that I hated them for life. It was New Year. Our whole large family - both old and young - gathered in the front hall. Everyone bowed, bowing to each other earthly bows: "Happy New Year, dad! Happy New Year, mom! Happy New Year..." And my turn came. I was the smallest, and I needed to bow more than everyone else. The room is full of people, and everyone is waiting. I was scared. I knelt down. <...> I decided to bow to all at once. "Happy New Year, aunts, uncles..." Everyone laughed. And the father said: "This is impossible! Not good! We must bow separately!" <...>. And I continued to bow down to my aunts, brothers, and older sisters, and I had four of them. The latter was only a year older than me. She always strove to take away my delicacies. And I still had to bow to her! She looked so important, and I wanted to shame her, to say that she was shameless, and, of course, not to bow. She cried loudly, and my father scolded me: "Sun Yue! Bow to your little sister, now!" <...>. With difficulty restraining my anger, I bowed, and when I got up from my knees, I also cried. Since then, I do not tolerate these bows. It's good that after the Liberation this custom was no longer observed."* [1, p.130-131].

"I also realized that two Confucian ideals govern our lives. The first is the "Three Obediences", which state: "Obey your father as a girl; obey your husband as a wife; widow obey your son." The second is the "four Virtues" that defined a woman's behavior, her speech, movements and activities: "Be chaste and compliant, calm and honest; be quiet and enjoyable in your speeches; be perfect in crafts and embroidery" [7].

For children, the world of nature becomes a place where they can hide from evil and injustice, in the bosom of which their dreams and fantasies gain unlimited freedom: *"Kuihua liked this river. She watched it, examined its streams, swell and scallops of waves. <...> I watched the daylight turn the river golden in color, watched the evening sunset change the color of the water and turn it into raspberry syrup, as countless drops of rain fall on the surface of the river, splashing silvery water flowers on it, like fish jumping out green waves of the river, draw beautiful arcs against the blue sky and return to the water..."* [8, p.13-14].

"Qingtong did not like to play with children from Damaidi village <...> His friends were river flows, reeds, a buffalo, numerous unknown herbs, birds and insects" [8, p.57-58].

A cross-cutting thought passing through all modern Chinese works about children is the child's right to his own life and his own opinion.

The variety of images and types evokes the keen interest of the reader and responds in the soul with sympathy for each child. The closed inner world of Chinese children in real life (the mentality does not allow them to openly express their feelings and emotions) opens with a deep and wide range of life conflicts, experiences, doubts. Heroes of children's works show such traits that are not characteristic of children: will, perseverance, determination, endurance. At the same time, their national behavior can be noted in their behavior and actions: pliability, complaisance, patience, respectfulness, non-malignancy, etc.

Today, Chinese children's literature is organically involved in the world literary process, which is due, we believe, to a desire to understand the mentality of the Chinese people, which is deeply reflected in works of art that describe the lives of children. Russian-speaking readers have yet to discover the world of Chinese children.

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THE COMMON FEATURES OF ADVERBS IN THE ADYGHE AND ENGLISH LANGUAGES

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The paper is dedicated to the category of adverbs in Adyghe and English. The paper considers the morphological groups of Adyghe and English adverbs and it should be emphasized that their morphological features and syntactic relations play an equally important role. A comparative analysis of the adverb in the Adyghe and English languages is carried out:

Keywords: adverbs of the Adyghe language, adverbs determinative, adverbs circumstantial, adverbialization, morphological features.

The category of adverb in the Adyghe and English languages is quite distinct as part of speech in the composition of significant words. The adverb, as an independent part of speech, was distinguished in ancient grammar. But, despite this, the development of a universal model of its classification still remains one of the most pressing problems for researchers. In the currently emerging approaches to the classification of adverbs – semantic, grammatical and pragmatic-we observe the distribution of adverbs by meaning, form, ability to use in certain syntactic constructions, position relative to the part of the utterance in which they function (the propositive or modus part), etc. [2, 149]. Specific features of the language, as we know, are more clearly expressed in the morphological organization of the word. It is also noteworthy that despite the fact that

the Adyghe and English languages are quite different in their structure features, nevertheless, morphological features play a secondary role in determining most parts of speech, and therefore they have to be determined mainly on the basis of semantic and syntactic features. The main features of grammatical originality of adverbs are that they are, first of all, unchangeable significant words that denote a sign of an action, quality or object; second, they define the verb by forming attributive phrases; third, they have a complex system of word-formation relations with nominal and verbal parts of speech.

In a sentence, an adverb is a circumstance and is combined mainly with a verb, adjective, or other adverb, for example:
адыг. Ахэмэ ин дэдэу орэдыр къаlощтыгъэп.
англ.They didn't sing very loudly.
Adyg. Ар инджылызыбзэкlэ мыпсынкlэу, ау дахэу мэгущыlэ.
Eng.He speaks English slowly, but beautifully .
Adyg. Ар лъэшэу фильм щхэнэу щытыгъ.
Eng.that was a very funny film. (ADJ.).
Adyg. Ахэмэ ин дэдэу орэдыр къаlощтыгъэп.
Eng.They didn't sing very loud

In both languages, the adverb is one of the least stable partial categories. This is expressed in the fact that adverbs are closely related to adjectives, nouns, pronouns, verbs, and other parts of speech, from which they are formed and at the expense of which they are constantly replenished. Both in the Adyghe language and in English, there are many words that can be nouns, adjectives, and adverbs, so that their partial belonging to at least one of the case forms is difficult to determine.

In the Adyghe language, this problem is further complicated by the fact that adverbs formed using the suffix –EU/-y coincide with the adverbial forms in-EU/-y. However, adverbs differ from these forms in that they, combined with verbs and denoting the sign of action, do not act as carriers of this action, while adverbs, denoting the sign of action, at the same time retain this action, cf.: дахэу щыс "sitting beautifully" and тхэу щыс "writes sitting". On the other hand, the adverbial part, unlike the adverb, changes in persons and numbers.

As for the adverbialization of nouns that Express tenses and parts of the day, the transition of such nouns to adverbs in both Adyghe and English occurs when they lose the definition-adjective-and begin to define the verb. In other words, adverbialization of nouns occurs as a result of the loss of subject-object relations and the acquisition of circumstantial relations.

In the circle of Adyghean adverbs, the following morphological groups are distinguished: adverbs formed from nouns; adverbs formed from adjectives; adverbs formed from numerals; adverbs formed from pronouns; adverbs formed from verb forms.

The transition of other parts of speech into adverbs is carried out by adverbializing, suffixing, prefixing-suffixing, by building up, by doubling the same bases or different bases, for example: мафэм "in the day", нэгъэунlэгъукlэ "instantly", дахэ-у "beautiful", ы-шъхьагъы-кlэ "from above", lэпкэ — лъlапкlэу "spots" , etc.

In English, adverbs are formed by adverbializing and using suffixes -ly,-e, for example: "happily", hard-e "firmly", wid-e "far" , etc. It was a very hard day. — It's been a long day. (hard is an adjective) It's hard to believe that he could cheat on his wife. — It's hard to believe that he could have cheated on his wife." (hard-adverb) Some adverbs can be formed by syntactically isolating forms of indirect cases of nouns, for example: nights "at night", etc. And there are adjectives that completely change their form when forming an adverb:good (good) – well (well) You can't form adverbs from adjectives that end in-ly. For example: friendly, lovely, silly, lonely (lonely). Instead, you can use constructions like in a silly way (in a silly way), in a friendly manner (in a friendly manner), and so on.

As you can see, in the Adyghe language, compared to English, the range of parts of speech involved in the formation of adverbs is wider and the grammatical methods of their formation are richer.

According to their structural composition, Adyghean adverbs can be divided into simple, complex and composite ones.

Simple adverbs are those that consist of a single base (джы "now", игъом "in time").

To difficult are those adverbs which consist of two or more bases (асыхьатым "right" тыгьоспчыхьэ "last night").

Compound words include adverbs consisting of two or more partial words (гъорекlо гъатхэ "last spring", пчыхьэ кlахэм "late at night").

According to their structure adverbs of the English language are divided into simple, derived and complex.

Simple adverbs are those that are used without suffixes: often "often", seldom "rarely" , and so on.

Derivatives include such adverbs that are formed mainly using the suffix -ly: busi-ly "busily", easi-ly "easily" , and so on. Other suffixes that form adverbs are less productive: -ways, - wise, -ward(s), - like, ford.

Complex adverbs are those that are formed from two or more bases: inside "inside", inside "somewhere", and so on. Thus, odygowice and an-

gelista different approaches to the structure of a dialect. If the scientists studying the Adyghe language refer to complex adverbs as adverbs consisting of two or more bases, then anglicists call complex adverbs formed by suffixes. In addition, odygowice there are also compound adverbs consisting of two or more part-of-speech of words.

According to the meaning of the adverbs of the Adyghe language, it is possible to distinguish into two large groups: definite adverbs and circumstantial adverbs. Determinative adverbs denote the quality of an action, feature, or object and are attached to the verb. Hence the place of determinative adverbs in a sentence is more or less fixed, i.e. they are usually placed before those verbs or verb forms (participle, adverbial, etc.) to which they are attached. Determinative adverbs are divided into qualitative, quantitative, and mode of action adverbs.

Circumstantial adverbs characterize the circumstances and conditions under which an action occurs. Such adverbs mostly apply to the entire sentence, so they don't have a fixed place in the sentence. Circumstantial adverbs can be divided into adverbs of time, adverbs of place, adverbs of cause and purpose, of which the most numerous in the Adygean language are adverbs denoting temporal and spatial relations. As for the causal and target relations, they have not yet acquired sharp signs of an independent category in the system of adverbs. The range of use of the adverbs of cause and purpose in the Adyghe language is narrowed, probably because the causal and target relations are not yet clearly differentiated. This is evidenced by the fact that both these relationships answer the same questions.

In anglistics, semantic classification is very extensive. We are guided by the Russian classification, which divides adverbs into two large classes: determinative (qualitative) and circumstantial.

Determinative adverbs are divided into adverbs of image and mode of action and adverbs of measure and degree. Adverbs of image and mode of action are formed using the suffix -ly, and adverbs of measure and degree do not have special formats. Since qualitative adverbs convey the quality of action, they act as adjectives of definition.

Circumstantial adverbs are divided into adverbs of time and adverbs of place.

Adverbs of time and place that Express purely external conditions of the process do not characterize the internal qualitative characteristics of the process itself. Therefore, their connection with the verb is less close than that of other adverbs. Because of this, it is quite common to separate adverbs of time and most adverbs of place from the verb and put them

in the first place in the sentence. But circumstantial adverbs can be used between a subject and a predicate, after a subject and an auxiliary verb, between a predicate and an indirect complement, and at the end of a sentence. However, circumstantial adverbs do not have a specific connection with any word in the sentence, but relate to the entire sentence. In this respect, the Adyghe and English adverbs are identical.

Thus, when describing an adverb as a part of speech, it is necessary to be fully guided by semantic, morphological, and syntactic features. At the same time, of course, we should take into account the fact that the adverb does not have a single lexical meaning and is devoid of its own forms of change and word formation, although in a separate, frozen form, numerous affixes of nominal and verbal parts of speech appear in it.

Speaking about the grammatical characteristics of parts of speech, it should be emphasized that their morphological features and syntactic relations play an equally important role. But, as A. I. Smirnitsky notes, "the syntactic side is more general and takes the first place in the grammatical characteristic of the word.

Thus, morphologically unchangeable words, such as interjections and adverbs, act as different categories of words that have different grammatical characteristics, namely in terms of syntax" [1; 103]. This is especially true for a language such as English, which does not present clear morphological indicators.

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ÉLÉMENT ROMAN EN POLONAIS MODERNE: HISTOIRE, MODERNITÉ, PERSPECTIVES

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Cet article est consacré à l'étude et à la classification des emprunts lexicaux romans en polonais moderne. La composante romane fait partie intégrante de la culture polonaise, en raison de ses liens religieux, historiques et économiques. Les résultats de cette interaction, reflétés à tous les niveaux de la langue polonaise, intéressent les chercheurs et nécessitent une attention particulière en termes de synchronie et de diachronie.

L'étude de cette question dans un contexte sociolinguistique mérite une attention particulière, car l'expansion de l'élément roman a affecté la langue polonaise en particulier et la culture polonaise dans son ensemble. La tradition d'emprunter des faits culturels romans est aujourd'hui encore caractéristique de la culture polonaise. La tradition d'emprunter des éléments de la culture romane est un trait distinctif du polonais moderne, bien que moins qu'avant, dans le cadre d'une certaine réorientation anglo-saxonne ce qui reflète une tendance globale.

Ce fait se reflète non seulement dans le discours vivant de tous les jours et dans le discours savant et scientifique, mais aussi dans la littérature. En d'autres termes, nous pouvons dire que les emprunts lexicaux aux langues romanes peuvent être détectés dans pratiquement tous les styles fonctionnels de la langue polonaise moderne.

Dans le même temps, il est important de noter que l'emprunt d'éléments romans peut se produire directement, ainsi que par l'intermédiaire d'autres langues. Cela concerne à la fois les emprunts et les calques.

Mots-clés: polonais, français, latin, interactions lexicales, emprunts

La langue polonaise, connue comme appartenant au sous-groupe léchitiques du groupe slave occidental de la branche slave de la famille des langues indo-européennes, comme de nombreuses autres langues slaves, s'est enrichie d'un grand nombre d'emprunts étrangers lors de son processus de développement historique [Boichuk: http]; [Tikhomirova, 1988: 232].

T.S. Tikhomirova identifie trois principales sources d'emprunts en polonais: ce sont les langues classiques, celles d'Europe occidentale et les langues slaves [Tikhomirova, 1988: 232]. Les langues d'Europe occidentale auxquelles la langue polonaise a emprunté des mots sont allemand, italien, français et anglais [Tikhomirova, 1988: 233].

Le centre de notre attention dans cette étude est l'élément roman dans la langue polonaise - vocabulaire emprunté par le polonais à la fois à la langue latine et aux langues néolatines, c'est-à-dire langues romanes modernes - français, italien, espagnol, portugais, roumain, incluses dans la branche italienne de la famille des langues indo-européennes et remontant génétiquement à un ancêtre commun - le latin.

Le rôle de la langue latine comme source d'emprunts s'explique par l'appartenance de la Pologne au monde catholique, dont la langue officielle était le latin. Ce facteur doit être pris en compte dans l'aspect diachronique. N. B. Mechkovskaïa écrit que “non seulement parmi les peuples romans, mais aussi sur les terres allemandes et dans la région de Slavia Latina, la langue latine était une composante organique de la culture” [Mechkovskaïa, 2004: 191]. Le latin jouit depuis longtemps d'un très haut prestige en Pologne. Comme de nombreuses sources l'indiquent, la noblesse de la cour et même la petite noblesse locale, en règle générale, posséda très bien et souvent à la perfection le latin. Pour de nombreux représentants de la noblesse, ce fut une question d'honneur et un attribut nécessaire de leur statut social. Par exemple, Pierre Chevalier dans son livre “Henri III” dit que les aristocrates polonais démontrèrent une bien meilleure connaissance du latin par rapport à la noblesse française, même si les Français ont bien moins de difficultés à apprendre le latin, étant donné le fait que la langue française descend du latin populaire, par conséquent, cela demande plusieurs fois moins d'efforts des Français que des Polonais, dont la langue maternelle appartenant au groupe slave occidental est, donc, génétiquement très faiblement lié au latin - uniquement au niveau de l'appartenance à la même famille linguistique. Il convient également de rappeler comme un brillant exemple de maîtrise du latin par le politicien et chef militaire de La République des Deux Nations, Mikołaj Ostroróg (1593-1651), dont la connaissance ment du latin fut parfaite. Ce chef militaire

participa à la répression du soulèvement paysan et cosaque dirigé par Bohdan Khmelnitski, et sa maîtrise du latin lui a valu le surnom de *Latina* par la suite.

En substance, la langue latine fut pour le polonais ce que le Slavon d'église fut pour les langues slaves orientales, mais il faut prendre en considération que ce fut cependant une langue beaucoup moins proche. N. B. Mechkovskaïa écrit: “Le bilinguisme culturel latino-slave et le “bilinguisme” (le terme de N. I. Tolstoï pour désigner deux traditions littéraires relativement autonomes” - en latin et en langue populaire) furent les plus développés en Pologne du XIIe au XVIIe siècle. “Le latin fut la langue principale de l'Église polonaise, de l'État, de la science et de l'éducation”. [Mechkovskaïa, 2004: 191]. Ainsi, nous voyons que la période du bilinguisme latin-polonais fut tombée sur la période du vieux polonais et la plupart des périodes du polonais moyen de l'histoire de la langue littéraire polonaise, c'est-à-dire, essentiellement, sur les périodes qui devinrent particulièrement importantes pour la formation de la langue polonaise moderne.

T.S. Tikhomirova estime également nécessaire de souligner le rôle spécial de “la langue latine et de l'écriture latine dans la vie de la société polonaise” [Tikhomirova, 1988: 7]. Selon ce savant, “le rôle de la langue latine dans l'histoire de la langue littéraire polonaise fut divers et ambigu, et son impact se manifesta à la fois dans le fonctionnement de la langue polonaise et dans sa structure” [Ibid.]. Il est très important que: “En Pologne, très tôt, presque à l'aube de l'éducation humaniste (latine) en Europe, l'érudition classique commença à être cultivée (ce que l'on appellerait plus tard *studia humanitatis* en Italie)” [Mechkovskaïa, 2004: 7]. Cette tradition s'avéra extrêmement stable, ce qui peut facilement être confirmé non seulement par les sources historiques, mais aussi par le discours artistique. Ainsi, Pan Tyburtius, un personnage de la nouvelle de V. G. Korolenko “Dans une mauvaise société” (1885) “... commença à réciter les périodes latines les plus longues ...” (nous rappelons que le prototype de la scène de cette śuvre partiellement autobiographique est la ville de Rivne au milieu du XIXe siècle). Dans le même temps, l'influence de la langue latine commença à s'affaiblir progressivement à partir du milieu de la période polonaise moyenne [Tikhomirova, 1988: 10], bien que dans la première moitié du XVIIIe siècle, le désir d'érudition classique eût non seulement persisté par inertie, mais eût également donné un élan au développement d'un certain nombre de programmes éducatifs des institutions qui furent nommées en latin et fonctionnèrent exactement comme les établissements d'enseignement classiques. À cet égard, l'existence d'un établissement

d'enseignement fondé par Stanislav Konarski, connu sous le nom de *Collegium Nobilium pijarów w Warszawie* est très révélateur. L'éducation dans ce *convictum* (c'est-à-dire un établissement d'enseignement fermé pour les enfants de représentants de la noblesse) se déroula exclusivement en latin, mais, contrairement à de nombreuses autres écoles pour les nobles, le droit polonais et international y fut également enseigné, ainsi qu'un certain nombre de sciences naturelles. À ce sujet, Marek Borucki écrit dans son livre “Les Polonais à Rome: de Mieszko Ier à Jean-Paul II”:

“A w “Ustawach szkolnych”, opracowanych przez księdza Konarskiego w 1755 roku, czytamy miçdzy innymi: Jak nasze Collegium Nobilium zakladamy na wzor rzymskiego Collegium Nazarenum, tak tez zachowujemy jego reguly, prawa, zwyczaje, o ile dadzęsić u nas zastosować” (“Et dans les "Chartes scolaires", préparés par le prêtre Konarski en 1755, nous lisons, entre autres choses: Comment nous mettons notre Collegium Nobilium sur le modèle du Roman Collegium Nazarenum, donc nous gardons également ses règles, lois, coutumes, tant que nous les appliquons).

Il ne fait donc aucun doute que des facteurs sociolinguistiques tels que l'énorme prestige de la langue latine en Pologne, son statut de langue de l'Église catholique, sa bonne connaissance par un nombre relativement important de Polonais contribuèrent à cette langue devenant une source d'emprunts à la fois des unités lexicales et des constructions syntaxiques.

T.S. Tikhomirova distingue les signes de formation de mots et les particularités d'inflexion de certains groupes d'emprunts latins (mots en -um et en -ent). Nous aimerions y ajouter de nombreux noms masculins à -a: *poeta, idiota, ateista, artysta, alpinista, atleta*, etc.), ainst que les noms masculins en *-iusz*: *proletariusz, agrariusz* [Tikhomirova, 1988: 7].

Il y eut également une deuxième vague de romanisation de la langue polonaise, probablement presque aussi forte que à la première. Cette fois, la source d'emprunt fut l'une des langues néolatines - le français. L'influence puissante de la langue française sur le polonais n'est pas non plus mise en doute malgré le fait que ces pays n'ont pas de frontières communes et une distance géographique importante les sépare. Nous sommes certains que les principales raisons en sont sociolinguistiques. T.S. Tikhomirova constate que “l'influence active du vocabulaire français sur le polonais commença à la fin du XVIIIe siècle et se manifesta dans divers domaines sémantiques” [Tikhomirova, 1988: 233]. Cependant, les contacts polono-français intenses remontent à la fin du XVIe siècle - la période où le prince d'Anjou, Henri de Valois, fut élu roi polonais après la mort de Sigismond II Auguste, mort sans enfant, donc le dernier représentant de la dynastie jagellonne. Henri de Valois et sa cour séjournèrent au Wawel de novembre

1573 à juin 1574, et leur présence à Cracovie fut probablement la base des premiers contacts linguistiques franco-polonais directs et jeta les bases de la période d'acculturation franco-polonaise. Il est prouvé que la communication entre les représentants de l'aristocratie polonaise et française fut principalement en langue latine, laquelle, comme déjà mentionné, l'aristocratie polonaise parlait beaucoup mieux que les nobles français.

Malgré la fuite d'Henri de Valois de la Pologne, nous estimons que les contacts franco-polonais continuèrent à être assez intenses depuis lors. Cela est attesté avec éloquence même par le fait que le roi polonais Jan II Casimir Waza, après son abdication en 1668, partit pour la France, où il reçut l'abbaye de Saint-Germain-des-Prés, où, déjà comme abbé, il décéda en 1672. Il est symbolique que “Son corps fut enterré le 31 janvier 1676 dans la cathédrale du Wawel, et son cœur repose dans l'abbaye de Saint-Germain-des-Prés”.

Comme l'une des principales raisons des contacts intenses et durables entre la France et la Pologne, nous considérons la religion commune - comme on le sait, ces deux pays ont une forte tradition catholique, bien que la France soit maintenant une République laïque.

"Avant la Révolution française, le catholicisme fut considéré comme la religion d'État de la France, et le pays lui-même fut appelé la “fille aînée de l'église”, ce qui joua probablement un rôle majeur dans le désir de la Pologne, entourée de pays protestants et orthodoxes et dans un état d'opérations militaires presque permanentes avec la Porta ottomane, de renforcer les contacts avec la France catholique qui fut très influente. Il est intéressant que N. B. Mechkovskaïa parle des Polonais comme des “français slaves”: “... comparez la réputation du français comme langue de la culture européenne sophistiquée ou du polonais comme langue du” français slave” Rappelons que dans la même veine, Varsovie entre les deux guerres mondiales fut appelée poétiquement “Paris d'Europe de l'Est”. Tout cela souligne une fois de plus le fait que l'emprunt des mots français par la langue polonaise eut lieu dans le cadre du processus général d'acculturation.

Au XVIIIe siècle ces contacts furent encore intensifiés. Cela fut facilité par le fait que tout au long de ce siècle, la langue française régna en maître en Europe. Ainsi, N.E. Ananyeva écrit: “Au XVII et surtout au XVIII siècle, avec l'apogée de la littérature française, la mode, la cuisine, et avec l'intérêt croissant des Européens pour tout ce qui était français, l'expansion des gallicismes commence. Les emprunts français dans divers domaines de la vie apparaissent en polonais: fryzjer “coiffeur” (friser), bagaż (bagage), biuro (bureau), krawat (cravate), perfumería (parfumerie) [Walczak, 1999:

147-149]; [Ananyeva, 1994: 266-269]. “Citons, à titre d'exemple, encore quelques emprunts français, notant qu'en général leur nombre est énorme: *bagatela, ażurowy, barykada, awans, debiut, depesza, brylant, bukiet, peruka, ofensywa, maniera* et beaucoup d'autres. La position de Napoléon Bonaparte concernant la reconstruction de l'État polonais et le prestige de la France impériale au début du XIXe siècle renforcèrent ces contacts. Comme on sait, le nom de Napoléon Bonaparte est même mentionné dans l'hymne national de la République de Pologne.

L'étroite interaction culturelle et économique se poursuivit tout au long du XIXe siècle et le début du XXe siècle, jusqu'au début de la Seconde Guerre mondiale. En témoignent avec éloquence des personnalités telles que Frédéric Chopin, Maria Skłodowska-Curie et bien d'autres. La France a accueilli un grand nombre d'immigrants polonais. Bien sûr, la culture polonaise interagit non exclusivement avec la culture française, il suffit de rappeler Joseph Conrad (pseudonyme de Józef Teodor Konrad Korzeniowski), l'un des écrivains anglais les plus en vue de la fin du XIXe et du début du XXe siècle.

Néanmoins, il semble raisonnable de dire que l'influence de la culture française fut dominante pendant cette période, ce qui ne put qu'affecter la langue polonaise. Il est à noter que dans certains cas, la médiation de la langue allemande ne peut être exclue lorsque les emprunts français entrent dans la langue polonaise: le français *une pantoufle*> l'allemand *ein Pantoffel*> le polonais *pantofel, pantofla*.

Une analyse des sources lexicographiques et des textes en polonais révèle la présence dans chacun d'eux d'un nombre très important d'emprunts lexicaux français. Les emprunts français enregistrés dans des sources lexicographiques reflètent l'état statique de ces emprunts en polonais moderne, et les textes en polonais reflètent la dynamique de l'état du corps de ces emprunts.

De nombreux gallicismes lexicaux sont présents, par exemple, dans le discours des personnages de la pièce de Gabriela Zapolska “Moralnosć pani Dulskiej” écrite en 1906 (nous mettons les emprunts français en italique): „Wielka *afera* – zgoisię, dowesela”(<une affaire), „Ojciec *toleruje*” (<tolérer), „Bo ty jesteś *sentimentalna*” (<sentimentale), „Ładna *edukacya*!..”(<une éducation), „Macie *parasol*?” (<un parasol), „Proszę pani na *kanapę*." (<un canapé), “Przyjmujecie gorącą *kolacyą*...” (<une collation, il y a ici un certain biais de sens: *Kolacja* en polonais veut dire "dîner"), “będzie *kontenta* ...” (contente) et bien d'autres. Notons que dans le discours des personnages de la pièce il y a aussi des mots français non adaptés, par exemple, *jamais* (cependant, de même que de tels mots allemands).

Voici quelques exemples tirés des śuvres d'écrivains polonais de la fin du XXe siècle (les emprunts français sont également en italique): “Pomiarkował że *mam rację*, bo przestał kląć, ale zato znowu od czasu do czasu pojekwali *lametował*” (Jerzy Siewerski "Niezçasi) - dans ce cas, dans la même phrase, nous avons affaire à deux gallicismes lexicaux (nous soulignons l'italique): mam rację - papier calque du français j'ai raison (raison), lametował - du français *se lamenter*; „Wypuszczç, jak oddasz *walizkę* ... “(id.) <franc. la valise; “ Dlaczego Śliwa nie zadjął *kostiumu* świętego Mikołaja?” (Id.) < français *le costume*; „Ja pociągnę z *butelki*.....” (id.) <français *une bouteille*; „gdzieś na wysokośći serca tkwit wbity aż po rękojeść duży wojskowy *bagnet*” (id.) <français *une baïonnette* (en russe, le concept correspondant est transmis en utilisant un germanisme); « Nie było *okazji*, żeby do niej podejść » (Zygmunt Zeydler-Zborowski “Człowiek o cętkowanej twarzy”) <français *une occasion*, “Siedzieć tu *nie ma sensu*” <français *n'a pas pas de sens*, “To był zwykły, *ordynarny szantaż* “<français *ordinaire*, *un chantage* (dans ce cas, on observe également la présence de deux mots d'origine romane dans une phrase courte, en français ordinaire” ordinaire “, en polonais ordynarny” grossier”),” Zadnych *revelacji* “ <français une révéation. L'un des livres de Jan Andrzej Kaczmarczyk s'appelle “Koneser” <français *connaisseur* (Jan Andrzej Kaczmarczyk “Koneser”), “Na dole pewne już czeka cała *ekipa*” (id.) <français une équipe; “Nie kiełbasę, tylko sos – sprostowała mama” <français *une sauce* (Maria Terlikowska „Kuchnia z niespodzianką”).

Dans certains cas, il est assez difficile d'établir de manière fiable à partir de quelle source - latin ou français, une unité lexicale d'origine romane particulière est entrée en polonais : “*Mizernie* wyglądasz ... “ (Jerzy Siewerski, “Niezabijasiç swiçtego Mikolaja”) <français *misérablement* ou, plus probablement, lat. *misere* - dans ce cas, la forme du mot témoigne plutôt de son origine latine; “Uprawiał sportu, był silny,..., pełen życia i młodzieńczego wigoru“ (Zygmunt Zeydler-Zborowski “Mizernie wyglądasz”) <français *une vigueur* ou lat. *vigueur*. De toute évidence, si un mot d'origine romane entra en polonais avant la fin du XVIe siècle, il a presque certainement fut emprunté à la langue latine, et si cela arriva dans une période ultérieure, il y a de grandes chances que le mot provienne du français. Il est important que les résultats de ce processus se reflètent non seulement dans le discours artistique, mais également dans les textes journalistiques, qui sont dans une certaine mesure inclus dans le discours quotidien: “ja, Trąba Boża, ku chwale Boga i świętych Janów Chrzciciela i Ewangelisty, patronów tej świątyni, zostałam odlana” [Gazeta Miejska

nr 19 (62), 2000], „Poza tym błędem jest pisane “Iesu” przez duże “J”, trzeba wiedzieć, że język łaciński liczy 24 litery i nie ma wśród nich litery “j” [Gazeta Wyborcza, nr 9 (260), 1998].

Cependant, étant donné que la grande majorité des mots français est d'origine latine (avec la division des mots français en mots savants et mots populaires), cette division est quelque peu arbitraire. Il convient de noter que des difficultés similaires d'attribution de la langue sont rencontrées pour déterminer de quelle langue - latin ou français - un mot particulier d'origine romane est entré dans la langue anglaise (voir de nombreux dictionnaires explicatifs anglais qui indiquent l'étymologie, par exemple, *Concise English Dictionary*, *Wordsworth Editions* etc). La grande majorité des emprunts français en polonais remontent finalement aux racines latines.

Les sources de la statique reflètent dans certains cas le statut d'un emprunt au latin ou au français en polonais moderne. Ainsi, par exemple, il s'avère que le mot *wagabunda* (<un vagabond) en polonais moderne est plutôt livresque et, par conséquent, peu courant et peut-être même complètement inconnu de certains locuteurs natifs de la langue polonaise.

Il faut dire que les gallicismes sont également présents en polonais moderne sous forme de citations graphiques: „Nie żadna *à la*, tylko à la Tomek, co po francusku znaczy „według” albo „nasposób” – wyjaśnił tatuś (Maria Terlikowska, “Kuchnia z niespodzianką”).

Revenant à la question de ce que nous appelons la première vague de romanisation de la langue polonaise, il convient de dire qu'à l'heure actuelle, nous pouvons affirmer que la latinisation du vocabulaire de la langue polonaise moderne s'est avérée loin d'être aussi massive qu'on pouvait s'y attendre, compte tenu de la gamme complète des conditions sociolinguistiques décrites ci-dessus. Ainsi, par exemple, dans un certain nombre de cas où il y a un latinisme en russe, en polonais, nous trouvons le mot slave original: l'équateur est *równik*, le donneur est *dawca*, la dose est *dawka*, le locuteur est *mówca* et le réflexe est *odruch*. Parfois, à un latinisme en russe en polonais il correspond simultanément un mot d'origine slave et un germanisme: une profession

- *zawód, fach* (<allemand *das Fach*). Cependant, dans la langue polonaise, un emprunt aux langues romanes et un germanisme, par exemple les vacances, peuvent coexister pour indiquer le même concept, par exemple les vacances:

- *wakacje* (<français *les vacances*) et *ferie* (<allemand *die Ferien*).

Cela est également vrai dans une certaine mesure pour les mots d'origine française: le *trottoir* - *chodnik* (<French un trottoir), *le chef-d'śuvre* -

arcydzielo (<français un chef-d'śuvre), un tirage-*naklad* (<français un tirage). De plus, on trouve parfois des calques en polonais, alors qu'en russe on utilise le mot emprunté au français: *woda kolońska - cologne - l'eau de Cologne*.

En conclusion, arrêtons-nous sur l'adaptation phonographique du matériel lexical roman emprunté par la langue polonaise. Il faut dire que l'aspect graphique et phonétique des mots français empruntés par la langue polonaise subit des changements très importants. Dans une moindre mesure, cela s'applique aux mots empruntés au latin. Ainsi, de nombreuses lettres et combinaison de lettres françaises sont remplacées par leurs équivalents polonais: *v -w, j-z, c* (avant *a, o, ou, u*) - *k, ch-sz, x -ks*. Les changements phonétiques sont également très importants. Donc, il y a une substitution du son français / i /, le son polonais complètement phonétiquement étranger à la langue française / j /, graphiquement exprimé comme _Y. Les voyelles nasales françaises ne sont pas conservées, malgré la présence de voyelles nasales en polonais (parmi les langues européennes, hormis le français et le polonais, les voyelles nasales existent encore en portugais). Il y a désiotisation: *fotel* <franc. *un fauteuil*. Parfois, la sonorisation du / k /> / g / initial se produit, apparemment liée à l'emprunt de tels mots par lintermédiaire de la langue italienne ou espagnole: un cabinet> gabinet, cependant, une telle sonorisation n'est pas régulière: un cordon> kordon. La diphtongue française / wa /, transmise en français par la combinaison de lettres *oi*, en polonais est graphiquement et phonétiquement convertie en *oa*: " Gabinet był cały wykładany ciemną, dębową boazerią"(Jerzy Siewerski „Jestem newinny"). En général, on peut dire que dans une certaine mesure, les mots français s'adaptent dans la langue polonaise comme s'ils étaient des mots latins, ce qui s'explique probablement par une tradition plus longue et plus solidement ancrée, ainsi qu'une plus grande proximité phonétique des langues polonaise et latine. En d'autres termes, les emprunts lexicaux du français lors de l'adaptation phonographique en polonais subissent souvent une certaine «latinisation». Le français et le polonais sont des langues de l'accentuation fixe: en français, la dernière syllabe est toujours accentuée. En polonais l'accentuation est d'ordinaire portée sur la pénultième syllabe d'un mot polysyllabique. En mots français empruntés par le polonais se produisent régulièrement un mouvement de l'accentuation de la dernière syllabe à l'avant-dernière, cependant, il y a des exceptions. Par exemple, le gallicisme *etui* est prononcé en polonais avec un accent sur la voyelle finale, bien que ceci ne soit pas caractéristique de la langue polonaise.

Les emprunts français subissent également une adaptation morphologique importante dans la langue polonaise. La terminaison française *-tion* (la terminaison des noms féminins) est remplacée par la terminaison polonaise *-cja*. Les mots français empruntés avec une voyelle terminale en polonais, contrairement au russe, dans lequel ils ne s'inclinent pas, sont inclinés selon les règles qui existent pour les substantifs polonais. Ici, nous pouvons faire une analogie avec la déclinaison susmentionnée des noms propres latins.

En conclusion, nous voudrions noter que la part des emprunts aux autres langues romanes (par exemple, espagnol, portugais, roumain) est extrêmement faible. Ainsi, les emprunts à la langue roumaine en polonais sont pratiquement absents.

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NATIONAL AND CULTURAL COMPONENT OF SEMANTICS OF THE KINSHIP TERMS IN RUSSIAN AND CHINESE LANGUAGES

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The article compares the terminology of kinship in Russian and Chinese linguistic cultures in their synchronous aspect in order to determine their volume, structure and functioning. The terms of kinship are the most ancient vocabulary of the language and reflect the norms of the social life of the people. Despite this, the problem of kinship terminology in such distant cultures as Russian and Chinese remains relatively little studied and is of interest to ethnographers, linguists, translators, and teachers of Russian as a foreign language. As a result of the study, it was found that the number of kinship terms in Chinese significantly exceeds their number in Russian. The semes "kinship of the mother or father", "age in one generation", which are important for the Chinese kinship system, were also identified. Chinese linguistic culture is more characterized by patriarchy and hierarchy, while androcentrism is characteristic of both linguistic cultures.

Keywords: kinship terminology, Russian, Chinese, linguistic culture, seme, semantics.

The terms of kinship are a set of lexical units used to indicate the relationship of blood and matrimonial kinship [Kuznetsov AM, 1971], as well as functioning as etiquette units in linguistic culture. There are different views on the nature of the terminology of kinship. According to I.Zh. Kozhanovsky's terms of kinship is the oldest layer of vocabulary, with the help of which it is possible "to restore layers of proto-languages unreachable from us in time" [Kozhanovskaya I.Zh., 2005], however N.A. Dobronravin clarifies that basic words also include words denoting a person's gender and age. The researcher identifies the group of lexemes with the meaning of the relationship of kinship with the codifying (legal in the broad sense of the word) lexical and semantic group, as he sees the close relationship of

this vocabulary with the norms of society and the transfer of status, that is, the terminology of kinship is a reflection of social life, therefore, extralinguistic material must be involved [Dobronravin N.A., 2006].

The social life of the Chinese for many centuries was determined by Confucian ideology, according to which everyone occupied a certain position in society. Dong Zhongshu, the founder of orthodox Confucianism, legally established the following order of submission: a subject obeyed the emperor, the father ruled over his son, husband over wife. Patriarchal law in the family was based on filial piety, the main of the four virtues highlighted by Confucius. The family was engaged in moral education of the individual from birth and instilled in him norms of behavior in society, respect for ancestors, reverence for the sovereign. The status of a woman in ancient China was lower than that in Russian culture, which was due to the Christian and Confucian religious and ethical systems that determined the order of life of society, as well as the custom of polygamy that was prevailing in traditional China. Despite the influence of the Orthodox Church, a woman played an important role in the life of the family and the community, while in Chinese culture the status of a woman became higher only with the advent of the New Age.

According to the classification of E. Hall, Chinese culture is collectivist. According to the four-membered typology of A. Kreber, the Chinese system of kinship terms is bifurcatively linear, while the Russian system of tokens united by the seme «родство», refers to the linear type [Kroeber A.L., 2009]. CM. Tolstaya notes that it was the bifurcatively linear system of kinship terms that was characteristic of the Old Russian language, as in modern Chinese. Such lexemes as «вуй» and «стрый» had the meaning "father's brother", and «вуйка» and «стрычина» - meant the father's sister [Tolstaya SM, 2009]. As for now, these terms are no longer in use.

The following methods were used in the study: continuous sampling method, comparative typological method, component analysis, comparative-matching method.

The study was prepared on the basis of the material of the Great Sino-Russian Dictionary of D.G. Mudrova, Z.I. Baranova, V.E. Gladtskova, V.A. Zhavoronkova [Mudrov D.G., Baranova Z.I., Gladtskov V.E., Zhavoronkov V.A., 2009] and the dictionary of Chinese terms of kinship Feng Hanjing [Hanjing Feng, 1989].

The terms of kinship were divided into two groups: lexemes with the meaning "cognitive kinship" and "matrimonial kinship". The Chinese language has 54 terms of consanguinity and 11 inherent terms, while in the Russian language there are only 24 lexemes united by an integral seme

“cognitive kinship” and 8 terms denoting matrimonial relations. The study was conducted on the basis of the data contained in the tables.

As a result of the linguocultural analysis, it became known that the semes “gender”, “degree of relationship”, “cognitive or matrimonial relationship”, “direct or lateral relationship” are common for linguistic cultures. The semantic attribute “age in one generation” is the most important for Chinese linguistic culture, while in Russian it does not play such a role. Tokens 伯伯 (father's elder brother) - 叔叔 (father's younger brother), 堂哥 (elder cousin) - 表弟 (younger cousin), 堂姐 (elder cousin) - 表妹 (younger cousin), 嫂子 (elder's wife brother) - 弟媳 (wife of the younger brother) contain the opposition on the basis of "older / younger." In Russian culture, age in one generation is less important, which is why all the terms combined by this seme are combinational: «младший брат», «старшая сестра» etc.

The Chinese system of terms of kinship is characterized by the presence of the seme “kinship of the father or mother,” which is not significant in Russian linguistic culture. The opposition “friend” - “foe” is connected with this sign, which determines membership in a clan. The ancient Chinese system of kinship presupposed the presence of direct (by father) and lateral (by mother) branches, since the bride passed into another family and continued the clan of her husband. In the Chinese language, a huge number of tokens are united by the semes “maternal / paternal relationship” and “age in one generation”, which indicates their special importance for Chinese linguistic culture. For example: 堂兄 (the eldest cousin of the father) - 堂弟 (the younger cousin of the father), 内兄 (the eldest son of the mother’s brother) - 内弟 (the younger son of the mother’s brother), 堂姊 (the elder cousin of the father) - 堂妹 (paternal younger cousin), 表姐 (maternal older cousin) - 表妹 (maternal younger cousin), etc.

The study revealed that the Chinese language allows you to more accurately describe the relationship of kinship, as it has a large number of terms and terminology of kinship in comparison with Russian. This feature is due to the presence of semantic attributes “age in one generation” and “kinship on the paternal or maternal side”, which are not characteristic of Russian terminology. The Confucian ethical system had a tremendous impact on the Chinese kinship system, increasing the clan's importance and instilling respect for ancestors and elders, which is reflected in the lexemes united by the integral seme “kinship”. Chinese culture is characterized by clannishness, patriarchalism and hierarchy. Androcentrism and patriarchy are also characteristic of Russian culture, but to a lesser extent, as indicated by the linear system of kinship and significant semes “gender”, “degree of kinship”, “cognitive and matrimonial kinship”, “direct or

lateral kinship". Thus, semes important for Chinese linguistic culture can be lost in translation, and the meaning of the terms of kinship cannot be adequately conveyed in translation into Russian, which confirms the need for linguists and translators to study this problem.

Table 1. Terms of consanguinity in Russian and Chinese linguistic cultures

Kinship terms in Russian linguistic culture	Kinship terms in Chinese linguistic culture
Отец, папа, папенька, батя, папаша	bàba/父亲fùqīn
Мать, матушка, мама, маменька, мамочка, мамаша	妈妈māma/母亲m□qīn
Сын, сынок	儿子érzi
Дочь, дочка	女儿 nǚér
Родители	父母fùmǔ/双亲shuāngqīn
Дети	孩子háizi
Дед, дедушка, дедуля	爷爷yéye/祖父zǔfù grandfather on the part of the father 姥爷lǎoye/外祖父wàizǔfù grandfather on the part of the mother
Бабушка, бабуля	姥姥lǎolao/外祖母wàizǔmǔ mother's grandmother nǎinai /祖母zǔmǔ father's grandmother
Внук, внучок	孙子sūnzi son's son 外孙子wàisūnzi daughter's son
Внучка, внученька	孙女sūnnǚ son's daughter 外孙女wàisūnnǚ daughter's daughter
Прадед, прадедушка	曾祖父/太爷爷zēngzǔfù/tàiyéye paternal great-grandfather 外曾祖父wǎizēngzǔfù maternal great-grandfather
Прабабка, прабабушка	曾祖母/太 zēngzǔmǔ/tàinǎinai paternal great-grandmother 外曾祖母wàizēngzǔmǔ maternal great-grandmother
Правнук	曾孙zēngsūn paternal great-grandson 外曾孙wàizēngsūn maternal great-grandson
Правнучка	曾孙女zēngsūnnǚ paternal great-granddaughter 外曾孙女wàizēngsūnnǚ maternal great-granddaughter
Старший брат	哥哥gēge
Младший брат	弟弟dìdi
Старшая сестра	姐姐jiějie

Младшая сестра	妹妹mèimei
Дядя	伯伯/伯父bóbo/bófù father's older brother 叔叔/叔父shūshu/shūfù father's younger brother 姑父gūfu aunt's paternal husband 姨父yífù aunt's maternal husband 舅舅jiùjiu older/younger brother of the mother
Тетя	姑母gūmǔ father's sister 姨母yímǔ mother's sister 伯母bómǔ wife of father's older brother 婶母shěnmǔ wife of father's younger brother 舅妈jiùmā wife of older / younger brother of mother 姑姑gūgu older/younger sister of father 姨姨yíyí older/younger sister of mother
Двоюродный брат	堂兄tángxiōng paternal elder cousin 堂弟tángdì paternal younger cousin 内兄nèixiōng elder son of mother's brother 内弟nèidì younger son of brother's mother 堂哥tánggē older cousin 表弟biǎodì younger cousin
Двоюродная сестра	堂姐tángjiě older cousin (female) 表妹biǎomèi younger cousin (female) 堂　tángzǐ paternal older cousin (female) 堂妹tángmèi paternal younger cousin (female) 表姐biǎojiě maternal older cousin (female) 表妹biǎomèi maternal younger cousin (female)
Племянник	子zhízi brother's son 外甥wàisheng sister's son
Племянница	女zhínǚ brother's daughter 外甥女wàishengnǚ sister's daughter

Table 2. Terms of matrimonial kinship in Russian and Chinese linguistic cultures

Kinship terms in Russian linguistic culture	Kinship terms in chinese Linguistic culture
Невестка	儿媳/妯娌 érxífu/zhóuli (daughter-in-law) 嫂子sǎozi older brother's wife 弟媳dìxí younger brother's wife
Зять	女婿nǚxu son-in-law 姐夫jiěfu husband of the elder daughter
Муж	老公lǎogōng/ 丈夫zhàngfu
Жена	老婆lǎopo /妻子qīzi /太太tàitai /夫人fūren
Свекор	公公gōnggong

Свекровь	婆婆 pópo
Тесть	岳父yuèfù
Теща	岳母yuèmǔ / 丈母娘zhàngmǔniáng

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INTERNAL PICTURE OF A DISEASE AND TYPE OF ATTITUDE TO THE DISEASE OF TUBERCULOSIS PATIENTS

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The article considers the structure of the internal picture of the disease, the factors that form it. The aim of the theoretical and experimental study was to describe the model and scheme of the internal picture of the disease, as well as to identify its effect on the type of attitude towards the disease. The concepts "internal picture of treatment" and "internal picture of health" are analyzed. The article presents the results of a study of the attitude to the disease of patients with tuberculosis, gives a detailed description of the behavior of respondents in the disease.

Keywords: disease, internal picture of the disease, types of attitude towards the disease, patients with tuberculosis, internal picture of treatment, internal picture of health.

Attitude to the disease is formed in humans since childhood. We "learn to be ill", looking at relatives and friends at home and in society. The child compares how he is sick, what he feels and how he behaves with how others do it. Thus, an idea of the disease as a whole and the way of behavior in the disease are formed. Over time, a person learns to analyze individual symptoms of the disease, a personal idea of the causes and outcomes of diseases begins to form in him. The same disease has a specific individual image in each individual person. Many factors influence how a person perceives his disease and adapts to it.

Any chronic disease is considered by a person as a crisis situation leading to disorganization of personality. A special place here is occupied by the system of affective-cognitive response - the internal picture of the disease [10]. The disease affects the personality, deforms it. But personality also affects the disease, its course and prognosis.

The disease from the perspective of the theory of relations of V. N. Myasishchev is a significant event in the life of a person; therefore, one should speak about the personal meaning of the disease and its possible consequences [6]. To do this, you need to turn to one of the most important concepts of medical psychology - the internal picture of the disease.

The concept of the internal picture of the disease was introduced by R. A. Luria. He defined it as “the totality of the patient’s sensations and experiences in connection with the disease and treatment.” Luria identified the sensitive and intellectual levels in the structure of the internal picture of the disease. Subsequently, the psychological structure of this phenomenon became more complex, making it similar to the concept of quality of life. The quality of life, being an interdisciplinary concept, can be considered in the broader context of the functioning of the individual [10].

When studying the internal picture of the disease at the modern level of methodology, it is necessary to take into account the personal meaning and its dynamics [4], the quality of life of patients and the system of relationships between the doctor and patient [5]. Studying the mechanisms of psychological adaptation to the disease includes an analysis of the characteristics of the protective and coping behavior of patients.

A disease, regardless of nosology, can be defined in the framework of three approaches: as a certain state of the body or a change in the physical state of the body; as the point of view of the patient and the fullness of his awareness of the disease - from an emotional reaction to an independent concept; as a doctor’s interpretation or clinical diagnosis [13, 16].

The process of recognizing a disease in a patient is associated with going to a medical institution, recollecting and telling about past diseases, awareness of changed feelings, objective examination of the body, taking a certain position on the disease and the treatment process [11]. Of particular importance to the patient is the ability to obtain accessible information about the disease. Ideas about the disease significantly affect its course [18, 19, 23] and the emotional state of the subject [25, 27]. A change in the patient’s psyche is a consequence of the work of mental mechanisms in altered conditions that are caused by the situation of the disease. The most common to describe the subjective aspects of the disease, which determine the reflection of the disease in the psyche of the individual, in domestic medical and psychological research is the concept of "Internal picture of the disease."

In the future, the scheme of the internal picture of the disease was differentiated by N. Nikolaeva in 1987 by adding emotional and motivational components. She identifies 4 levels of the internal picture of the disease:

the direct-sensory reflection of the disease (a complex of painful sensations), the emotional level (experiencing the disease and its consequences), the intellectual level (knowledge of the disease), the motivational level (the emergence of new motives and the restructuring of the premorbid motivational structure). “The specific gravity of each level is different both at different stages of the same disease, and in different diseases” [3].

In 1976, Reznikova T.N., Smirnov V.M. proposed a model of the internal picture of the disease, based on the concept of the cerebral information field, which is based on the concept of long-term matrices [13].

In the typology of response to the disease Lakosina N.D. and Ushakova G.K. as a criterion, taken as the basis for the classification of types, is a system of needs that are frustrated by the disease: vital, social, professional, ethical, aesthetic or associated with intimate life [8].

The internal picture of the disease is a holistic, structurally complex and multidimensional psychological phenomenon that reflects the characteristics of the patient’s deep feelings in connection with the disease, its personal meaning [1]. The “personal meaning” of the disease can be obstructive (negative), positive or conflict [14]. The negative personal meaning is that psychological defenses begin to prevail in the patient’s personality structure.

R.M. Voitenko highlighted the factors that determine the internal picture of the disease: biological (somatic pathology, intoxication, infections, injuries), social (changing the social status of the patient); psychological (decreased self-esteem, loss of life prospects, a sense of inferiority, anxiety) [7].

As personal adaptation resources of the internal picture of the disease, one can consider the “internal picture of health” (“IPH”). This concept was introduced by A. B. Orlov as an alternative to a pathocentric medical model based on the concept of “disease” [17].

Ananyev V.A. also operated on the concept of "internal picture of health." He defined it as “a combination of intellectual representations of an individual’s health, a complex of emotional experiences and sensations, as well as his behavioral reactions”. Human self-knowledge underlies the internal picture of illness and health. The disease was defined by V. A. Ananyev as “a difficult life situation in which the internal picture of health is an element of self-consciousness that transforms into the internal picture of the disease in the process of socio-psychological adaptation” [17].

Uryvaev V. A. investigated the "internal picture of treatment." He considers this concept to be the key in the process of patient selection of a strategy of behavior in the treatment process [15]. The internal picture of

treatment includes the pre-medical stage of human activity. It consists of ideas about the disease and the methods of treatment used, it can have different intensity and content. The author correlates the considered concept with the concept of "compliance", believing that their structure and content are identical.

Thus, the content and structure of the internal picture of the disease was studied in the framework of various theoretical and methodological concepts, which contributed to the formation of the idea of the internal picture of the disease as an integrated multi-level personality system of the patient. The relations of the internal picture of the disease with other constructs necessary to understand the patient's attitude to the disease, treatment and his own life in the disease situation are formulated.

Studies of the internal picture of the disease and the type of attitude towards the disease in children and adults with various forms of the tuberculosis process have been carried out.

Sirenko I.A. and Rybalka V.V. studied the type of attitude to the disease of children and adolescents with a turn of tuberculin samples and various forms of active pulmonary tuberculosis. It was revealed that in children 10-14 years old at an early stage of infection in more than half of cases an adaptive attitude to the situation of the disease is revealed, while in patients with pulmonary tuberculosis the frequency of occurrence of adaptive types of attitude to the disease is reduced by almost 5 times. The diagnosis is a strong traumatic factor. Of great importance is the dynamics of the infectious and therapeutic processes. With positive dynamics, patients tend to deny the disease and hypersocial behavior. Thus, it was found that the form of the tuberculosis process does not affect the formation of the internal picture of the disease and attitude to it [12].

Researchers also emphasize the significant contribution of not only personal, but also microsocial factors to the formation of the attitude of tuberculosis patients to their disease [20, 24]. With pulmonary tuberculosis, a high level of social anxiety and a low level of quality of life, a fear of social isolation, which has gender characteristics, are noted [22]. The level of self-esteem of patients with tuberculosis is closely related to the peculiarities of their perception of the relationship of other people [21]. The stigmatization of tuberculosis patients by their social environment plays a very important role [26].

S. A. Petunova studied the subjective assessment of the complex of painful sensations studied using clinical interviews and questionnaires. It was revealed that in the first weeks of the disease, as well as during hospitalization for more than three months, most patients consider themselves

healthy. The emotional component of the internal picture of the disease is characterized by the presence of fears, feelings, anxiety for the future, affective outbursts, followed by apathy and a depressed state. The cognitive level of the internal picture of the disease is composed of the desire of patients to learn as much as possible about tuberculosis disease, course features, forms and methods of treatment. As the main source of information for most patients are the attending physician and hospital staff [9].

The motivational and behavioral component of the internal picture of the disease is characterized by the desire of most patients to continue working, to maintain their professional and social status. Such patients are ready for the doctor to take responsibility for treatment and cure in all possible ways, if only it would be possible to return to normal life and work. If the patient has no complaints, side effects of drugs are not expressed, patients tend to leave the hospital and finish treatment, motivating this with the need to return to work. Patients with an anosognosic type of attitude towards the disease indicate their lack of clinical symptoms of the disease, doubt the correctness of the diagnosis. They consider prescribing and taking medications unjustified and refuse to do so. Almost never, such patients lose their bad habits that adversely affect their health. In the work of S. Petunova, a description of patients with sensitive, ergopathically-sensitive and anxious types of attitude to the disease is presented. The predominant component of the internal picture of the disease in patients of these groups is emotional [9].

Gelfond M. L. et al. did not find a correlation between the form of tuberculosis and the type of psychological response to the disease, however, they found the dependence of treatment results on the psychological type of attitude to the disease. The prognosis of the course of tuberculosis and the effectiveness of treatment are to some extent determined by the type of patient personality [2].

A study was conducted on the type of attitude toward the disease in patients with tuberculosis. The experimental group consisted of 800 subjects aged 19-60 years: 400 women and 400 men. Criteria for inclusion in the experimental group: informed consent to participate in the study, the presence of the following diagnoses (according to ICD-10): A15.6 Tuberculous pleurisy, confirmed by bacteriological and histological; A15.7 Primary tuberculosis of the respiratory system, confirmed bacteriologically and histologically; A15.8 Respiratory tuberculosis, confirmed bacteriologically and histologically. The control group is identical to the experimental one in terms of number and gender and age composition. It included conditionally healthy adult subjects.

To study the types of attitude to the disease, the Methodology was used for the psychological diagnosis of types of attitude to the disease (TADIS).

An analysis of the results shows that there are statistically significant differences in the frequency of occurrence of certain types of attitude to the disease in men and women of the experimental group. In men, the manifestations of anosognosic and ergopathic types of attitude to the disease are significantly more often diagnosed, and in women - sensitive. The frequency of occurrence of the remaining types is not statistically different (Figure 1).

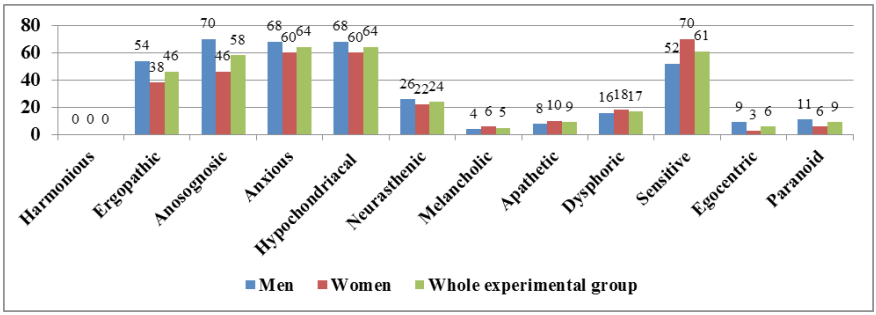

Figure 1. Frequency of occurrence of types of attitude to the disease in tuberculosis patients (%)

The severity of each type of attitude to the disease in men and women of the experimental group was studied. Graphically obtained values of scale estimates are shown in the form of a profile (Figure 2).

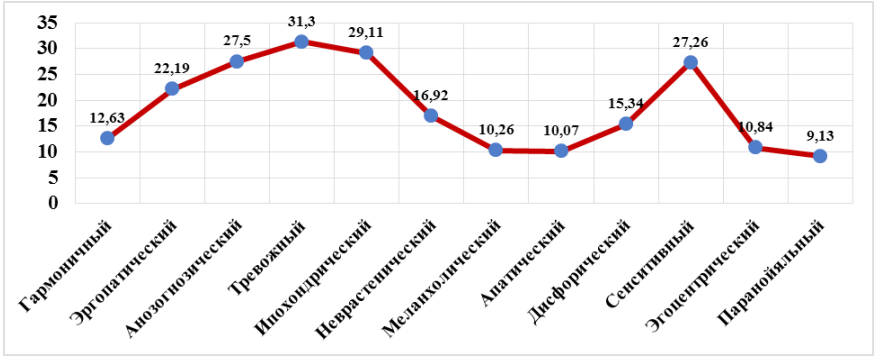

Figure 2. Type of attitude to tuberculosis disease

The most pronounced (31.3 points) and common (64%) is the ***anxious type of attitude towards the disease.*** Patients are concerned about the manifestations of the disease, its course and prognosis. They tend to doubt the correctness of the diagnosis and treatment prescribed. They try to get more information about the disease, and not always from doctors, they often turn to online sources or alternative medicine. Patients 'uncertainty about doctors' recommendations contributes to their frequent shift. Often without complaining to doctors, patients try to obtain information about the disease and treatment from other patients. The mood is reduced, there is a constant expectation of deterioration in well-being, fear of loneliness, loss of work, infection of loved ones.

The next type of attitude to the disease in terms of severity and frequency of occurrence in the experimental group is ***hypochondriacal*** (29.11 points and 64%, respectively). Patients of this subgroup are characterized by excessive focus on pain and unpleasant experiences. Patients tend to exaggerate the severity of symptoms and find non-existent diseases. Patients actively complain to doctors, medical personnel, but believe that they are inattentive and treated incorrectly. They require additional diagnostic and treatment procedures, but they are afraid of them and do not come for additional examination and treatment. Patients want to be treated, but doubt the success of treatment. Often turn to unconventional methods of treatment, express a desire to move from one doctor to another. Constant fear for one's health and the expectation of its deterioration hamper the fulfillment of professional and family responsibilities. The future seems hopeless.

Sensitive type of disease response was detected in 61% of subjects of the experimental group. The severity of it in the group is 27.26 points. Patients in this subgroup are characterized by increased sensitivity in relationships with others, due to the disease. The adverse impression that patients make on people around them is very worrying. The respondents of the experimental group with this type of attitude towards the disease are very sensitive and vulnerable, do not tolerate an incorrect attitude to themselves on the part of medical personnel and doctors. Patients are afraid to infect others, but at the same time they are very worried that close relatives and friends will turn their backs on them for fear of infection. Patients in this subgroup tend to be ashamed of their illness and fear of being isolated from society.

Anosognosic type of attitude towards the disease was diagnosed in 58% of patients with tuberculosis. Its average value in the group is 27.5 points. This type of attitude towards the disease belongs to the first block;

social and mental adaptation is not significantly disturbed. Patients tend to reject thoughts of the disease, its consequences and possible complications. There is no desire to be treated, the doctor's recommendations are not taken seriously. Patients hope that everything will go away by itself, that doctors in vain frighten with possible complications and death. The respondents in this subgroup seek to live their normal lives, ignore the deterioration in well-being and requests from close relatives to start treatment and not to abandon it prematurely. The likelihood of infection of others and the refusal of treatment increases. As a result, the emergence of drug resistance and a decrease in the likelihood of a favorable outcome of the disease.

Conclusions.

1. The internal picture of the disease is a multi-level system of personality of a person, which was formed as a result of a mental reflection of the state in which it is located. It includes certain knowledge, a system of ideas, assessment criteria, emotions and feelings, motives, behavior, and defense mechanisms associated with the disease. the study and timely determination of the type of person's response to the disease are of great importance for the correct assessment of the patient's condition, doctor's tactics and treatment methods in order to prevent the negative influence of the person on the course of the disease and to mobilize the body's protective reactions.

2. The study and timely determination of the type of person's response to the disease are of great importance for the correct assessment of the patient's condition, doctor's tactics and treatment methods in order to prevent the negative influence of the person on the course of the disease and to mobilize the body's protective reactions.

3. In patients with tuberculosis, a diffuse type of attitude towards the disease is diagnosed: anosognosic (1 block), anxious (2 block), hypochondriacal (2 block), sensitive (3 block). The types of disease response related to the second block prevail. They are characterized by an intrapsychic orientation, causing violations of the social adaptation of patients. The behavior is maladaptive, characterized by the presence of reactions of the type of irritable weakness, anxious, depressed mood, failure to fight, heterogeneous aggressive tendencies, blaming others for their illness, using the presence of the disease to achieve certain goals.

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THE IMPACT OF MODERN STERILIZATION TOOLS ON THE PREVENTION OF HCAI

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Health care–associated infection (HCAI) are considered as one of the most acute problems of modern health care, as well as features of modern means for sterilizing medical devices, difficulties in choosing the most suitable sterilization options for practitioners of health, the optimal choice and proper use of sterilizing agents, sterilization equipment, sterilization controls.

Keywords: HCAI, sterilization, sterilizing agents, sterilization equipment, sterilization controls, sporocidal action.

Health care – associated infection, (HCAI) is one of the most acute public health problems. The introduction of new types of diagnostic and treatment equipment, the use of high-tech invasive procedures, the widespread use of a variety of antibacterial drugs, leading to the selection of highly virulent patient bodies - these and many other factors contribute to the growth of nosocomial infection of patients and staff.

In surgical practice, in 69.2% of cases, instruments and dressings served as transmission factors for infection pathogens due to inefficient sterilization equipment, and in 30.8% due to aseptic disorders by personnel working with sterile material [1].

Means for pre-sterilization cleaning and sterilization - medical devices, which have found application today in healthcare, have largely changed the situation with the processing of these products. At the same time, the multiplicity of these tools, taking into account their multifunctionality, often creates difficulties when practitioners choose the most suitable options. The conditions and modes of use of funds of similar composition and purpose, specified in the "Manuals", often differ significantly from each other depending on the researchers, developers of documents. The

expansion of the number of research centers has eased the question on the timing of testing new tools, but has led to a difficult situation with the adequacy of the study results. In some cases, insufficient knowledge of research methods leads to falsely "good" results and recommendations of knowingly underestimated values of such parameters of the regimes as the concentration and time of exposure of the agent, and in some cases the temperature of exposure.

An important principle for the implementation of sterilization measures is the optimal selection and proper use of sterilizing agents, sterilization equipment, and sterilization control equipment.

A full-fledged modern set of accessories for sterilization by a specific method should include: a sterilizer in which a sterilizing agent is produced and / or used; cartridge with sterilizing agent (for certain chemical sterilization methods); sterilization packaging materials; biological indicator; chemical indicators of various classes.

Therefore, when choosing methods, preference should be given to those in which products can be sterilized centrally in packaged form, and for which there are control options. A modern sterilizer must carry out the process automatically, have control systems, light and digital indicators, an audible alarm and process blocking systems; it is desirable that the apparatus provides a printout of information about a perfect cycle [5].

In recent years, in medical institutions, many new domestic and foreign sterilizers have appeared with different operating principles: steam, air, infrared, gas, plasma. Significant positive changes are observed in equipping practical facilities with sterilization packaging materials and chemical indicators of different classes that are applicable to sterilization methods used.

The changes that took place in the field of sterilization of medical devices certainly would not have reached this level without the development and implementation of new regulatory documents, including adopted in the rank of GOST R ISO and interconnected with the harmonization process of domestic and foreign approaches in this field. For the first time in Russia, these documents standardize the requirements for the specified materials and equipment, which allows not only to correlate foreign samples proposed for implementation in Russia, but also enables domestic developers to create products that meet modern international standards [9].

In the future, it is planned to consider standards for small steam sterilizers, for air sterilizers, as well as a revision (due to clarification of a similar foreign standard) of 1 part of the standard for chemical indicators. The

introduced standards require rethinking, taking into account new knowledge and practical experience, which should provide for their periodic revision.

In practice, during sterilization, one often has to face certain difficulties: the equipment instructions do not always give a full description of the recommended cleaning and disinfection products, as well as the processing steps.

Sometimes the chemicals listed in the instructions are not registered in the Russian Federation, which creates a problem when choosing disinfectants. In addition, not all medical workers conducting disinfection know which groups of active substances can provide the necessary level of disinfection for a particular sensor without damaging it. The medical staff should be careful in choosing the right level of disinfection, and when choosing a means for cleaning and disinfecting, focus primarily on the antimicrobial activity of the active substance. Among the disinfectants registered in the Russian Federation, there are 159 ineffective against Mycobacterium tuberculosis, which contain Quaternary ammonium compounds (QAS) and guanidines, and at the same time have the corresponding modes in the instructions. And also there are more than 60 types of disinfectants based on QAS, amines and guanidines, which do not have sporocidal properties, but for some reason have in their instructions the modes of HLS and sterilization. But according to paragraph 2.19 SanPiN 2630-10 “For chemical sterilization, solutions of aldehyde-containing, oxygen-containing and some chlorine-containing agents exhibiting sporocidal action are used” [2,6].

In this case, not only belonging to the group of active substance, but also the amount of active substance in the working solution of the disinfectant, its Ph and interaction with other components are important. Unfortunately, there are ineffective agents in which the minimum amount of active substances is not maintained even according to the bacterial regimen. The use of such disinfectants for the treatment of semi-critical and critical medical devices, which include endocavital and intraoperative ultrasound sensors, endoscopes and other products, contributes to the spread of infections and entails a violation of SanPiN, which in turn can lead to administrative and criminal liability. To solve this serious problem, a new regulatory document was developed - Sanitary rules for the prevention of infectious diseases with endoscopic interventions. (SP 3.1.3263-15) [7].

Important for public health are guidelines for the processing of endoscopes and instruments for them, as well as for controlling the removal of

air in steam sterilization chambers. At the same time, there is an urgent need to prepare a new general document on sterilization control.

It is advisable to consider the inadmissibility of local production of biological indicators for monitoring the operation of sterilizers in medical institutions, which, first of all, concerns indicators for monitoring steam and air sterilizers. Any indicators should be registered in the prescribed manner by the manufacturer. As for the rules and processing conditions for specific groups of products, the processing of flexible endoscopes remains a constant issue [3].

For their sterilization, effective solutions of agents containing as active substances sufficient quantities of aldehydes, oxygen-containing or some chlorine-containing components with sporocidal action are effective. However, an increase in the number of registered and recommended chemicals for this purpose does not solve the problem of quick, high-quality and gentle sterilization of these complex products. Significant labor and time costs for manual processing leave relevant issues in the development and implementation of equipment for mechanized cleaning, as well as for sterilization of these products. So far, the facilities proposed for this, as a rule, are related to foreign developments, which, due to their high cost, are not available for widespread implementation of the work of medical institutions.

Concerns remain regarding the quality of cleaning and sterilization of a number of dental instruments, as well as products used in cosmetology. In some cases, the absence of appropriate markings on their packaging leads to the fact that complex single-use products for processing are used repeatedly in practical conditions and processed according to the regimes developed for instruments of a different constructional design, calling into question the very possibility and effectiveness of both pre-sterilization cleaning and sterilization [8].

The urgency of the problem, as well as the lack of common standards, prompted the community of specialists of the Russian Federation to create federal clinical recommendations (FCR) “Optimization of epidemiological safety when using medical equipment and medical devices in regime and specialized departments of medical organizations”.

Federal clinical recommendations are an official practice paper that sets out technologies for quality assurance, assessment, and auditing of epidemiological safety. This and educational material, as well as practical recommendations in those aspects that are not described in the Sanitary Rules and Regulations (SanPiN), for which there are no guidelines (GL) and Sanitary Rules (SR).

Previously, it was not indicated anywhere how to use and process equipment in the operating unit and ultrasound equipment. But the processing of US sensors is an extremely complex process. And if there are Sanitary rules for the processing of endoscopic equipment, then there are no such regulatory documents or standards for US equipment in Russia, although the risk of using endoscopic and US equipment without proper processing is the same.

Thanks to federal clinical guidelines, it is now possible to understand what can be used and what does not have reliable barrier properties, how to process equipment without a case (cover) and using a case [9].

In FCR, classifications are presented and action algorithms are described, as in guidelines or in the Sanitary Rules, a list of references and reference information in the form of photographs are given. This is a practical document that is intended for epidemiologists, doctors and nurses of medical institutions, healthcare organizers, it can be useful for students, graduate students and teachers of medical schools and the system of postgraduate medical education. The recommendations contained in the document on the use of special polymer covers for the protection of sensors and disposable sterile coatings for the protection of medical equipment were developed by specialists in the field of disinfection and hospital epidemiology, surgery and functional diagnostics based on a synthesis of experience, existing scientific data and in accordance with international standards.

It should be noted that in federal clinical guidelines, the barrier method is considered for the first time as an independent method of nonspecific prevention of infections associated with the provision of medical care, by creating a mechanical barrier impervious to liquids, biological agents (microorganisms) through the use of special authorized products.

One of the main directions in the activities of medical organizations is to ensure the safety of patients and staff. The concept of safety also includes the epidemiological safety of medical care. The most significant component of the entire security complex is considered to be the prevention of infections associated with the provision of medical care [9].

The HCAI National Prevention Concept sets the strategic goal of healthcare to ensure the epidemiological safety of the organization of the diagnostic and treatment process, which is an integral requirement for the provision of quality medical care.

Thus, based on constantly replenishing research results, taking into account the expanding harmonization with foreign approaches, it is necessary to further improve the means and equipment for pre-sterilization

cleaning and sterilization of medical devices, as well as their means of control, training and professional development on these issues of medical personnel - preventive institutions, persons performing control functions, employees of development companies and suppliers, as well as teachers of educational organizations [4].

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ENDOSCOPIC ADENOMECTOMY - MODERN VIEW ON THE PROBLEM

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The article provides an overview of existing enucleation techniques for adenomatous tissue in benign prostatic hyperplasia. A brief history of the development of both traditional (open adenomectomy) and endoscopic enucleation techniques is presented. Particular attention is paid to modern transurethral surgical treatment of BPH. The features of the technique of performing holmium laser enucleation of the prostate, as one of the most radical modern methods of surgical treatment of prostatic hyperplasia, are examined in detail. Other laser and non-laser enucleation methods are also touched upon. A comparative analysis of open and endoscopic techniques has been conducted. The validity of the term endoscopic adenomectomy is determined.

Keywords: endoscopic enucleation, adenomectomy, holmium laser, transurethral resection.

Benign prostatic hyperplasia (BPH), being the most common non-cancerous disease in older men, occurs in more than 40% of men over 60 and is the most common cause of lower urinary tract symptoms (LUTS) in men [2].

Over the past decades, approaches to the treatment of BPH have undergone significant changes. Effective medicines exist, new ones appear and existing minimally invasive methods of treatment are improved. But even such a variety of methods does not solve the problem, because in many cases, due to the progression of BPH, the need for surgical treatment remains high [10].

The history of surgical treatment of BPH, as such, begins in 1884, when Eugene Fuller performed the first suprapubic removal of prostate adenoma. In 1890, Peter Freyer reported the first adenomectomy with a mortality rate of 5%. This operation was called Freyer adenomectomy and was the “gold standard” for BPH for more than half a century.

An entire century has passed since open prostate adenomectomy (OPAE) was developed. Naturally, progress did not stand still. During this period, new methods of surgical treatment of BPH were mastered, endourological transurethral interventions were widely developed and spread, however, the nature of the complications remained largely the same [1].

Currently, the generally accepted "gold standard" of surgical treatment of BPH due to its safety and effectiveness, including long-term results, is transurethral resection of prostate (TURP) [36]. But even with TURP, complications such as bleeding, hyponatremia, and less commonly TUR-syndrome are encountered [12, 13, 39]. These complications can be avoided during bipolar TURP [14, 19, 25]. Bipolar TURP allows resection in saline. In this case, the current, in contrast to the monopolar system, does not pass through the body into the cutaneous electrode. The bipolar circuit is closed at the resection site between the active and return poles, fixed in a single unit on the resectoscope (true bipolar system) or tube (pseudobipolar system). With all the advantages of the method, a long time of resection can lead to the appearance of electrolyte disorders, which limits the possibility of TURP in patients with a prostate volume of more than 80 cm^3.

This limitation was the reason for the search for alternative methods of endoscopic surgical treatment. It is well known that open prostate adenomectomy is a truly radical method of treating patients with BPH. Some authors believe that open surgery is preferable, and has more advantages, in comparison with endoscopic techniques, as it provides simultaneous and complete removal of the adenoma [11].

The essence of an adenomectomy is the blunt separation or enucleation of the operator of hyperplasia nodes by the finger from the so-called false adenoma capsule, which ensures radicalness. It is this “anatomical enucleation” that is the key criterion for radicalness.

However, for all its radical nature, OPAE is very traumatic and is accompanied by a large number of complications. Therefore, the main direction of progressive thought working in the field of surgical treatment of BPH is the creation and implementation of a technique that combines the radicalness of open adenomectomy and minimally invasive endourological techniques. That is, the creation of an ideal method - endoscopic adenomectomy.

As early as 1983, the term transurethral enucleation (TUE) of the prostate was introduced. So, Hiraoka Y. [27] described more than 300 cases of TUE, in which he separated the adenoma from the false capsule with a blunt blade ("Hiraoka's detaching blade") or with the tip of a resectoscope in the same way as with an open adenomectomy. At the same time, the author claims that he did not have a single case of repeated surgery for recurrence of adenoma. The 2016 European Association of Urology (EAU) guidelines for the treatment of non-neurogenic lower urinary tract symptoms caused by BPH introduced the concept of endoscopic enucleation of the prostate (EEP), which combines existing types of enucleation [30].

EEP can be divided into 2 types, depending on the technique, the radical implementation or the anatomy. One method is transurethral enucleation in a blunt way along the false capsule of the prostate gland, the so-called anatomical enucleation, which allows you to completely remove the adenoma. The second method is transurethral enucleation along the surgical capsule - i.e. TURP [27].

In general, however, speaking of anatomical enucleation, we imply the removal of adenomas along the false capsule. Endoscopic enucleation can be carried out using both laser energy (laser methods) and electrical energy (non-laser methods). Existing EEP methods, in accordance with the recommendations of the European Association of Urology (EAU), include holmium laser enucleation of the prostate gland (HoLEP) and thulium laser enucleation of the prostate gland (ThuLEP) [18], as well as methods of monopolar and bipolar electroenucleation of the prostate gland.

For the first time holmium laser was applied by scientists from New Zealand - Peter Gilling and Mark Fraundorfer. They started working with a holmium laser in 1996 [21], and in 1998 P.J. Gilling, M.R. Fraundorfer [23] presented preliminary results of holmium laser enucleation of prostatic hyperplasia with intravesical morcellation of removed tissue in 14 patients [6]. The creation and use of a morcellator has become a significant event in the use of a holmium laser. It was first used in 1996 in the United States and was originally used by gynecologists to remove bulky connective tissue formations from the abdominal cavity. It is thanks to morcellation -

the ability to remove large tissue fragments through a channel of small diameter that made it possible to create holmium laser enucleation, which changed the approach to the surgical treatment of adenoma. This fundamentally new technique pushed into the background the methods of ablation and resection [7,21]. The combination of vaporizing, hemostatic capabilities of a holmium laser with transurethral morcellation allows effective surgical treatment of large adenomas with immediate improvement in urination and a decrease in the number of complications [8].

With holmium enucleation, laser energy with a power of 60-100 W, concentrated "at the tip" of the laser fiber, allows you to dissect adenomatous tissue. In this case, the adenomatous nodes are separated from the capsule in the same way as it is done with the index finger of the surgeon during an open adenomectomy [1]. Consistently enucleated middle and lateral lobes retrogradely displaced into the bladder and subsequently evacuated using a morcellator. If it is not possible to use a morcellator, the lobes of the prostate gland are partially enucleated and then the devascularized lobes are crushed using a resectoscope and removed via the tube of the latter (the “mushroom” technique). Coagulation of bleeding vessels is ensured by removing the tip of the fiber 3-4 mm from the vessel. Saline or glycine solution is used as an irrigation fluid during HoLEP [2].

The combination of the hemostatic capabilities of the holmium laser and transurethral morcellation allows for the effective treatment of even large adenomas, providing an immediate positive urodynamic effect, as with TURP, with fewer complications. The initial use of the holmium laser in the treatment of BPH was a combination of holmium and neodymium Nd:YAG lasers – endoscopic laser ablation of the prostate. A holmium laser was used to vaporize (burn) the channel before conducting a quadrant Nd:YAG with the laser. Later it became possible to vaporize the prostate only with a holmium laser wave and used an electrode with end (side) or end glow - the HoLAP technique (holmium laser ablation of the prostate).

In recent years, HoLEP has become increasingly popular. HoLEP has several advantages over TURP, especially in patients with large prostate volumes [28]. According to EAU recommendations, with a prostate volume greater than 80 cm^3, HoLEP is the operation of choice along with open adenomectomy and bipolar enucleation [31]. Some authors have called HoLEP the new “gold standard” for the surgical treatment of prostate hyperplasia [40]. In addition, to date, holmium enucleation of prostate adenoma is positioned as a “size-independent” procedure, i.e. applicable to adenomas of any size [29,41]. Conducted scientific studies confirm the

high efficiency of holmium enucleation in the elimination of infravesical obstruction due to prostatic hyperplasia. So, Elmansy H.M. [6] reports positive results of examination of patients even 10 years (62 months) after surgery, including with large prostate hyperplasia.

After HoLEP, in 2004, the method of bipolar plasmakinetic enucleation of the prostate (PkEP) appeared, then later, in the late 2000s, other transurethral methods based on laser exposure to the enucleation technique appeared: Tm:YAG (thulium laser with an aluminum yttrium garnet) vapoenucleation (TuhuEP) anatomical enucleation with support for Tm:YAG (thulium enucleation of the prostate - ThuLEP), diode laser enucleation of the prostate (DiLEP) and, finally, enucleation with a green laser "Greenlight" (GreenLEP) with lithium borate modulation (LBO).

Many of the proposed laser techniques were rejected at the initial stage of their use, as unsuitable for enucleation [24].

So, in 2010 Herrmann T.R. with colleagues [25] were the first to propose a holium-like technique for enucleation of an adenoma using a thulium laser called ThuLEP (thulium laser enucleation of the prostate). If the radiation in a holmium laser is excited by a flash lamp, in a *thulium* laser, energy is emitted in a continuously generated wave mode. Thulium ions in this case are excited directly by high-power laser diodes. Thanks to the continuously generated laser beam, the thulium laser works better in soft tissues.

The pulsating radiation of a holmium laser causes a tearing effect, while the constantly generated wave of a thulium laser allows you to smoothly excise tissues and vaporize them, achieving excellent hemostasis. Since water is found everywhere in soft tissues and is the target chromophore, this creates a constant chromophore content in laser-irradiated tissues and leads to a uniform interaction of radiation with tissues [26].

As with HoLEP, a large number of studies have been conducted that confirm the effectiveness of ThuLEP [5]. Review of Barbalat et al. [15] showed that thulium laser enucleation of the prostate is a safe and effective procedure. Even before the development of ThuLEP, a thulium laser was used to perform vapoenucleation of the prostate gland. The ThuVEP procedure was introduced in 2008 for patients with large adenomas.

In general, ThuVEP and ThuLEP, - "twins" of laser technology, have demonstrated the full spectrum of laser exposure with enucleation techniques. Moreover, while with ThuVEP, the adenoma tissue is firstly vaporized by long-wave lasers for fast, efficient and safe enucleation, then with ThuLEP, almost blind mechanical enucleation is performed using a laser only for dissecting adhesions and mucous membranes [24].

For obvious reasons, the emergence and spread of such high-tech and promising methods, in particular HoLEP, as well as ThuLEP, has led to the appearance of many publications devoted to assessing the complications after these interventions and their effectiveness. Many centers describe the first experience of using such technologies [8]. The use of thulium laser energy for enucleation and separation of hyperplastic tissue from the capsule is accompanied by significant carbonation and leads to the fact that the operator tries to minimize the use of laser energy and carries out for the most part mechanical enucleation with a resectoscope.

A number of authors analyzed the effectiveness of HoLEP in comparison with other surgical methods for treating the prostate gland: TURP [17, 20], open adenomectomy [29, 32, 37], endovascular surgical adenomectomy [9], the results of HoLEP and ThuLEP were compared [7, 18, 38]. In 2 large meta-analyzes [33, 34], HoLEP and bipolar enucleation were compared with OPAE. They showed that no significant difference between EEP and OPAE was observed in the medium and long-term observation. At the same time, HoLEP is characterized by a shorter period of irrigation, catheterization, and hospitalization.

With a large number of factors affecting the choice of method, in economically developed countries, preference is given to transurethral. In this regard, there are ideas about the futility of using open methods in our country. However, in many countries of the world, the traditional surgical treatment of BPH - open adenomectomy is a priority method, so it has the right to exist along with the latest modern techniques. So, according to Pevzner P.N. [10], the ratio of open and transurethral operations of prostate hyperplasia in certain regions of the Russian Federation (RF) according to different authors was as follows: according to N.A. Lopatkina in 2002 in Moscow, the ratio was 69.4% to 30.6%, in St. Petersburg according to Komyakov S.K. 64.67% to 35.33%, in Kazan according to Sitdykov E.N. the ratio is categorically inclined in favor of OPAE: 91.31% to 8.69%.

In addition, an alternative method of surgery for the treatment of prostate adenoma is used in RF: extraurethral transvesical and posterolateral urethro- and vaso-preserving adenomectomy. A distinctive feature of this technique is the preservation of the dorsal and urethral vascular plexuses and the integrity of the prostatic urethra [11].

Comparative analyzes of the results of surgical treatment of BPH are carried out haphazardly by various authors, often only by listing the complications that arose. Most often, 2 any methods of surgical treatment are compared: either transurethral (for example, TURP versus HoLEP) [17, 20], or 2 modifications of a single transurethral method, for example,

HoLEP versus ThuLEP [38]. There is no systematic approach to assessing complications arising after open or transurethral interventions in BPH. There are no adequate criteria according to which it would be possible to evaluate each method even at the stage of its development. Such criteria, in accordance with the Clavien-Dindo classification, were developed with respect to complications of endoscopic surgery of nephrolithiasis [4].

That is why today the study of the nature of surgical complications in OPAE, TURP, HoLEP, their systematization and comparative analysis in relation to each of the studied methods of surgical treatment, as well as the development of adequate measures to eliminate complications, begins to play an important role. This is necessary for the most adequate assessment of endoscopic adenomectomies.

Thus, we can clearly say that the future in the surgical treatment of BPH today is determined by modern methods of endoscopic enucleation, such as holmium and thulium, as well as bipolar enucleation of the prostate gland. However, open adenomectomy cannot be discounted either, since high-tech operations, such as HoLEP and ThuLEP, are not yet widely implemented and require high-level experience and endoscopic skills in many centers.

The radicalness of surgical treatment for BPH lies in the "anatomical enucleation" of the adenoma within its surgical capsule. And if with OPAE, which provides the best results, enucleation is carried out manually, blindly, then with laser or bipolar enucleation, this procedure is carried out under the control of vision, with the most complete hemostasis. That is, the so-called endoscopic adenomectomy is performed. Enucleation itself is of paramount importance, and not the energy source by which it is carried out, because the ultimate goal in all cases is precisely anatomical enucleation. Endoscopic adenomectomy using laser or non-laser techniques confidently leads the way in the problem of surgical treatment of BPH and the future lies in the improvement of endoscopic methods.

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THE VALUE OF CONE-BEAM COMPUTED TOMOGRAPHY IN ENDODONTIC TREATMENT

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The number of errors and complications during and after endodontic treatment is still at a high level. Often, the complex and variable anatomy of the root canals leads to failure of endodontic treatment. An important diagnostic method to determine the number of root canals and their anatomical structure is cone beam computed tomography (CBCT).

In our study, we examined the configuration of the root canal structure in the sagittal, frontal and axial planes according to CBCT data, the data obtained are compared with the classification proposed by Vertucci. 100 CBCTs were analyzed. During the study, a large variability in the structure of all groups of teeth was found, especially in the front teeth of the lower jaw, premolars of the upper jaw and molars (all five types according to Vertucci are found).

A survey was also conducted among dentists of St. Petersburg. Based on the results, only 70% of practicing dentists use CBCT in their practice.

Keywords: endodontics, root canals, cone beam computed tomography (CBCT).

Introduction

Endodontic treatment is one of the most popular and at the same time complicated procedures at the dental appointment. To date, the development of complications during endodontic treatment remains at a high

level. Often this is due to the peculiarities of the anatomical and morphological structure of the root canals, which are a complex structure system with numerous branches. [4]. It is the variable anatomy of the root canal with a large number of anastomoses and apical deltas that limits the possibility of complete mechanical processing [8]. The doctor must clearly understand the morphology of a particular tooth in order to be able to qualitatively and fully carry out mechanical and drug treatment, constant obstruction [1,2]. An important role in improving the quality of endodontic treatment is played by cone beam computed tomography (CBCT) [6]. The combination of microfocus shooting technology and the cone-beam principle of image acquisition has significant prospects and allows counting on obtaining new and additional information about the anatomical features of the dentofacial system [7].

CBCT is a method that allows to determine the configuration, quantity, patency of the root canals, which is important to consider when planning endodontic treatment [9].

Therefore, at the stage of diagnosis and preparation of the treatment plan, along with the main methods of examining the patient, the CBCT of the causative tooth plays a huge role.

Purpose of the study

Reveal the anatomical structural features of the root canal system according to cone beam computed tomography.

Materials and methods

An online questionnaire was conducted, in which 40 dentists took part: 20 of them were stomatologists and 20 endodontists working in dental clinics in St. Petersburg. Based on the analysis of the conducted survey, it was revealed that for the diagnosis of the root canal structure, cone beam diagnostics is used only by 70% of doctors.

100 CBCTs were analyzed:

The root canal configuration was evaluated by CBCT in the sagittal, frontal and axial planes, then compared with the classification proposed by Vertucci.

According to this classification distinguish [3]:

Type I - a single channel throughout.

Type II - two channels merging closer to the apex into one.

Type III - one canal, divided into two, which merge into one in the apical part of the root canal.

Type IV - two channels, separate throughout.

Type V - one channel, dividing into two separate channels in the lower third of the root canal.

The results of the study

According to the survey, the following data were obtained:

1. CBCT in their practice is used by 70% of practicing dentists. Not all doctors use the CBCT method in the diagnosis of complicated caries due to the fact that this technique is expensive. In many settlements there is no equipment that allows a CT scan, therefore this category of dentists in the treatment of complicated caries focuses on knowledge of the root canal anatomy - 95% of respondents, vital staining - 50% of dentists (to identify the root canal mouths), uses the x-ray method (intraoral targeted shots) -55%.

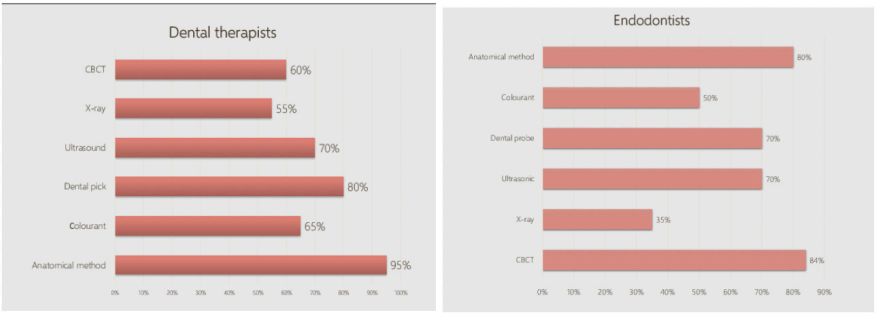

Figure 1. Frequency of using various root canal search techniques among dental therapists and endodontists.

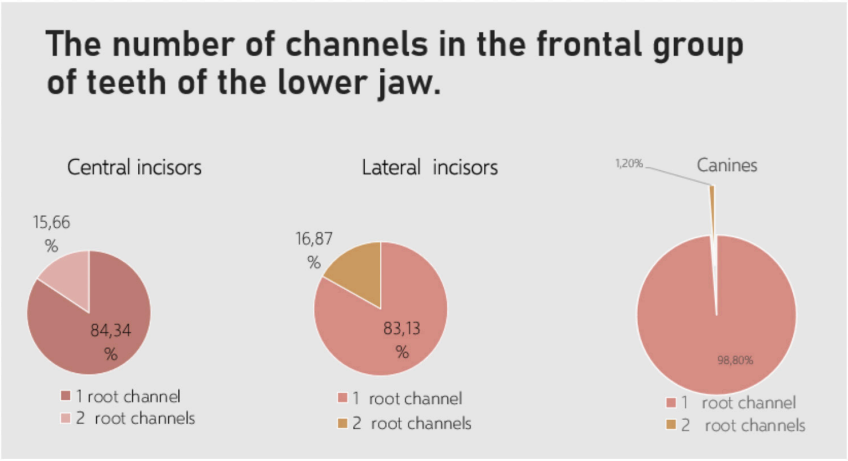

Figure 2. The number of channels in the frontal group of teeth of the lower jaw.

2. When analyzing a computer tomogram, the following data were obtained:

In the incisors and canines on the upper jaw, in 1% of cases, 1 channel was revealed (200 central incisors, 200 lateral incisors, 200 canines). Variability of the configuration was not detected. For the front teeth of the upper jaw (central, lateral incisors, fangs), 1 type of root canal structure according to Vertucci is characteristic.

In the central and lateral incisors of the lower jaw, 1 root canal occurs in 15.66-16.87% of cases, 2 root canals 83.13-84.34% of cases (200 central incisors and 200 lateral) (Fig. 2). 5 types of root canal structure were revealed according to Vertucci.

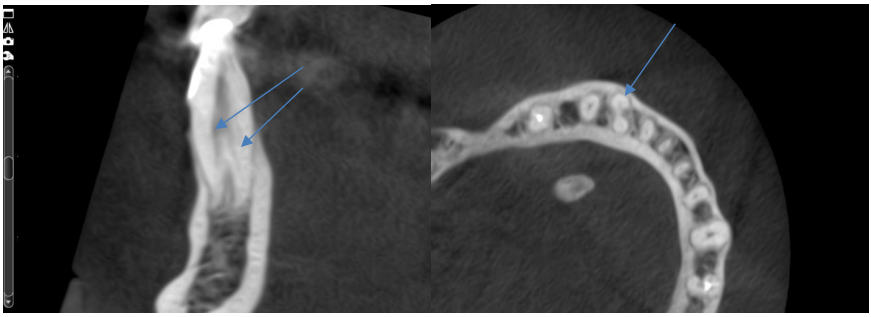

Figure 3. Cone beam computed tomography of tooth 4.3 in axial and coronal planes (V type of root canal structure according to Vertucci).

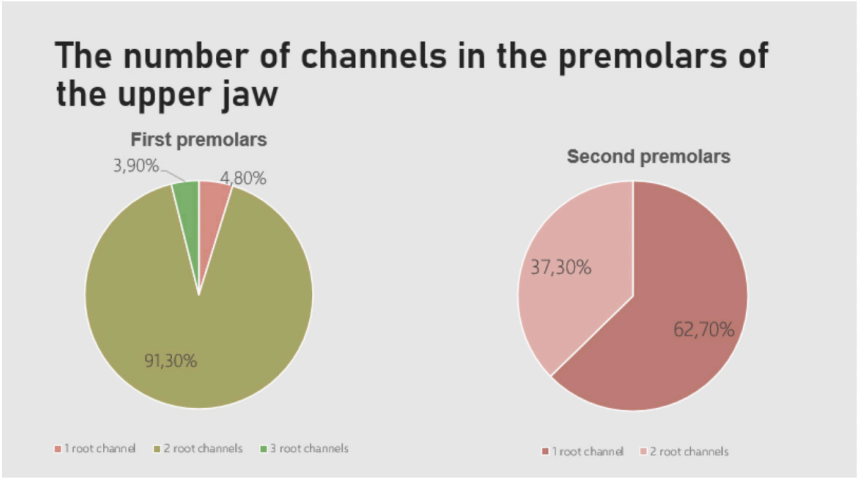

Figure 4. The number of channels in the premolars of the upper jaw.

In 1 premolars of the maxilla, in 1% of cases, 1 root canal was found, in 91.3% of cases, 2 root canals, in 3.9% of cases, 3 root canals (200 teeth). In the second premolars of the upper jaw, 37.3% had 2 root canals, the rest was 1 canal (200 teeth). (Fig. 4.5).

5 types of root canal structure were revealed according to Vertucci.

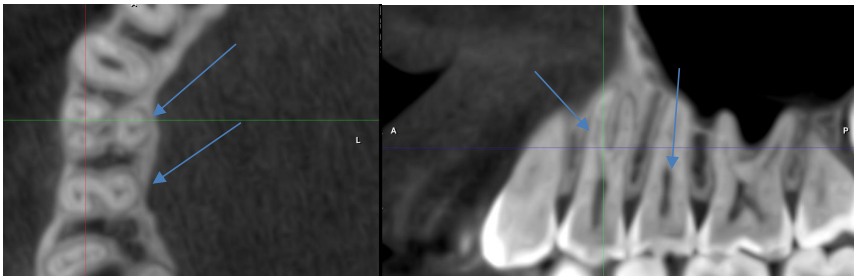

Figure 5. Cone-beam computed tomography of the tooth 1.4. and 1.5 in the coronal and axial projections (V and II type of root canal structure according to Vertucci).

As a result, it was revealed that premolar maxillars have a more variable anatomy compared to premolar molars.

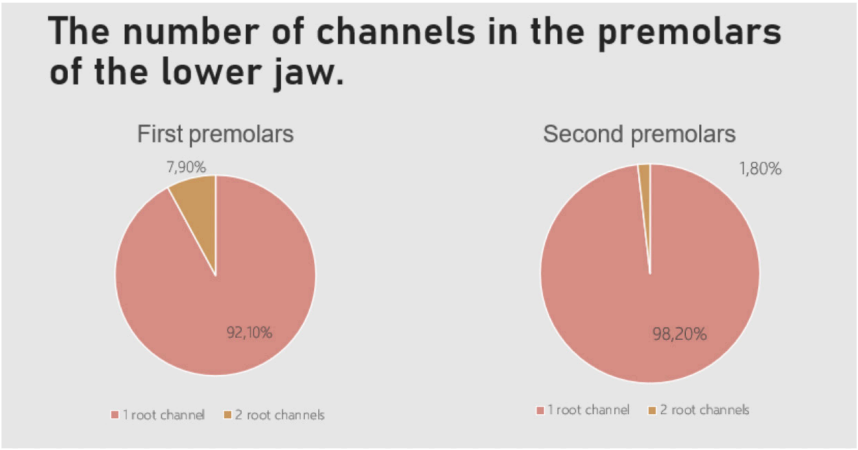

Figure 6. The number of channels in the premolars of the lower jaw.

When analyzing the CBCT of the first premolars of the lower jaw, it was revealed that in the first premolars of the lower jaw one root canal occurs in 92.1% of cases, 2 root canals in 7.9% (200 teeth). In the second premolars of the lower jaw in 1.8% of cases -2 root canals, in 98.2% - 1 canal (200 teeth). (Fig. 6).

The first premolars of the lower jaw have greater structural variability compared to the second. All 5 types of root canal structure according to Vertucci were.

In the first molars of the upper jaw a more variable anatomy, 4 channels were more common, in 20% of cases there were 3 channels (200 teeth). In the second molars of the upper jaw, 4.8 root canals were found in 4.8%, 3 root canals in 69.9%, and 4 root canals in 25.3% of cases (200 teeth). (fig. 7). All 5 types of root canal structure according to Vertucci were revealed.

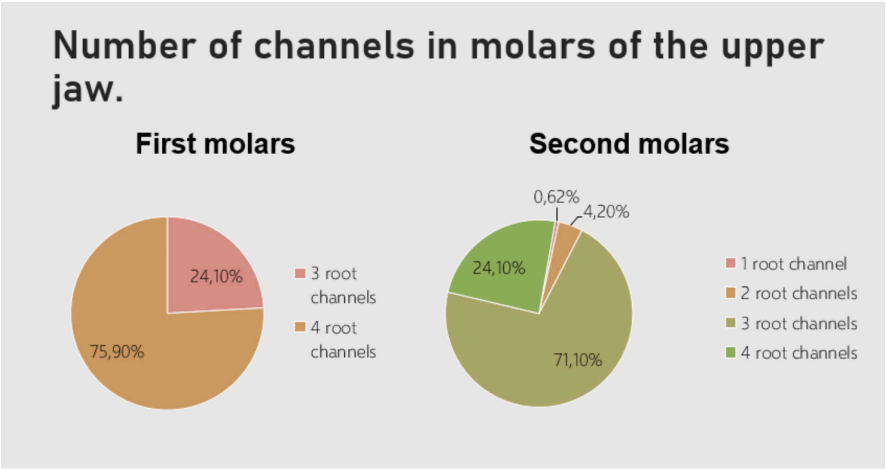

Figure 7. Number of channels in molars of the upper jaw.

The first molars of the lower jaw in 92.17% have 3 root canals, in 6.02% - 4 and in 1.81% of cases - 2 root canals (200 teeth). The second molars of the lower jaw in 91.5% of cases have 3 root canals, in 4.22% - 4, in 3.6% - c-shape channels and in 0.6% of cases - 1 root canal (200 teeth). (Fig. 8)

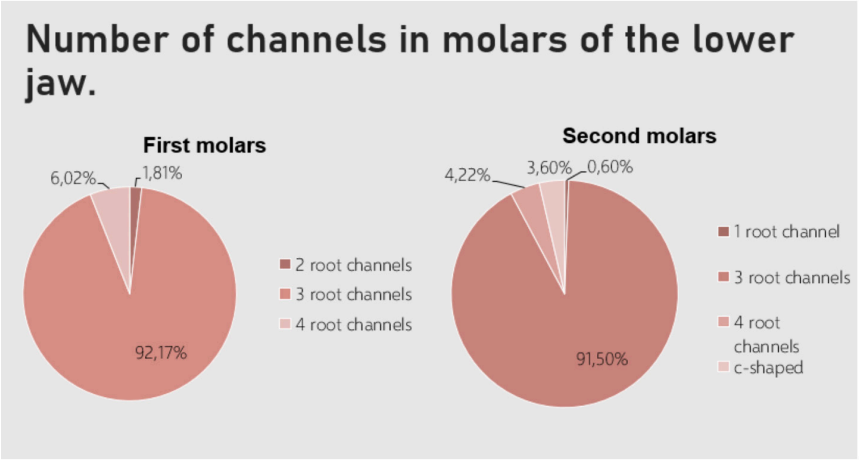

Figure 8. Number of channels in molars of the lower jaw.

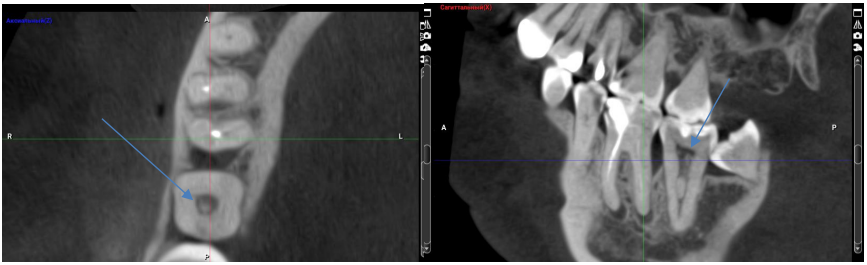

Figure 9. CBCT in axial and coronal projections tooth 4.7 has 1 root canal type I according to Vertucci.

According to the CBCT, the greatest variability in the structure of the root canals was found in the anterior teeth of the lower jaw, upper premolars, and molars. Often in premolars and molars, C-shaped channels are detected.

Such a structure must be taken into account when conducting endodontic treatment, as this causes certain difficulties in treatment.

Thus, the cone-beam computer diagnostics allows you to accurately determine the number of mouths and the configuration of the root canals.

We also conducted a comparative analysis of the results of our work and the data of other authors. In the incisors on the lower jaw in 2% of cases 2 channels were revealed, in 1988 Wolker (China) 1%. In the first

premolar in the lower jaw, 2 channels were found in 10% of cases, in Caliskan et al 1995 in 18% of cases, Burklein et al 2017 Germany in 22%.

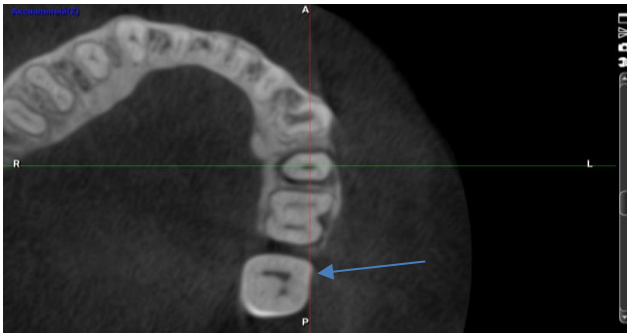

Figure 10. CBCT (axial projection) shows the C-shape channel of a tooth 4.7.

In the second premolars of the lower jaw 3% of cases were 2 channels, in the 2004 Sert and Bayirli study Turkey was 29% of cases [12].

The four-channel system in the first molar of the lower jaw in our study was found in 92.17% of cases, in the study of Wasti et al 2001 Pakistan in 43% of cases [13].

When analyzing the second molar of the lower jaw, the three-channel system is more common in 95% of cases, in the study of Razumova et al 2018 in 90% of cases [10].

When analyzing 60 distant second molars of the lower jaw among the inhabitants of Thailand, c-shape channels were found in 10% of cases [13], which is similar to the data of our study.

The large variability in the structure of the root canals in people of different countries is associated with different living conditions, different ethnic populations, different years of research and different age groups.

Conclusions

1**.** Based on the CBCT analysis, a large variability in the structure of the root canals was found, especially in the front teeth of the lower jaw, premolars of the upper jaw, and also in molars of the upper and lower jaw (all five types according to Vertucci were found).

2. An analysis of the questionnaire revealed that only 70% of doctors use CBCT in St. Petersburg.

3. To prevent possible errors and complications in the treatment of root canals of teeth with complex anatomy, it is necessary to use CBCT.

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THE EFFECT OF TOXEMIA ON THE CIRCADIAN RHYTHM OF CENTRAL AND PERIPHERAL HEMODYNAMICS IN SEVERE BURNS IN CHILDREN UNDER THREE YEARS OF AGE

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The authors showed that in the period of toxemia in infancy, a hyperdynamic type of blood circulation is characteristic. Part of the complex mechanism of the compensatory hemodynamic reaction during severe burn toxemia is a change in the magnitude of the daily fluctuations of MCO and TPR. The severity of the condition is characterized not only by an increase in the range of daily fluctuations in minute cardiac output (MCO), but also by significant daily fluctuations in total peripheral resistance (TPR) in the group of children with an average burn area of 30%, degree 6B 3B, and IF 70 units. The strong direct relationship between T°C and TPR and the absence of direct correlation between T°C and MCO in group 3 is due to hemodynamic failure in the formation of a compensatory reaction to fever, which is a harbinger of acute cardiovascular failure during toxemia in severe burns in infants.

Keywords: circadian rhythm, central and peripheral hemodynamics, burn, children under three years of age

Relevance. With imperfection of the subcortical parts of the brain of young children (up to 3 years), a higher metabolism is observed, which leads to the occurrence of a more severe period of toxemia and burn exhaustion. The cardiovascular system has great compensatory capabilities, which leads to persistent circulatory disorders, a state of de-

compensation of the contractile function of the heart develops due to increased heart rate. Due to the high risk of complications and mortality, the problem of developing effective timely corrective measures remains relevant [1,2,3].

Purpose. To study the effect of toxemia on the circadian rhythm of central and peripheral hemodynamics in severe burns in children under 3 years of age.

Material and research methods. Research data from 29 children of the age of 5 months to 3 years was studied. Patients were examined depending on the severity and area of damage, age, duration of treatment in the ICU. So in infancy, the number of children in ICU up to 10 days was 17 (1 subgroup), 11-20 days - 7 children (2 subgroups), more than 21 days (21-40 days –5 infants). Assessment of the severity of the burn was carried out by calculating the surface area of the damaged skin and using the Frank index. Hemodynamics were evaluated by minute cardiac output (MCO) and total peripheral resistance (TPR). A detailed analysis of reliably significant deviations, intergroup differences of the studied parameters was carried out. The results were obtained by monitoring with hourly recording of the studied parameters. The research data were processed by the method of variation statistics using the Excel program by calculating arithmetic mean values (M) and mean errors (m). To assess the significance of differences between the two values, Student's parametric criterion (t) was used. The relationship between the dynamics of the studied parameters was determined by the method of pair correlations. The critical level of significance was taken equal to 0.05. Intensive therapy from the moment of admission was aimed at rehabilitation from burn shock, simultaneous anesthesia and intravenous administration of crystalloids, volemic solutions under the control of hemodynamics, volume of diuresis. Regular, every 8-12 hours, the introduction of painkillers, non-steroidal anti-inflammatory, antihistamines, cardiotonic, desensitizing, stress-limiting agents, vitamins. According to indications, hormones and blood substitutes, parenteral nutrition were used. Humidified oxygen was inhaled. All children also received drugs against stressful damage to the gastrointestinal tract, anticoagulants. According to indications, early surgical necrectomy, prophylaxis of coagulopathy, energy-deficient state, volemic disorders, and correction of "tachycardial syndrome" were successfully carried out.

Results and discussion.

Table 1. Patient characterization

Groups	Age in months	Height, cm	Weight, kg	S in %	2-3 A	3 B	IF, cu	The number of days in the hospital	Days at ICU
1	19,3 ±6,2	81,6 ±8,8	10,9 ±2,2	32,7 ±9,8	32,7 ±9,8	0,1 ±0,03	33,4 ±10,1	15,4 ±3,5	6,8 ±1,8
2	14,2 ±4,6	79,7 ±5,7	10,1 ±1,9	33,6 ±7,6	24,8 ±7,4	9 ±2,8	48,4 ±11,28	41,6 ±10,2	12,8 ±1,3
3	10,1 ±2,1*	71 ±2,5	9,9 ±0,8	32,7 ±4,9	26,7 ±2,2	6 ±2,7*	71,3 ±8,4*	49,3 ±3,8*	26,3 ±2,4*

* difference is significant relative to the data in group 1

As shown in tab. 1, significant differences in body weight, area of the burn surface, area of the lesion 2-3A degree was not detected. However, children of group 3 were younger than patients of group 1 by 9 months ($p < 0.05$). The area of lesion 3B degree prevailed by 5.9% ($p < 0.05$), IF was more than twice as large ($p < 0.05$), which accordingly led to an increase in the duration of intensive therapy in ICUs by 20 days ($p < 0.05$) and in-patient treatment for 34 days ($p < 0.05$). Thus, the main factors affecting the severity of the condition of infants with thermal burns were age (the younger the child, the more severe the condition), the area of damage to the surface of the skin 3B degree, the IF indicator. That is, age, IF indicator, and area of thermal damage of degree 3B are objective indicators of the severity of a thermal burn and can predict the duration of intensive care in ICU and inpatient treatment.

Table 2. Dynamics of phase structures of the circadian rhythm of MCO during toxemia in severe burns in children under 3 years of age

	Mesor, l/min			The value of MCO in acrophase, l/min			The value of MCO in the bathyphase, l/min		
Days	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
1	3,4 ±0,8	3,5 ±0,7	4,2 ±0,5	4,2 ±1,5	5,2 ±0,8	4,9 ±1,1	3,1 ±0,8	2,9 ±0,8*	3,3 ±0,3*
2	3,2 ±0,8	3,4 ±0,8	4,3 ±0,5	3,4 ±1	3,8 ±0,9	4,8 ±0,3	2,9 ±0,5	2,2 ±1	3,2 ±0,9*
3	3,3 ±0,8	3,4 ±0,7	3,5 ±0,5	3,7 ±1,3	3,6 ±0,6	4,5 ±0,7	2,9 ±0,6	3 ±0,6	2,8 ±0,7*
4	3,3 ±0,7	3,3 ±0,7	3,9 ±0,7	3,5 ±0,7	3,7 ±0,9	5 ±1,4	3 ±0,8	3 ±0,5	3,2 ±0,3

5	3,4 ±0,8	3,5 ±0,9	3,8 ±0,6	3,6 ±0,7	3,9 ±0,7	4,5 ±0,5	3 ±0,8	3 ±0,7	2,8 ±0,2*
6	3,6 ±0,7	3,6 ±0,6	3,9 ±0,7	4 ±0,8	3,9 ±0,7	4,7 ±0,9	3 ±0,9	3,1 ±0,7	3,5 ±0,7
7	3,5 ±0,7	3,1 ±0,7	3,8 ±0,5	4 ±0,7	3,4 ±0,7	4,9 ±1,0	3,1 ±0,7	2,7 ±0,7	3,2 ±0,5*
8	3,5 ±0,6	3,3 ±0,6	3,6 ±0,5	3,8 ±0,6	3,5 ±0,6	4,5 ±0,4	3,2 ±0,5	2,7 ±0,4	3,0 ±0,6*
9	3,9 ±0,5	3,3 ±0,6	3,9 ±0,6	4,2 ±0,3	3,6 ±0,7	4,8 ±0,6	3,4 ±0,7	2,9 ±0,4	2,8 ±0,4*
10		3,4 ±0,7	3,7 ±0,4		4 ±0,5	4,2 ±0,3		3 ±0,6	3,3 ±0,1*
11		3,1 ±0,5	3,6 ±0,5		3,6 ±0,9	4,5 ±0,6		2,7 ±0,6	2,9 ±0,3*
12		3,6 ±0,4	3,7 ±0,5		4,5 ±0,5	4,3 ±0,7		2,8 ±0,7*	3,2 ±0,5
13		4,0 ±0,3	3,8 ±0,6		4,7 ±0,3	4,7 ±0,7		3,3 ±0,5*	3,2 ±0,3*
14		3,2 ±0,5	3,7 ±0,5		4,2 ±1,1	4,4 ±0,8		2,5 ±0,1*	2,7 ±0,2*‴
15		3,3 ±0,1	3,5 ±0,8		4,8 ±1,1	4,1 ±1,5		2,8 ±0,3*	3,0 ±0,3
16			3,6 ±0,5			4,2 ±0,1			3,1 ±0,4*
17			3,4 ± 0,4			3,3 ±0,2			3,1 ±0,6
18			3,5 ±0,4			4,3 ±0,6			2,6 ±0,7
19			3,6 ±0,4			4,5 ±0,4			2,1 ±0,1*‴
20			3,2 ±0,4			3,8 ±0,7			2,6 ±0,1*‴
21			3,5 ±0,4			4,4 ±0,4			2,9 ±0,3*
22			3,2 ±0,4			3,9 ±0,5			2,7 ±0,4*
23			3,8 ±0,4			4,3 ±0,7			3,1 ±0,2*
24			3,6 ±0,2			4,4 ±0,5			3,0 ±0,1*
25			3,4 ±0,1			4,2 ±0,1			2,5 ±0,5*

*- significant difference in acrophase and bathyphase

‴- significant difference from the indicator in 1 day

There were no significant deviations of the circulatory rhythm mesor indicator MCO from age-related data both on the day of admission to the clinic and on the following days of the toxemia period (Table 2). Only in children of groups 2 and 3, the MCO in the bathyphase at 1 day was significantly lower than the value in acrophase by 44% and 32%, respectively. In group 2, a significant difference between the bathyphase and the MCO in the acrophase was detected on days 12-15. Thus, the statistically significant difference between the MCO in the bathyphase and the value in the acrophase in group 3 over the entire observation period confirmed the presence of a daily rhythm of MCO fluctuations in the acute period after severe thermal injury.

The range of MCO fluctuations on day 1 in children of the 1st group was 1.2 liters per minute, in 2 - 2.3 liters per minute and in group 3 - 1.6 liters per minute. The studied indicator in group 3 on the 6th day decreased to 1.2 l/min, by 10 - to 1 l minute, by 17 to 0.2 l per minute. On the remaining days, the daily fluctuations of MCO averaged 1.5 liters per minute. While in groups 1 and 2 the range of diurnal fluctuations of MCO during the first 3–9 days remained significantly lower, in the range of 0.6–0.9 l per minute.

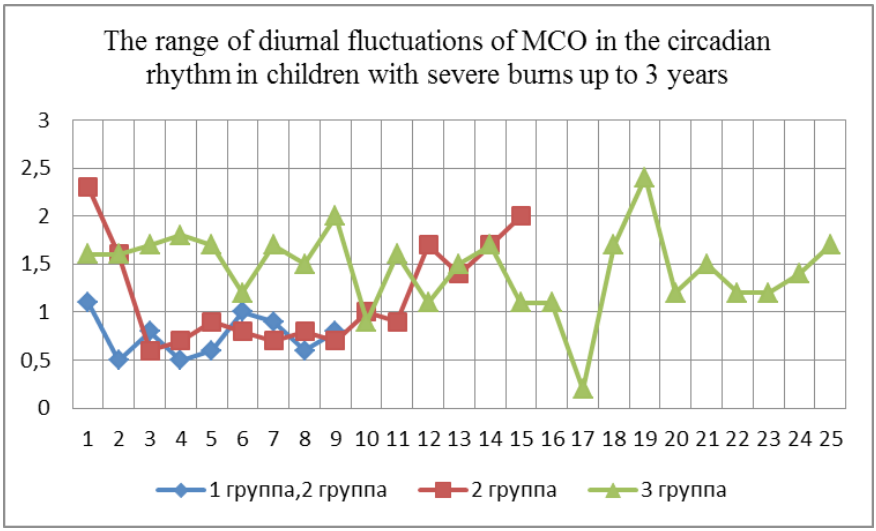

Fig.1

The decrease in the magnitude of the diurnal fluctuations in MCO is primarily the result of effective correction of homeostasis disorders that cause a change in MCO. What is evidenced by a decrease in the range of MCO fluctuations on the second day in groups 1 and 2 of children. Moreover, in group 1, the oscillation range of 0.5 l/min remains throughout the entire observation period, and in group 2 it does not exceed 1 l/min up to 11 days. In the next 12-15 days it increases to 2 liters per minute. In burnt children of the 3rd group, the daily range of MCO was more than in the 1st and 2nd groups, amounting to 1.6-2 liters per min. Significant decrease in MCO drops during the day on day 17 (decrease to 0.2 l/min) and an increase on day 19 to 2.5 l/min indicated a continuing instability of regulatory mechanisms that caused an increase in the magnitude of the MCO fluctuation on day 19 to 2.5 l/min. The increase in the range of fluctuations in the MCO indicator, apparently, is also part of a complex mechanism for compensating the circadian rhythm of MCO (Fig. 1) in the stress response of the body.

Table 3

The dynamics of phase structures of the circadian rhythm of TPR during toxemia in severe burns in children under 3 years of age

	Mesor			The value in acrophase, l / min.din.s.cm^{-5}m			The value of TPR in the bathyphase, l/min. din.s.cm^{-5}m		
Days	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
1	796 ±212	792 ±201	568 ±99	922 ±400	999 ±316	635 ±125	533 ±112	612 ±262	456 ±89
2	891 ± 265	822 ±268	571 ±118	957 ±366	900 ±286	801 ±207	796 ±208	754 ±255	503 ±110
3	865 ±298	796 ±201	697 ±125	921 ±295	887 ±231	963 ±321	796 ±241	745 ±189	554 ±159
4	811 ±224	817 ±210	667 ±108	889 ±255	867 ±221	823 ±259	734 ±161	742 ±179	531 ±110
5	858 ±294	828 ±264	675 ±103	957 ±356	933 ±445	844 ±115	795 ±285	714 ±245	560 ±65
6	771 ±208	760 ±172	633 ±107	830 ±199	887 ±267	719 ±146	696 ±145	688 ±109	503 ±80
7	795 ±191	886 ±213	663 ±107	890 ±219	1018 ±335	809 ±144	695 ±141	809 ±180	544 ±86*

8	795 ±179	813 ±172	713 ±112	899 ±242	892 ±183	893 ±284	741 ±178	732 ±126	584 ±85
9	671 ±75	835 ±216	667 ±91	853 ±228	980 ±353	913 ±215	545 ±41	743 ±124	532 ±49*
10		794 ±187	690 ±58		877 ±211	766 ±12		614 ±80	597 ±18*
11		843 ±197	697 ±86		1187 ±646	788 ±64		738 ±215	525 ±235
12		728 ±142	685 ±86		1000 ±350	778 ±79		602 ±114	623 ±142
13		636 ±59	679 ±78		770 ±51	794 ±203		545 ±24	533 ±61*
14		785 ±98	702 ±97		957 ±13	822 ±72		647 ±99	598 ±52*
15		753 ±216	734 ±112		848 ±244	787 ±66		577 ±210	667 ±124
16			695 ±80			925 ±221			596 ±19
17			713 ±90			773 ±133			620 ±41
18			705 ±59			916 ±170			553 ±26
19			697 ±78			771 ±67			602 ±64
20			771 ±87			912 ±179			660 ±124
21			742 ±113			901 ±135			611 ±65
22			800 ±189			968 ±202			662 ±68
23			705 ±165			833 ±95			611 ±98
24			760 ±157			912 ±55			620 ±88
25			731 ±186			945 ±233			456 ±122

*- significant difference in acrophase and bathyphase

‴- significant difference from the indicator in 1 day

The revealed significant difference between the TPR index in the bathyphase and the data in the acrophase on days 7,9,10,13,14 ($p < 0.05$, respectively) testify in favor of diurnal fluctuations in the peripheral vascular tone in the circadian rhythm during the period of burn disease toxemia in children infant age (table 3).

Confirmation of the above are diagrams of the range of daily fluctuations of the indicators MCO and TPR (Fig. 1.2). So, the range of diurnal fluctuations (Fig. 2) on the first day in groups 1 and 2 (380 l/min.din. cm.sup. $^{-5}$m) was greater than the range of TPR fluctuations in group 3 (170 l/min.din. cm^{-5}m).

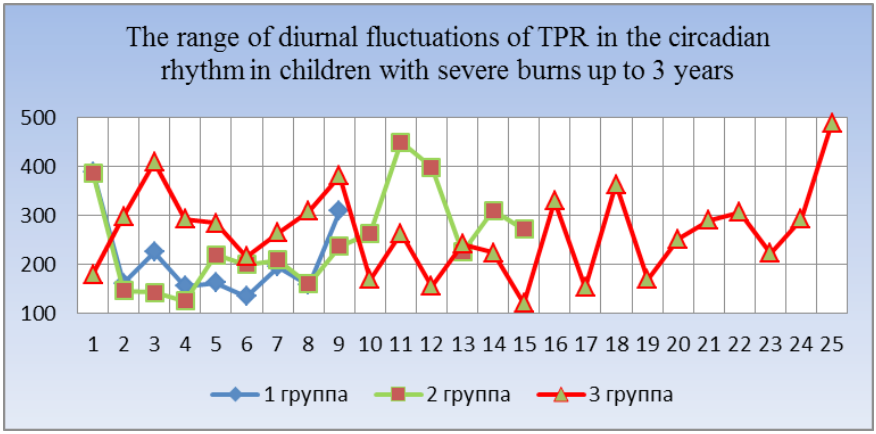

Fig.2

Over the next 7 days, it remains stable at a level of no more than 230 l/min.din.cm.sup. ¯□m, while in group 3 on day 3 the differences in the daily fluctuation of TPR reached 400 l/min.din.cm.sup. ¯□m. As shown in Figure 2, according to the changes in the daily TPR differences, it can be imagined that the more severe the burn injury, the more pronounced the daily TPR fluctuations, remaining at the level of 500 l/min.din.cm.sup. ¯□m. sick. Thus, the severity of the condition during the period of toxemia is characterized by the instability of not only central hemodynamics, but also significant diurnal fluctuations of TPR. The larger the range of fluctuations, the more severe the condition, the higher the risk of developing acute cardiovascular failure.

The revealed strong direct correlation (Fig. 3) of temperature and MCO at 8.9 a.m. in group 1 indicates an increase in MCO during hyperthermia, that is, the formation of a hyperdynamic type of hemodynamics in the

morning. The second wave of strengthening the direct dependence of MCO on the temperature reaction from 20 hours to 1 am can be understood as an unfavorable factor causing an increase in the load on the heart and on the cardiovascular system in general against the background of a physiological decrease in the activity of the pituitary-adrenal system. The latter creates a high risk of acute decompensation of cardiac function. An increase in energy consumption during the hyperdynamic type of blood circulation at night aggravates oxygen debt due to an energy-deficient state. Thus, in group 1, the compensatory increase in MCO for a hyperthermic reaction at night is an indicator of the formation of a mechanism that causes the development of acute heart failure, when hyperthermia by 1 am naturally leads to an increase in MCO, an increase in energy consumption and the associated oxygen debt and hypoxia of central regulatory systems.

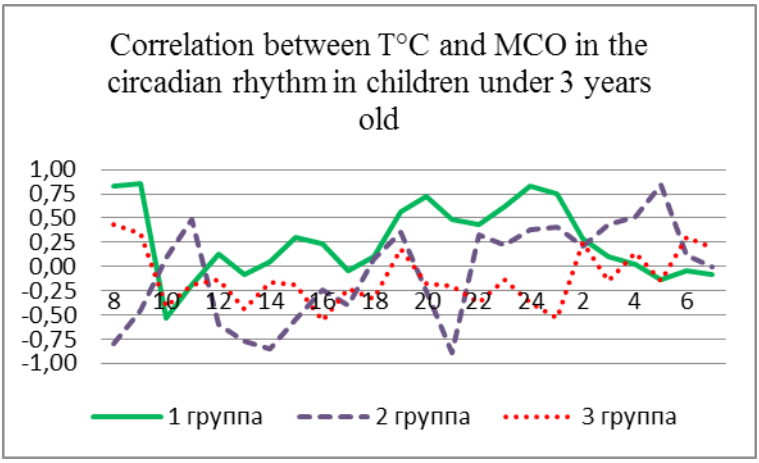

Fig.3

In children of group 2, a strong negative correlation of T°C and MCO prevailed at 8, 14 and 21 hours. That is, a correlation was found characterizing the tendency to decrease MCO with increasing body temperature, which, apparently, should be considered as the formation of a hypokinetic type of hemodynamics, an early sign of acute circulatory failure, which is primarily due to the severity of thermal burn in group 2. Only at 5 o'clock in the morning a strong direct dependence of MCO and T°C is formed, that is, the ability of hemodynamics to more adequately perform the com-

pensatory function, increase MCO on the body's hyperthermic reaction appears. Thus, during the period of toxemia in the 2nd group of children in the first 9 days of the period of toxemia, 8.14.21 hours are critical. The revealed pattern indicates the feasibility of enhancing cardiotonic therapy in the first 9 days in children of 2 groups.

In group 3 (Fig. 3), the complete absence of strong correlations between T°C and MCO draws attention, which characterizes the failure of hemodynamics in performing a compensatory increase in MCO in response to a hyperthermic reaction. In addition, a minimal change in body temperature was observed in this group, which was explained by the development of an energy-deficient state from the first hours after a severe thermal burn.

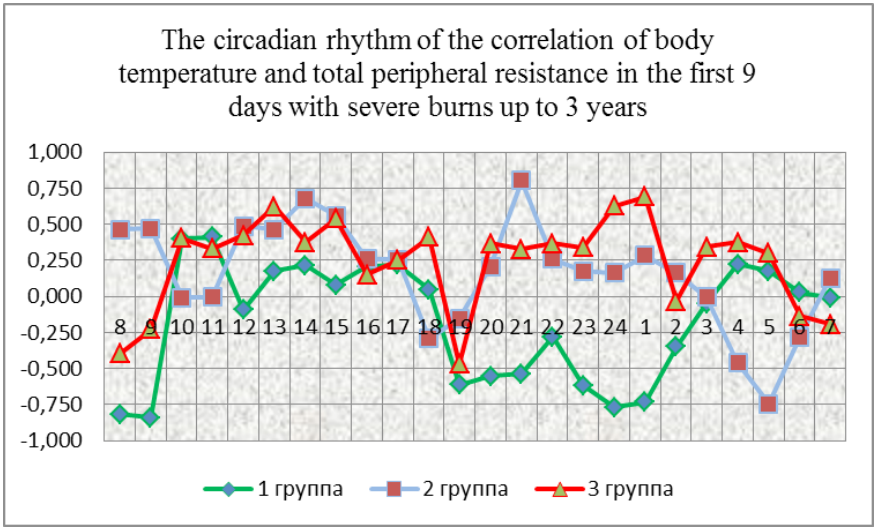

Fig.4

In group 1, a strong inverse correlation of T°C and TPR at 8 and 9 hours can be understood as a physiological compensatory reaction of blood circulation aimed at increasing peripheral blood flow, heat transfer, and oxygen delivery to tissues. However, this reaction is short-lived and is repeated only at 24-1 a.m. It should be noted that the revealed significant feedback T°C and TPR was found only in children of the 1st group, while in the 2nd and 3rd groups it was absent. In the 2nd group, over a longer time of day, a direct correlation of T°C and TPR indicated an increase in peripheral resistance with a tendency to increase temperature, which is an unfavorable factor that significantly reduces peripheral capillary blood flow, heat transfer, and oxygen delivery to peripheral tissues. An unfavor-

able factor in children of group 3 (Fig. 4) is the predominance of a direct correlation of T°C and TPR during the day moderate at 10-18 hours, from 20 to 1 hour, 3-5 hours, that is, for 18 hours out of 24 there was a tendency to increase TPR with increasing body temperature. The strong direct relationship between T°C and TPR and the absence of direct correlation between T°C and MCO in group 3 are due to the failure of hemodynamics in the formation of a compensatory reaction to an increase in temperature due to an energy-deficient state that causes the development of acute cardiovascular failure.

Conclusion. The phase characteristics of the circadian rhythm of the central and peripheral hemodynamics during toxemia in infancy characterize the formation of a hyperdynamic type of blood circulation. The severity of the condition during the period of toxemia is characterized not only by an increase in the range of diurnal fluctuations of MCO, but also by significant diurnal fluctuations of TPR most pronounced in the 3rd group of children. Part of the complex mechanism of the compensatory hemodynamic reaction during severe burn toxemia is a change in the magnitude of the daily fluctuations of MCO and TPR. The strong direct relationship between T°C and TPR and the absence of direct correlation between T and MCO in group 3 are due to hemodynamic failure in the formation of a compensatory reaction to a rise in temperature, which is a harbinger of acute cardiovascular failure during toxemia in severe burns in infants.

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MORPHEA AND METABOLIC SYNDROME - COMORBID DISEASE

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Limited scleroderma is more common in women, the predominance of women in the structure of the incidence increases with age. Patients with limited scleroderma revealed a higher frequency of metabolic syndrome (58.76%) than in the population. The frequency of occurrence of the metabolic syndrome, as in the population as a whole, increased with increasing age: in patients 18-39 years old, metabolic syndrome was observed in 26.7%, in patients 40-69 years old - in 65.85%. In these patients, a more frequent occurrence of arterial hypertension (76.29%), carbohydrate metabolism disorders (20.62%), hypocholesterolemia (42.26%), a high incidence of dyslipidemia (86.63%), hypertriglyceridemia (48.2%) was also observed. Patients with limited scleroderma had a greater body mass index, waist circumference, they were more often obese (51.55%), with a predominance of obesity in the central type.

Keywords: body mass index, obesity, arterial hypertension, dyslipidemia, type 2 diabetes mellitus, hyperglycemia.

Introduction

Metabolic syndrome is an interdisciplinary problem and is characterized by a complex of pathogenetically interconnected conditions, such as: an increase in visceral fat mass, a decrease in the sensitivity of peripheral tissues to insulin, hyperinsulinemia, disorders of carbohydrate, lipid, purine metabolism and arterial hypertension [7, 11]. According to modern data, 20-25% of the population suffers from metabolic syndrome, and after the age of 60 years, the incidence of this disease increases to 45% or more [15]. Patients with metabolic syndrome have a high risk of developing serious complications, especially in the form of cardiovascular disorders and the development of type 2 diabetes [11, 13, 3].

To date, there is no consensus on the root cause of metabolic disorders in the pathogenesis of metabolic syndrome. It is assumed that both genetic predisposition and external factors and certain lifestyle characteristics (especially eating behavior and physical activity) play a role in its development [6, 12]. A sedentary lifestyle, excessive consumption of carbohydrates and fats, insufficient amount of fruits and vegetables in the diet lead to the development of abdominal obesity, which in many cases is one of the earliest signs of metabolic syndrome [12].

Visceral adipose tissue has a pronounced neurohumoral activity [1]. Under its influence, the sympathetic-adrenal system is activated, the production of a large number of biologically active substances, inflammatory markers and reactive oxygen types, the development of insulin resistance, the activation of the renin-angiotensin system, endothelial dysfunction and impaired blood flow at the level of the microvasculature with the development of inflammatory changes, transport disorders, stimulation of fibrosis. Such a cascade of metabolic disorders underlies the pathophysiology of target organ damage and determines comorbid pathology, including skin diseases [1, 10, 6]. So inflammatory markers such as TNF-α, IL-17, IL-23, oxidative stress, apparently, are involved in the pathogenesis of many autoimmune and inflammatory skin diseases [2, 9]. Therefore, it is possible to detect the presence of common links in the pathogenesis of autoimmune skin diseases and metabolic syndrome.

Patients with metabolic syndrome have certain skin changes. A pathomorphological study of the skin in such patients reveals changes at the level of the epidermis and dermis: narrowing of the capillaries with thickening of their walls, skin elastosis, thickening of the prickly layer and basement membrane, acanthosis, mild lymphocytic infiltration around the capillaries, as well as a more significant accumulation of anti-apoptotic protein Bcl-2 in the epidermis. [7]. It is assumed that these changes can be associated, inter alia, with oxidative stress and hypoxia [7].

Associations of MS with autoimmune skin diseases such as psoriasis [4, 3, 11], lichen planus [4, 11], lupus erythematosus [4, 11] and annular granuloma are described [11]. There are few and conflicting data on the comorbidity of the metabolic syndrome and limited scleroderma. Several authors note a more frequent development of the metabolic syndrome in patients suffering from scleroderma [8, 5]. Although the exact relationship between metabolic syndrome and skin diseases, including limited scleroderma, is still unclear, understanding the mechanisms underlying the development of metabolic syndrome and skin diseases will help improve clinical results and guide the development of new therapeutic treatments [3].

Purpose of the sudy: examine the prevalence of metabolic syndrome and its components in patients of various age groups suffering from limited scleroderma.

Materials and research methods

We examined 97 patients with limited scleroderma, 88 women and 9 men who were treated at the Gomel Regional Clinical Dermatovenerologic Dispensary in 2018-2019. The age of the patients ranged from 18 to 69 years. The criteria for inclusion in the study group were the presence of limited scleroderma in the patients, voluntary consent of the patient to participate in the studies. The exclusion criteria from the group were children's age, age 70 years or more, pregnancy, the presence of concomitant pathologies in the form of oncological diseases, systemic diseases of the connective tissue, the patient's refusal to conduct the study. All patients were divided into two groups: 18-39 years old, 40-69 years old.

All patients underwent anthropometric measurements (height, weight); body mass index (BMI) was calculated by the formula BMI = m/h2, where m - the body weight in kilograms, h - the height in meters; measured waist and hips, calculated the ratio of the waist circumference to the circumference of the hips; the ratio of waist to hip volume was determined.

The presence and degree of arterial hypertension was assessed. The fasting glycemia level was determined by the enzymatic method. Lipid metabolism (cholesterol, high density lipoprotein cholesterol (HDL), low density lipoprotein cholesterol, very low density lipoprotein cholesterol, atherogenicity index, triglycerides) was determined using the Beckman Coulter AU480 analyzer by an enzymatic method.

For the diagnosis of metabolic syndrome, the criteria of the American Heart Association/ National Institute of Heart, Lung and Blood 2009 were used [14]: abdominal obesity (for residents of Europe, the waist circumference is more than 94 cm in men and more than 80 cm in women); a decrease in blood levels of high density lipoproteins (HDL) (less than 1.0 mmol/l in men

and less than 1.3 mmol/l in women or specific treatment being carried out for this); increase in triglycerides (1.7 mmol/l or more or specific treatment carried out in this regard); increase in blood pressure to 130/85 mm Hg and above or antihypertensive therapy; increased fasting glucose levels (5.6 mmol/l or more, or impaired glucose tolerance, or taking hypoglycemic drugs). Metabolic syndrome was diagnosed with any three of the above criteria.

Statistical analysis was carried out using the software package StatSoft Statistica 10.0 (USA). Assessment of the normality of the distribution of characters was carried out using the Shapiro-Wilk test. In the case of the distribution of quantitative indicators that differed from the normal, the data were presented as the median of the 25th and 75th percentiles: Me (25% –75%), with a normal distribution of attributes - in the form of the arithmetic mean and standard deviation of the arithmetic mean (M±SD).

Research results and discussion

Among patients with limited scleroderma, female patients prevailed in a 9: 1 ratio, moreover, in the age group of 18-39 years, 1 man accounted for 2 women with limited scleroderma, in the age group of 40-69 years old there were almost 20 times more women than men. Thus, at an older age, women are more likely to develop limited scleroderma. At the age of 18-39 there were 15 patients (10 females and 5 males), at the age of 40 - 69 there were 82 patients (78 women and 4 men). The average age of the patients was 53.3±13.16 years. Most patients were diagnosed with a plaque form of limited scleroderma, 7 patients had a linear form of limited scleroderma.

The average BMI of patients was 30.47±5.33 kg/m2. Only 13 patients (13.4%) had normal body weight (BMI 18.5-24.99 kg/m2). 33 patients (34.02%) were overweight (BMI 25.0-29.99 kg/m2). Obesity was detected in 51.55% of patients suffering from limited scleroderma: first-degree obesity (BMI 30.0-34.99 kg/m2) was determined in 31 patients (32.0%); 13 (13.4%) had second degree obesity (BMI 35.0-49.99 kg/m2); in 6 patients (6.19%) - of the third degree (BMI 40 kg/m2 or more). One patient had insufficient body weight (BMI less than 18.5 kg/m2). The value of the body mass index correlated with the size of the waist circumference, the correlation coefficient was 0.82. The average body mass index increased in groups with an increase in average age, as well as in the population as a whole, while exceeding the average statistics for Belarusians (28.5-28.9 - for respondents 40-69 years old, 26.7-27, 3 - for respondents 18-69 years old)[16]. So the average body mass index in patients aged 18-30 years was 25.86±5.07 kg/m2, aged 40-69 years - 32.27±4.98 kg/m2. In all patients, obesity was of the abdominal type. The average waist circumference was 97.7±13.5 in women and 96.78±11.3 in men. For women aged

18-39 years, the waist circumference was 83.6±15.56 cm, aged 40-69 years - 98.72±11.32 cm. The waist circumference did not exceed the target values in only 13 patients: 5 men (less than 94 cm) and 8 women (less than 80 cm). 86.6% of patients (44.44% of men and 85.11% of women) showed excess waist circumference. The waist sizes exceeded the target indicators mainly in patients 40 years of age and older, which corresponds to the trend in the population as a whole, while in patients with scleroderma more often there was an excess of these parameters. The average value of the ratio of waist to hip volume was 0.88±0.07 and exceeded the target value (0.85 for women and 1.0 for men) in 58 patients, which amounted to 59.79%.

When assessing lipid profile in 86.63% of patients with limited scleroderma, one or another type of atherogenic dyslipidemia was diagnosed. The average cholesterol level was 5.92±1.04 mmol/l. Cholesterol levels greater than 6.2 mmol/l were observed in 41 patients, which accounted for 42.26% of patients. In the age group 18-39 years, excess cholesterol was observed in 3 patients. In the group of 40-69 years old, hypercholesterolemia was observed in 38 patients, 9 patients at the time of the examination were taking statins for hyperlipidemia. Against the background of this treatment, their cholesterol level was within the normal range. The average HDL was 1.4±0.34 mmol/l; a decrease in HDL below 1.3 mmol/l in women and 1.0 mmol/l in men was observed in 51.55% of patients (in patients 18-39 years, a decrease in HDL level was observed in 73.33% (in female patients - in 60%), which exceeds the average population indicators, in the group of patients aged 40-69 - 42.68%, in women - 44.87%). The average level of low density lipoproteins was 3.88±0.81 mmol/l, and very low density lipoproteins were 0.83±0.46 mmol/l. Hypertriglyceridemia was detected in 48.2% of patients with limited scleroderma (the average value was 1.97±1.19 mmol/l). The atherogenicity index did not differ in different age groups, its average value was 3.4±1.0.

An increase in blood pressure was detected in most patients with limited scleroderma. Arterial hypertension was diagnosed in 76.29% of patients: in 22 patients there was arterial hypertension of the first degree, in 48 patients - in the second, in 4 patients - in the third degree. In the age group 18-39 years old, hypertension was diagnosed in 4 patients (26.67%), in the group of patients 40-69 years old - in 70 patients (85.37%), which exceeded the average population value.

12 patients with limited scleroderma suffered from diabetes mellitus: 11 patients (11.34%) had type 2 diabetes mellitus and one type 1 diabetes mellitus, in addition, laboratory tests in another 8 patients revealed an

increase in fasting glycemia in capillary blood to 6.1 mmol/l or more. Thus, in 20 patients (20.62%) there was a violation of carbohydrate metabolism. Diabetes mellitus was not detected in the age group up to 40 years, while two patients had an excess of fasting glucose to 6.1 mmol/l or more, in the age group of 40-60 years, a violation of carbohydrate metabolism in the form of diabetes or an excess of fasting glucose was diagnosed in 21.95% of cases, which significantly exceeds the prevalence of these changes in the population.

Table 1 – Metabolic changes in patients with limited scleroderma and average statistics among respondents of the Republic of Belarus (according to STEPS 2016 (2017)) [16]

Indicator	Age group, years	Patients with limited scleroderma	Respondents residing in the Republic of Belarus (city/village)
Average BMI, kg/m^2	18-39	25,86	24,5/25,0
	40-69	32,27	28,5/28,9
Waist circumference (women), cm	18-39	83,6	75,7/80,7
	40-69	98,72	90,4/95,5
The proportion of respondents with HDL <1.29 mmol/l (women), cm	18-39	60	32,5/33,6
	40-69	44,87	43,2/37,4
Total cholesterol ≥ 6.2 mmol/l or currently on treatment for high cholesterol, both sexes,%	18-39	20	2,9/2,2%
	40-69	57,32	16,1/13,5
Increased blood glucose or currently being treated for diabetes, both sexes,%	40-69	21,95	5,6/5,5%
Percentage of respondents with arterial hypertension, both sexes,%	18-39	26,67	14,6/26,0
	40-69	85,37	60,8/67,2

A comprehensive assessment of the criteria for the diagnosis of metabolic syndrome (abdominal obesity, a decrease in blood levels of high density lipoproteins, an increase in triglycerides, an increase in blood pressure, and elevated fasting glucose) revealed its presence in 57 patients with limited scleroderma (58.76%), which exceeds the general population indicators. The frequency of occurrence of the metabolic syndrome, as in the population as a whole, increased with increasing age and exceeded

the population values: in patients 18-39 years old, metabolic syndrome was observed in 26.7%, in patients 40-69 years old - in 65.85%.

Conclusion

Thus, patients with limited scleroderma have a higher prevalence of arterial hypertension - 76.29%. It is likely that these patients develop more pronounced metabolic disorders and activation of neurohumoral systems, which lead to a decrease in arterial compliance and an increase in stiffness of the vascular wall.

Atherogenic dyslipidemia was diagnosed in 86.63% of patients with limited scleroderma, a decrease in the level of high density lipoproteins was detected in 48.2% of patients with scleroderma, which indicates a high risk of developing atherosclerosis in this group of patients.

Patients with limited scleroderma also recorded a high incidence of obesity (in more than half of patients). The values of the body mass index and waist circumference exceeded the average for Belarusians.

Diabetes mellitus and disorders of carbohydrate metabolism in the form of hyperglycemia were diagnosed in 21.95% of patients, which also exceeds the average population indicators in the Republic of Belarus.

Based on the diagnostic criteria of the American Heart Association / National Institute of Heart, Lung and Blood 2009 in patients with limited scleroderma, the metabolic syndrome was diagnosed in 58.76% of cases, which is significantly higher than in the general population.

It is likely that lipid and carbohydrate metabolism disorders, which lead to the development of the metabolic syndrome, may be risk factors for the development of limited scleroderma. When examining patients with limited scleroderma, it is necessary to pay attention to the frequent combination of this skin pathology with arterial hypertension, diabetes mellitus, dyslipidemia, and metabolic syndrome. Early diagnosis of the metabolic syndrome in patients with limited scleroderma and its adequate treatment will not only improve the prognosis of patients with cardiovascular disease, but will also increase the effectiveness of treatment of limited scleroderma, given the presence of common pathological mechanisms in the development of these conditions.

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THE EFFECT OF EXTREME LIVING CONDITIONS IN PUDDLES ON HYDROBIONTS (USING MOINA MACROCOPA CLADOCERA, CRUSTACEA AS AN EXAMPLE)

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The results of a histological study of Moina macrocopa females (Cladocera, Crustacea) from puddles on a village dirt road in the Yaroslavl Oblast are presented. Of the 865 individuals decomposed into serial sections, 169, that is, 19.5%, had decaying growing eggs of the older generation. In gamogenetic females, there was no egg decay. In addition, pathological changes in other tissues were observed. The cause of these disturbances is probably the astatic nature of the habitat and, possibly, anthropogenic pollution of the water.

Keywords: temporary water bodies, pathology, Moina macrocopa.

About one fifth of Moinas sampled from puddles on a country road in Yaroslavl Oblast have been in a pathological state. Disintegration of older generation oocytes in the ovary, an irregular epithelium of the midgut and morphological changes in the «placenta» have been observed. We believe that sharp fluctuations in environmental factors are the causes of these pathological phenomena.

The living conditions of hydrobionts in rain puddles are much more adverse than in permanent ponds. Nevertheless, there are species that are common in them, and a number of species are found only in them. Are they fully adapted to their environment or do they suffer from the inconstancy of the regime in them? To answer this question, a histological examination of females *Moina macrocopa* (Straus, 1820) (Moinidae? Cladocera, Crustacea) was performed. Its goal was to find out in what condition their ovaries and other tissues are.

Material and methods

The crustaceans were caught on May 31, June 5, 8, 10, 15, June 1, 13 and 31 from three puddles on a country dirt road near the village of Borok, Yaroslavl Oblast. Fixation in Buena fluid. Decomposed into serial sections of 865 individuals. The thickness of the paraffin sections was 7 μm. Sections were stained with Heidengain iron hematoxylin.

Results and discussion

M. macrocopa - is a common inhabitant of rain puddles on country dirt roads of the Yaroslavl Oblast. The ephippies of these crustaceans are spread by the wheels of bicycles, vehicles and pedestrian shoes. Previously, they were also distributed by livestock hooves, but now there is very little left in the Yaroslavl Oblast. In 169 crustaceans, that is, in 19.5%, in the ovaries, the decay of the eggs of the older generation was observed. The location of the internal organs of *M. macrocopa* is shown in Figure 1, which shows a section of the entire crustacean in the field of view. The breakdown of the eggs began with the disappearance of their nuclei (Fig. 2*Bh*). Then, the eggs disintegrated into small round strongly stained fragments (Fig. 2*Bi*). Among gamogenetic females, individuals with decaying eggs were not found. I have been studying the reproductive system of cladocera with interruptions since the 60s of the last century. Using a histological method, I examined 48 species of these crustaceans (Makrushin, 1978, 1979, 1980, 1985, etc.). They were taken from laboratory cultures, from ponds, lakes, rivers, from the Gulf of Finland of the Baltic Sea and from the Black Sea. Viewed serial sections of thousands of individuals. But individuals with decaying eggs, including among *Moina macrocopa,* were extremely rare. I remember only one case. Therefore, a large proportion of individuals among *M. macrocopa* from puddles in which ovule breakdown occurred needs explanation.

In *Daphnia (Daphnia) pulex* Leydig, 1860 and *D. (Daphnia) longispina* G.O. Sars, 1862 (Daphniidae), the breakdown of growing eggs can be caused by the transplantation of these crustaceans from water rich in food particles into water in which they are almost absent (Makrushin, 1966). In the puddles from which *M. macrocopa* was taken, the feeding conditions, judging by the fullness of the brood bags of these crustaceans with eggs and embryos, were good. The reason for the death of their eggs is most likely not a lack of food, but a sharp and frequent change in environmental conditions. Each such change required the crustaceans to quickly redirect the flow of matter and energy in the body from oogenesis to adapt to a new situation. Because of this, the eggs often undernourished and died. Since drastic changes in the environment took place constantly in

puddles, individuals with decaying eggs were constantly present in them. In laboratory cultures, ponds, lakes, rivers and in the Gulf of Finland, the living conditions are more stable.

In addition to the disintegration of the oocytes, *M. macrocopa* showed structural disturbances in other tissues. The intestinal epithelium was sometimes jagged (Fig. 1). In the "placenta," the organ located in the brood bag and secreting nutrients for the needs of developing juveniles, pathological formations were occasionally present (Fig. 2*Ag*), which were absent in *M. macrocopa* from laboratory cultures and were absent in the individual depicted in Fig. 1*b*). The reason for these violations is not clear to me. Perhaps it is associated with water pollution.

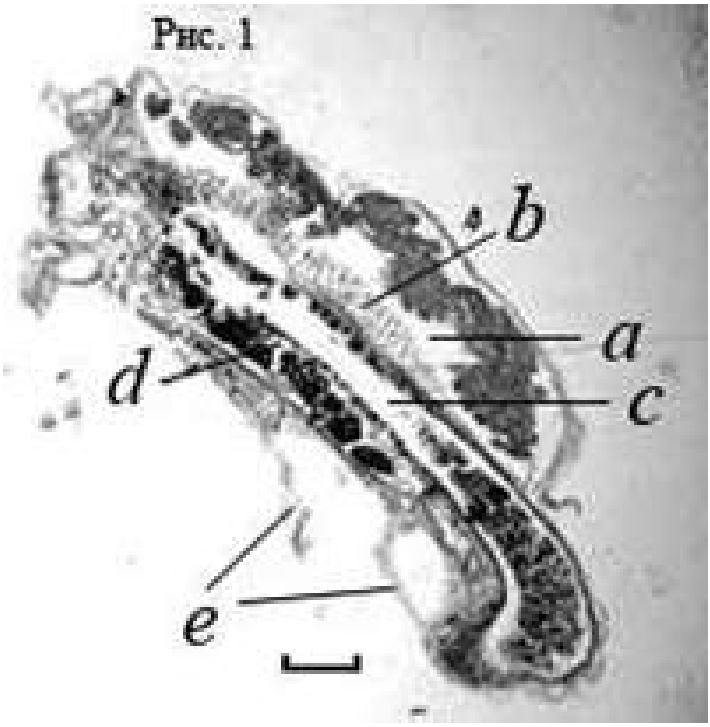

Fig. 1. Longitudinal section of parthenogenetic female *Moina macrocopa. Designations a* - space of the brood sac with embryos inside, *b* - "placenta" without pathological disorders, *c* - middle intestine; in the anterior (upper) part of the dorsal side, the epithelium is partially jagged, in its posterior part - food particles, *d* - ovary, *e* - legs,

Scale - 100 μm.

Despite the variability of the environment in the puddles, *M. macrocopa* were numerous in them. Their pinkish swarms were clearly visible on the surface of the water. There were many younglings. Males and eppippial females came across in small numbers on sampling days.

Рис. 2

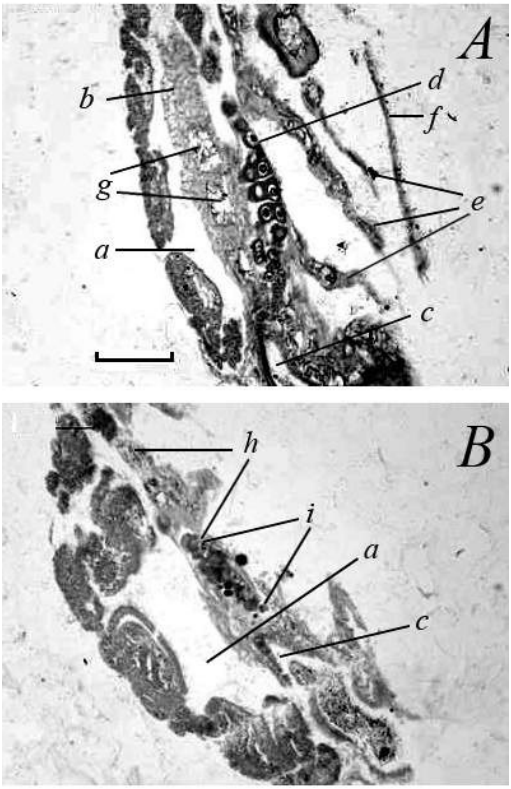

Fig. 2. Longitudinal sections of parthenogenetic females *Moina macrocopa. A* - "placenta" is pathologically altered, *B* - older generation of eggs breaks down. Designations: *a* - space of the brood pouch with embryos inside, *b* - "placenta", *c* - oblique section of the middle intestine, *d* - ovary, *e* - legs, *f* - shell leaf, *g* - pathological structures in the "placenta", *h* - the beginning of death of the eggs, they have lost their nuclei, but their protoplasm does not separate independently, *i* - the part of the ovary in which the eggs break up into many rounded strongly colored parts, k - the oblique section of the middle intestine.

Scale - 100 μm.

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CYTOGENETIC EFFECT OF CEMENT DUS[i]

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A study of the mutagenic effect of cement dust on the natural flora growing on the territory of the cement plant was conducted. An increase in the frequency of cells of roots of dandelion seedlings with a chromosomal abnormality has been shown. It is also noted that the fragmentation of chromosomes is most common among them, and cells with chromosomal abnormalities such as "bridge" and "double bridge" occur much less often.

Keywords. Cement dust, chromosomal abnormalities, environmental pollution, wild flora, dandelion, bioindicator.

Introduction

The current stage of development of civilization is characterized by large-scale construction projects in all spheres of human activity. In this connection, one of the most demanded industries is the cement industry. Emissions from cement plants are both solid and gaseous substances, which, of course, adversely affect the environment and natural biosystems. In this connection, one of the main problems of our time is the deterioration of the quality of the environment due to the influx of significant volumes of pollutants of different origin into it.

The most widely used and highly informative indicators of environmental pollution is the wild flora. There are a lot of works in the literature on the use of plants as biomarkers of the state of the environment, including the study of the problem of the effect of cement dust on living systems. For plants, the deterioration is determined by the fact that cement dust clogs the stomatal apparatus of plants, reduces the growth rate, fertility and their development [1]. In the works of Kraevaya E.V. et al (1995) and Shelukho V.P. et al. (1997) showed that cement dust causes persistent changes in the vital state of trees, in particular ordinary pine. It has been shown that yellowed and necrotic spots appear on the needles, which directly affects the degree of water circulation, photosynthesis and transpiration and, therefore, can lead to death [6, 8]. Yu.V. Ivanov et al. Showed that pine trees growing in the vicinity of the cement plant show a decrease in yield and seed germination, which threatens the natural regeneration of common pine in the studied areas [9].

However, in the scientific literature there are very few studies on the possible cytogenetic and mutagenic effects of cement dust on the natural flora. In a study by Reutova N. et al (2018) [10] using dandelion as a bioindicator, an increased level of mutagenicity of soil pollution with heavy metals is shown. The work of Dzhambetova P.M. (2012) showed a significant increase in the level of mutations in species of wild flora growing on soils contaminated with oil products.

In connection with the foregoing, the aim of our work was to study the level of mutability in the dandelion officinalis, growing on the territory of the cement plant.

Material and research method

The study of the genotoxicity of cement dust was carried out using a wild-growing dandelion medicinal plant (*Taraxacum officinale Wigg*.S.l.). The material was collected at three points: directly on the territory of the Chiri-Yurt cement plant (Chechen Republic), in the village of Chiri-Yurt (1.5 km from the cement plant) and in the vicinity of Duba-Yurt (8.5 km from the cement plant). The choice of a clean zone for collecting material - the village of Duba-Yurt, is due to the fact that the settlement is located in the Argun gorge. The wind rose is most often directed down the gorge from the mountains, and cement dust does not reach this locality. In this connection, we chose this village as a conditionally clean territory.

The frequency of chromosomal aberrations in the cells of seedlings of seeds of *Taraxacum officinale Wigg*. s. l. was determined by analysis of the structure of chromosomes at the stages of anaphase and metaphase of mitotic division according to the method proposed by L. Dubinina (1978)

[3]. Chromosome fragments, bridges and double bridges were counted. The so-called "bridges" occur during complex multiple rearrangements of the mitotic spindle of division, which leads to the formation of dicentric chromosomes.

Methodology

The seeds of dandelion were germinated at 26 °C in a Petri dish. Stained with 5% solution of acetocarmine in a water bath for 10-12 minutes. Then, put on a glass slide in a drop of 45% acetic acid, and the dark-colored tips of the roots were cut off. Covered with a coverslip, two layers of filter paper and crushed with a match, tapping lightly on the coverslip. Quality products look like a uniformly colored pink spot. The analysis was carried out using a light microscope at a magnification of 10x40.

The results of the study

The results of the study of the level of stability of dandelion officinalis are presented in table 1.

Table 1.
Frequency of occurrence of dandelion root cells with chromosomal abnormalities

Research point	Total	Frequency chromosomal aberrations		p
		abs	%	
The territory of the cement plant (CP)	1000	126	12,6	<0,001
Chiri-Yurt village (2 km from CP)	1000	102	10,20	<0,001
Duba-Yurt village (8.5 km from CP)	1000	19	1,90	

As we see, the lowest level of mutability was detected in seedlings of dandelion seeds collected in the vicinity of the village of Duba-Yurt (1.90%). A similar result is consistent with the data of Dzhambetova P.M. (2012) [2], in which the average level of chromosomal abnormalities for dandelion officinalis for a relatively clean zone is 2.27%.

The frequency of occurrence of chromosomal abnormalities in *Taraxacum officinale* seedlings collected on the territory of a cement plant is 6.6 times significantly higher than this indicator of a conditionally clean zone (<0.001). Significant differences are also noted for the frequency of chromosomal aberrations of seedlings (10.20%) collected in the vicinity of the village of Chiri-Yurt, which exceeds the data of a relatively clean zone by

5.4 times.

The results of the analysis of chromosomal rearrangements for individual types (fragments, “bridges” and “double bridges”) in the roots of *Taraxacum officinale* Wigg seedlings. s.l. are presented in table 2.

Table 2.

Frequency of ana-telophase cells of dandelion root roots with chromosomal disorders of various

Research point	Total	Frequency of various types of chromosomal abnormalities of cells					
		fragmentation		"bridges"		"double bridges"	
		abs	%	abs	%	abs	%
Cement plant territory (CP)	1000	101	10,1	17	1,7	6	0,6
Chiri-Yurt village (2 km from CP)	1000	78	7,8	18	1,8	6	0,6
Duba-Yurt village (8.5 km from CP)	1000	16	1,6	3	0,3	0	0,0

As we can see (Table 2), the mutagenic and cytotoxic effect of cement dust is revealed in an increase in the frequency of certain types of chromosomal aberrations; a high frequency of occurrence of chromosomal abnormalities in all three types of aberrations is noted. So, if for a conditionally clean zone (the village of Duba-Yurt) the indicator “double bridges” is not detected (0.0%), and “bridges” are found with a low frequency (0.3%), then these chromosomal abnormalities in the cell of seedlings of Medicinal dandelion collected in contaminated areas are found at approximately the same frequency (Table 2). The highest frequency of occurrence of structural chromosome abnormalities is characteristic of the “fragmentation” indicator: 10.1% and 7.8% of the total number of chromosomal aberrations, respectively, were detected for the contaminated territory of the cement plant and village.

Thus, the study showed that the emissions of the cement plant (mainly cement dust) have a mutagenic and cytogenetic effect, which is revealed by an increase in the frequency of chromosomal abnormalities in the anaphophase cells of rootlets of seedlings of dandelion seeds in comparison with a relatively clean zone. At the same time, it should be noted that the species of wild flora (in particular, medicinal dandelion) as bioindicators for detecting pollution of their habitat are the most informative and convenient to study, because they are directly in contact with soil, atmosphere

and water. Their high sensitivity to oil products and heavy metals in soil [7, 9] and to cement dust was shown in this study.

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DELAYED EFFECT OF MATERNAL α-TOCOPHEROL ON FREE RADICAL HOMEOSTASIS OF PHYLOGENETICALLY DIFFERENT PARTS OF THE CNS OF MALE RATS

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The problem of prenatal influences of a different nature and their consequences is becoming increasingly relevant, and an understanding of the mechanisms providing these influences is more understandable in connection with the development of the epigenetic theory of intrauterine adaptation of the body to changing external influences. Due to the wide range of effects of α-tocopherol on the body and ongoing debate in the literature on the appropriateness of its use, it was important to study the effects of maternal α-tocopherol on free-radical homeostasis of adult offspring at different levels of the central nervous system, as an important regulatory system. The experiment involved 8 female outbred white rats aged 6-8 months and their offspring (90 days). Females, starting from the 2nd day of pregnancy, orally received an oily solution of α-tocopherol at a rate of 1 mg/100 g body weight. The control group received appropriate doses of refined sunflower oil. The change in free radical homeostasis was evaluated in homogenates of the cerebral cortex, midbrain and spinal cord tissue according to the level of superoxide dismutase activity, the level of LOP products, FRO protein products, SOD and POM activity were recalculated per gram of protein. A-tocopherol, taken by female rats during pregnancy, led to a significant decrease in LOP products in the studied sections of the central nervous system. An increase in POM and probably a compensatory increase in SOD activity were characteristic only of spinal cord tissue. Thus, maternal α-tocopherol significantly and long-

term changed the metabolism in the central nervous system tissues of the offspring of these females, the changes are ambiguous, appear even in adulthood, and we estimate them more likely as negative.

Keywords: males, rats, adaptation, free radical homeostasis, ontogenesis, α-tocopherol acetate.

The problem of prenatal influences of a different nature and their consequences is becoming increasingly relevant, and an understanding of the mechanisms providing these influences is more understandable in connection with the development of the epigenetic theory of intrauterine adaptation of the body to changing external influences. This adaptation determines the characteristics of the functioning of the organism throughout postnatal ontogenesis. Factors that determine the maturation of the body at the earliest stages have significant delayed effects on the fetus and manifest themselves throughout postnatal ontogenesis [10]. The completely different effects in the early stages of ontogenesis can carry both protective effects and significantly increase the risks of the development of the organism [11]. The central nervous system reacts most sensitively to environmental changes, the functional state of which determines the processes of maturation and functioning of the organism throughout all stages of ontogenesis [13].

One of the nutrients and biologically active substances that have proven themselves in experimental and clinical practice and used as part of food additives and vitamin complexes is α-tocopherol acetate. It is known that α-tocopherol has a fairly wide range of effects, effectively regulates oxidative processes [8, 9], is a powerful biological regulator of cell metabolism, has pronounced neuroprotective properties and affects the expression of genes of a number of biologically active components, in particular, antiapoptotic proteins [5, 12]. Due to the wide range of effects of α-tocopherol on the body and the ongoing debate in the literature on the appropriateness of its use, the **purpose** of the study was to examine the effects of maternal α-tocopherol on free radical homeostasis of adult offspring at different levels of the central nervous system.

Materials and methods

The experiment involved 8 female outbred white rats aged 6-8 months and their offspring (90 days). In females, the stages of the estrous cycle were determined by the standard method of taking a vaginal smear [2]. If oestrus or proestrus was detected, the male was planted to the female. The first day of pregnancy was considered the day of detection of sperm in the smear. Females, starting from the 2nd day of pregnancy,

orally received an oily solution of α-tocopherol at a rate of 1 mg/100 g body weight. The control group received appropriate doses of refined sunflower oil. At the age of 90 days, the male offspring of females were euthanized with sodium etaminal, decapitated, the brain and spinal cord were isolated in the cold, 10% homogenates were prepared on 0.1 M phosphate buffer. The change in free radical homeostasis was evaluated in the homogenates of the tissue of the cerebral cortex, hypothalamus and spinal cord. All methods for studying free radical homeostasis were carried out no later than 2 weeks after the tissue was isolated and homogenates were prepared. Free radical homeostasis was assessed by the level of superoxide dismutase (SOD) activity [7], the level of lipid oxidation products (LOP) [3], the products of protein oxidative modifications (POM) [4], the SOD and POM activity were recalculated per gram of protein, the level of which was determined according to the Lowry method. Statistical processing of the results was carried out using the Mann-Whitney criterion.

Results and discussion

At all levels of the central nervous system under the influence of α-tocopherol obtained by rats during fetal development, a significant decrease in LOP products was noted (Table №1). The level of diene conjugates decreased at all considered levels of the central nervous system ($p < 0.01$), the level of ketodienes and conjugated trienes - in the middle and spinal cord, the level of final LOP products decreased only in the midbrain tissue ($p < 0.01$). The level of FRO protein products characteristic of initiation processes has increased; this increase has become significant for the cerebral cortex and midbrain tissue ($p < 0.05$). SOD activation was noted only at the level of the spinal cord ($p < 0.01$).

Against the background of a natural increase in oxidative stress during pregnancy, a decrease in the level of α-tocopherol in blood plasma was noted, and the intake of exogenous α-tocopherol normalized its level [1], which may indicate an increase in the demand for this antioxidant in pregnant women. However, there is evidence that additional α-tocopherol can lead to impaired fetal-maternal circulation, which in the offspring is manifested by malnutrition and erythrocytosis [6]. In our study, exogenous maternal α-tocopherol, obtained by females during pregnancy, had an ambiguous effect on the free radical homeostasis of their offspring: a decrease in LOP products in all studied departments, an increase in the products characteristic of the initiation of protein oxidation, and, probably, compensatory, an increase in the activity of the main antioxidant protection enzyme - SOD.

Table №1. Changes in free radical homeostasis of the brain parts of sexually mature male rats prenatally treated with α-tocopherol.

Groups		SOD cu/ min*mg protein	FRO protein products		LOP products		
			Initiation, 270, cu/mg protein	Prolongation, 370, cu/mg protein	Diene conjugates, Un. oxidation index	Ketodienes and conjugated trienes, Un. oxidation index	Schiff bases, Un. oxidation index
Cerebral cortex	Control	1,09±0,053	4,38±0,394	2,89±0,274	0,60±0,015	0,25±0,006	0,018±0,001
	α-tocopherol	1,22±0,262	10,75±3,153 #	2,46±0,540	0,45±0,032 ##	0,29±0,006	0,10±0,030
Hypothamamic region	Control	1,07±0,166	2,27±0,463	1,99±0,313	0,59±0,009	0,25±0,026	0,04±0,011
	α-tocopherol	1,1±0,22	5,26±1,140 #	2,71±0,591	0,51±0,009 ##	0,18±0,003 ##	0,012±0,001 ##
Spinal cord	Control	0,49±0,083	0,83±0,14	0,64±0,04	0,114±0,0067	0,099±0,0157	0,017±0,0021
	α-tocopherol	1,37±0,281 ##	2,66±0,299	0,92±0,15	0,072±0,0098 ##	0,051±0,0094 #	0,015±0,0012

Legend: # - statistically significant differences in relation to the control group (# - $p < 0.05$; ## - $p< 0.01$),

reliability calculation was performed using the Mann-Whitney criterion, confidence thresholds - according to Gubler E.V. and Genkin A.A., 1973

Thus, the exogenous maternal α-tocopherol obtained by females in the third trimester of pregnancy significantly and long-term changed the metabolism in the tissues of the CNS of their offspring, the changes are ambiguous, they are manifested even in adulthood, and we estimate them mostly as negative.

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THE SYNTHESIS OF BENZYL DERIVATIVES OF SULFONAMIDES BENZO-ORTHO-THIAZINE STRUCTURE

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Sulfonamides of the benzo-ortho-thiazine structure obtained from substituted thionylanilines by the Diels-Alder reaction and bicyclic dienophiles with the subsequent oxidation reaction are introduced into the alkylation reaction at the nitrogen atom of the sulfonamide function, which allows for additional modification of the starting compounds.

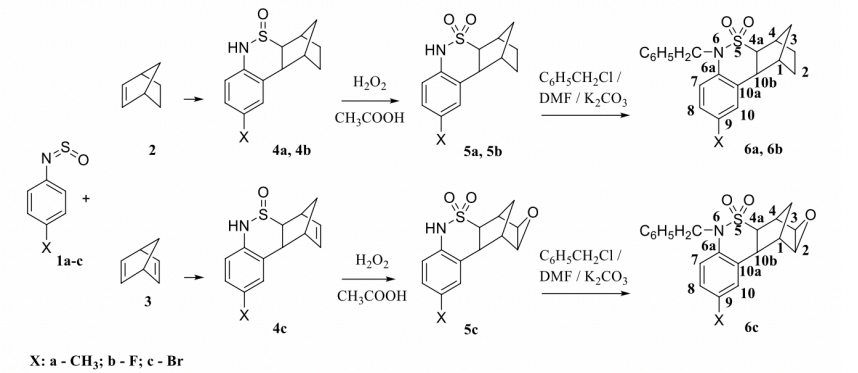
Keywords: sulfonamides, alkylation, sulfinylanilines, Diels-Alder reaction.

Recently, much attention has been paid again to the synthesis and study of the properties of compounds with sulfonamide fragments. First of all, this is due to a change in outlook on the possibility of using sulfonamides as drugs with a wide range of therapeutic effects. Studies of representatives of this class, obtained from previously identified sulfonamides with specific therapeutic effects, the introduction of additional functional groups to identify new and more powerful substances in their action are under way [1-3]. Additional functionalization of already known sulfonamide preparations makes a significant contribution to the expansion of the bank of compounds of this class [4].

For further modification of the compounds of the benzo-ortho-thiazine structure, an alkylation reaction on the amino group of the sulfonamide function is proposed. Sulfonamide structures (5a-5c) were used as the initial substrate for the alkylation reactions, obtained according to an earlier developed procedure, which included the heteroatomic variant of the Diels-Alder reaction between the corresponding sulfinylaniline (1a-1c) and bicyclic dienophiles norbornene (2) and norbornadiene (3) and the oxida-

tion reaction of the obtained adducts (4a-4c) to the corresponding sulfonamides (Scheme 1) [5, 6].

Scheme 1



X: a - CH_3; b - F; c - Br

To carry out the alkylation reaction, anhydrous potash was quickly triturated with the corresponding sulfonamide and placed in a flask, dimethylformamide was used as a solvent, and after dissolution, benzyl chloride was added as an alkylating agent. The reaction was carried out with constant stirring and heating in an oil bath at a temperature of 120 °C for 1 hour. At the end of the synthesis, the mixture was cooled and poured into a glass of cold distilled water with stirring. The precipitate was filtered off.

The IR spectrum of the alkylated derivative 6c (Fig. 1) contains intense characteristic absorption bands of ν_{SO2} (1332, 1142 cm^{-1}) and there is no signal in the region characteristic of the NH bond (in the initial sulfonamide there is an absorption band of ν_{N-H} 3260 cm^{-1}). The IR spectra of compounds 5a and 5b have a similar structure.

The 1H NMR spectra of the obtained benzyl derivatives of sulfonamides contain signals of protons of aromatic fragments in the range of 6.5-7.5 ppm. and signal groups of the bicyclic fragment in the region of 1.0-4.0 ppm Signals at -120 ppm are observed in the ^{19}F NMR spectrum of compound 6b. The group of signals of the bicyclic fragment has a structure identical to similar signals of the corresponding sulfonamides [5]. Signals corresponding to protons of aromatic fragments have a fundamental difference. So in the NMR ^1H spectrum of compound 6a, the signal data system is represented by two doublets of the AB system (2H^{12,16}, 6.82 ppm,, ^3J 7.6 Hz; 7.35 ppm., ^3J 7.8 Hz); two doublets (2H^{7,8} 7.17 ppm., ^3J 7.2 Hz; 7.23 ppm., ^3J 7.6 Hz), group of signals in the region of 7.11-7.17 ppm., which can be attributed to 1H^{14}, a triplet (2H^{13,15}, 7.06 ppm., ^3J 7.7 Hz) and a singlet (1H^{10}, 7.02 ppm.). In addition, there is a lack of signals in the region of 9.00-11.00 ppm., characteristic of the N – H proton (Fig. 2).

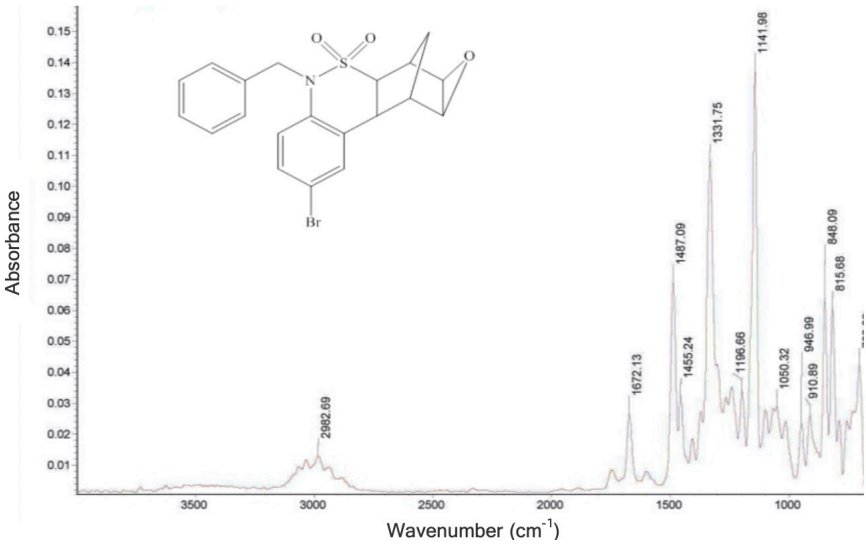


Fig.1 IR spectrum of compound 6c (KBr tablet)

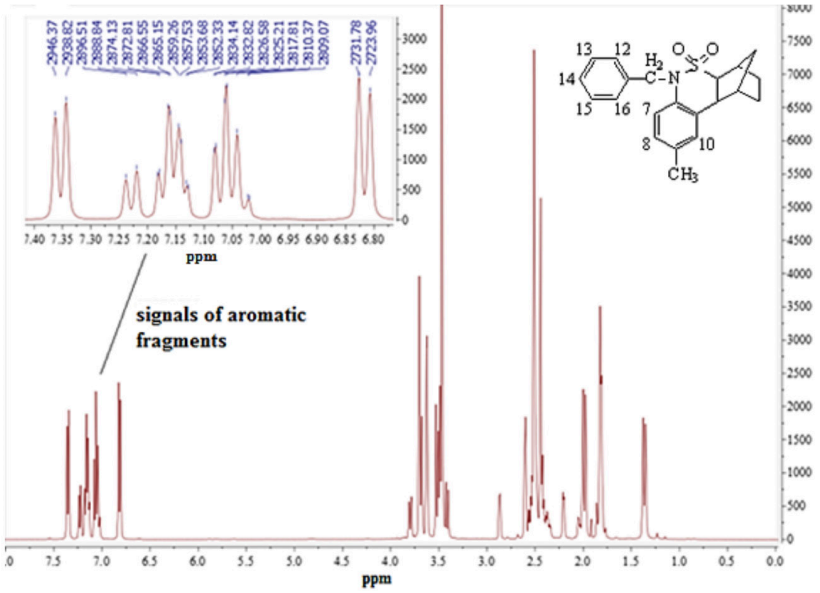


Fig.2 NMR ^{1}H spectrum of compound 6a (400 MHz, DMSO -d_6)

To summarize, the proposed method for the synthesis of a new type of sulfinamides with substituted thionylaniline fragments opens up great prospects for the preparation of new compounds of a thiazine nature, presumably with biological activity.

Experimental part

Elemental analysis was performed using a EuroEA J elemental CHNS analyzer. NMR ^{1}H spectra (400,0 MHz) and ^{19}F (376,5 MHz) were recorded on a Bruker Avance 400 spectrometer in DMSO-*d6* solutions. IR spectra were recorded on a Nicolet 6400 IR Fourier spectrometer in a KBr tablet. Melting points were measured using a Digital MelTemp 3.0 melting point analyzer.

7-benzyl-9-methyl-1,2,3,4,4a,10b-hexahydro-1,4-methano-*6H*-dibenzo[*c,e*]-5,6-thiazine-5,5-dioxide (6a)

7.9 g of compound 5a (0.03 mol) was ground in a mortar with 11.0 g (0.08 mol) of anhydrous potassium carbonate. Dimethylformamide (50 ml) and 9.8 g (0.08 mol) benzyl chloride were added to the resulting mixture, heated with stirring for 1 hour in an oil bath at 120 °C. The mixture was cooled and poured into distilled water (100 ml) with stirring. The precipitate was filtered off, washed with water and dried in air. The product is small crystals of light yellow color.

T_{melt}: 210-212 °C. Yield: 8.6 g (85 %).

IR – spectrum, ν, cm^{-1}: 1139, 1324 (SO_2).

NMR ^{1}H spectrum (400 MHz, DMSO -d_6), δ, ppm.: 1,36 d (1H, H^{11}, $^{2}J_{HH}$ 10,3 Hz), 1,77-1,86 M (4H, $C^{2}H_2C^{3}H_2$), 1,99 d (1H, H^{11}, $^{2}J_{HH}$ 10,5 Hz), 2,42 s (1H, $H^{1(4)}$), 2,44 s (2H, CH_2), 2,51 s (3H, CH_3), 2,60s (1H, $H^{1(4)}$), 3,62s (1H, $H^{10b(4a)}$), 3,70 s (1H, $H^{10b(4a)}$), 6,82 d (1H, $^{H12(16)}$, $^{3}J_{HH}$ 7,8 Hz), 7,02 s (1H, H^{10}), 7,06-7,08 t (1H, H^{14}), 7,14 t (2H, $H^{13,15}$, $^{3}J_{HH}$ 7,1), 7,17 d (1H, H $^{7(8)}$, $^{3}J_{HH}$ 7,1 Hz), 7,23 d (1H, H $^{7(8)}$, $^{3}J_{HH}$ 7,6 Hz), 7,35 d (1H, H $^{12(16)}$, $^{3}J_{HH}$ 7,6 Hz).

Found, %: C 71,46; H 6,52; N 3,95; S 9,10. $C_{21}H_{23}NO_2S$. Calculated, %: C 71,36; H 6,56; N 3,96; O 9,05; S 9,07.

7-benzyl-9-fluoro-1,2,3,4,4a,10b-hexahydro-1,4-methano-*6H*-dibenzo[*c,e*]-5,6-thiazine-5,5-dioxide (6b)

The synthesis was carried out according to the method of obtaining 6a from 8.0 g (0.03 mol) of adduct 5b. The resulting adduct is small crystals of light beige color.

T_{melt}: 180-183 °C. Yield: 7,7 g (75 %).

IR – spectrum, ν, cm^{-1}: 1142, 1323(SO_2), 1051 (F).

NMR ^{1}H spectrum (400 MHz, DMSO-d_6), δ, ppm.: 1,21 d (1H, H^{11}, $^{2}J_{HH}$ 10,4 Hz), 1,60-1,68 m (4H, $C^{2}H_{2}C^{3}H_{2}$), 1,79 d (1H, H^{11}, $^{2}J_{HH}$ 10,5 Hz), 2,27 s (1H, $H^{1(4)}$), 2,41 s (1H, $H^{1(4)}$), 2,69 d (2H, CH_2 $^{2}J_{HH}$ 3,0 Hz) 3,44 s (1H, $H^{10b(4a)}$), 3,56 s (1H, $H^{10b(4a)}$), 6,68 dd (2H, $H^{7,8}$, $^{3}J_{HH}$ 8,6 Hz, $^{3}J_{HH}$ 5,4 Hz, $^{4}J_{HH}$ 5,2 Hz), 6,82-6,89 m (3H, $H^{13,15}$, H^{14}), 7,02 dd (1H, H^{10}, $^{3}J_{HF}$ 10,2 Hz, $^{4}J_{HH}$ 2,2 Hz), 7,15 dd (2H, $H^{12,16}$, $^{3}J_{HH}$ 9,5 Hz, $^{4}J_{HH}$ 2,3 Hz).

Spectrum of NMR ^{19}F, δ, ppm.: -120 s (C – F)

Found, %: C 67,18; H 5,62; N 3,98; S 8,91. $C_{20}H_{20}NO_2SF$. Calculated, %: C 67,20; H 5,64; N 3,92; O 8,95; S 8,97; F 5,32.

7-benzyl-9-bromo-1,2,3,4,4a,10b-hexahydro-2,3-epoxy-1,4-methano-*6H*-dibenzo[*c, e*]-5,6-thiazine-5 5-dioxide (6c)

10.3 g of compound 5c (0.03 mol) was ground in a mortar with 11.0 g (0.08 mol) of anhydrous potassium carbonate. Dimethylformamide (50 ml) and 5.7 g (0.045 mol) benzyl chloride were added to the resulting mixture, heated with stirring for 1 hour in an oil bath at 120 °C. The mixture was cooled and poured into distilled water (100 ml) with stirring. The precipitate was filtered off, washed with water and dried in air. The precipitate is light beige small crystals.

T_{melt}: 257-259 °C. Yield: 8,5 g (68 %).

IR – spectrum, ν,cm^{-1}: 1141, 1331 (SO_2); 702 (Br).

NMR ^{1}H spectrum (400 MHz, DMSO-d_6), δ, ppm.: 1,19 d (1H, H^{11}, $^{2}J_{HH}$ 10,2 Hz), 1,67 d (1H, H^{11}, $^{2}J_{HH}$ 9,7 Hz), 2,29 s (1H, H^{4}), 2,46 s (1H, H^{1}), 2,73 d (2H, CH_2 $^{2}J_{HH}$ 5,0 Hz) 3,41 s (1H, H^{3}), 3,49 s (1H, H^{2}), 3,53 s (1H, H^{10b}), 3,55 s (1H, H^{4a}), 6,74 d (1H, H^{8}, $^{3}J_{HH}$ 7,6 Hz), 6,95 t (1H, $H^{13(15)}$, $^{3}J_{HH}$ 6,9 Hz), 7,01 t (1H, $H^{13(15)}$, $^{3}J_{HH}$ 6,9 Hz), 7,09-7,15 m (2H, $H^{12,14}$), 7,17-7,22 m (2H, H^{7}, H^{16}), 7,24 s (1H, H^{10}).

Found, %: C 55,51; H 4,26; N 3,27; S 7,40. $C_{20}H_{18}NO_3SBr$. Calculated, %: C 55,56; H 4,20; N 3,24; O 11,10; S 7,42; Br 18,48.

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THE CONSTRUCTIONS, WHICH PROVIDE PASSING OF ICE THROUGH LOW-PRESSURE WATERWORKS IN SPRING PERIOD

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In the construction of low-pressure waterworks, solution to the problem of ice passage in the spring is important. The article suggests constructive solutions for the passage of ice, namely: structures protected by copyright certificates.

Keywords. Low-pressure hydroelectric facilities, spring ice, ice passage, hydraulic structures.

In the construction of low-pressure hydroelectric facilities, the issue of passing spring ice through structures remains relevant today. One of the main factors affecting the choice of ice skipping scheme and the size of the waterworks is the strength of spring ice, which depends on its internal structure and external conditions that change over time and depending on geographic location.

To ensure the passage of ice, both technological measures and constructive solutions are used, which allow to reduce the size of the ice and guarantee unhindered passage of spring ice through hydraulic structures; while maximally aimed at protecting nature.

For the most part, hydraulic structures are designed to regulate the flow, ensuring the safe use of water bodies. But hydraulic structures are closely connected with the river element and, in turn, are subject to the active influence of both the water flow and ice loads.

The operating experience of low-pressure hydroelectric facilities shows that ice in the upper pool is not delayed, it must be let through. In some cases, congestion may occur in the reservoirs and directly at the hydroelectric facilities, which lead to an increase in the water level above the level of permissible marks, as a result of which significant damage to objects located in the coastal zones of the reservoirs can be caused.

Various measures are used to ensure unimpeded passage of ice during the construction and operational periods in severe ice conditions, which are usually aimed either at increasing the retention time of the ice cover, or at reducing thickness and strength, or at reducing the size of the ice before moving it.

However, the use of technological measures leads to a significant increase in operating costs. Blasting is detrimental to fisheries. Preventive measures to destroy the ice cover by dispersing blackening or chemical materials are harmful. They harm the environment by polluting the water, almost without accelerating the time for opening the ice cover [1].

Thus, at present, the issue of passing ice through low-pressure hydraulic structures remains relevant. When solving this problem, two main factors should be kept in mind. The first is the strength of the ice cover before opening, which significantly affects the choice of ice skipping scheme, and, consequently, the layout of the waterworks, the width of the span holes, etc. [1]. The second is constructive solutions that help ensure unhindered passage of spring ice through low-pressure structures.

The strength of spring ice in front of the ice drift depends on the formation conditions, heat transfer processes between the aquatic environment and atmosphere, the hydraulic regime of the reservoir, meteorological conditions, etc. In the spring, transient processes occur in the ice cover, its structure changes significantly. It is important to note that ice breaking and ice drift does not begin mainly at the moment the average daily air temperature changes from negative to positive, but much later, when the ice cover strength noticeably decreases. It is such ice that needs to be passed through hydroelectric facilities.

Despite the fact that by now a great deal of experience has been accumulated in the field of studying the strength characteristics of ice, the generalization of these data presents a certain difficulty, since the structure of ice and its strength are different for different rivers and regions. Therefore, the most reliable way to obtain data is a direct measurement and analysis of the physicomechanical characteristics of ice in the area of the alignment, where ice passage is planned.

Field studies of spring ice strength at the Novosibirsk reservoir, the Onega river, and the Irtysh river [2,3] allow us to generalize the results.

Table 1 shows the values of strength at the time of transition of daily average air temperatures from negative to positive.

Table 1

The strength of spring ice in bending, Ru, MPa

Area / Strength	Novosibirsk reservoir	Onega river Kargopol	Irtysh river, gate of the Shulbinsk HPS
1	2	3	4
Upper layers of ice	0,5	0,35	0,45-0,47
Lower layers of ice	0,25	0,18	0,36-0,42

To study the strength of ice at the Novosibirsk Reservoir, 28 samples were made. Their width was mainly 70, 105 and 140 cm. Several samples had a width of 35, 200 and 300 cm. Their length varied from 30 to 315 cm. The thickness depended on the natural conditions and was 90-95 cm at the beginning of the tests, at the end - 60-62 cm. The period of immersion of samples at the Novosibirsk reservoir is 1-3 minutes.

The breaking stress on bending was determined as for a cantilever beam (or slab) of rectangular cross section, rigidly clamped at the base and destroyed by the vertical force applied to its free end. Given the weighing pressure of water, when there is no water on the ice, the formula has the form:

$$R_u = \frac{6}{bh^2}\left\{P(l-c)+\frac{bl^2}{2}\left[h_в\rho_л g-\rho_в g\left(h_л-h_l\right)\right]\right\}. \quad (1)$$

For the case when water appear on the surface of the ice:

$$R_u = \frac{6}{bh^2}\left\{P(l-c)\pm\frac{bl^2}{2}\left(\rho_в-\rho_л\right)gh_л\right\}, \quad (2)$$

where the plus sign corresponds to the load applied from below, the minus sign to the top, P – the value of the breaking load; *l* – sample length; *b*– sample width; h_i– the thickness of the ice in the pinched part; ρ_w – water density; ρ_i – ice density; c – distance from the free end of the end to the point of application of the load; h_l– height of the excess of the sample over water.

Based on the data obtained, spring-ice bending strength graphs are plotted and a dependence graph of N.N. Petrunicheva:

$$R_u = R_o - \sum_{i=0}^{n} i\Delta\tau_i \quad (3)$$

and V.A. Korenkova [4] for the conditions of middle Siberia:

$$R_u = R_o - 0,30n, \quad (4)$$

where R_o – according to K.N. Korzhavina [3] and V.A. Korenkova [4] for middle Siberia is 0.55 MPa; *n* – number of days with positive average daily temperatures; *i*– value of the decrease in the ice strength per day in the time interval Δτ, during which *i* can be considered a constant value.

The time interval is assigned based on an analysis of meteorological conditions for a number of years or for a specific year based on preliminary weather forecasts. N.N. Petrunichev also gives recommendations for assignment *i,* which in turn depends on air temperature, cloud cover, ice structure, etc.

Comparing the results of studies with empirical dependences, it can be noted that for the upper ice layers of the Novosibirsk reservoir, equations (3) and (4) give convergence, which is quite satisfactory for practical calculations (Fig. 1).

The following formulas are recommended for calculating the flexural strength of the lower ice layers of the Novosibirsk reservoir:

$$R_u = \frac{R_o}{2} - 0,07\sum_{i=0}^{n} i\Delta\tau_i, \text{ MPa} \quad (5)$$

$$R_u = \frac{R_o}{2} - 0,02n, \text{ MPa} \quad (6)$$

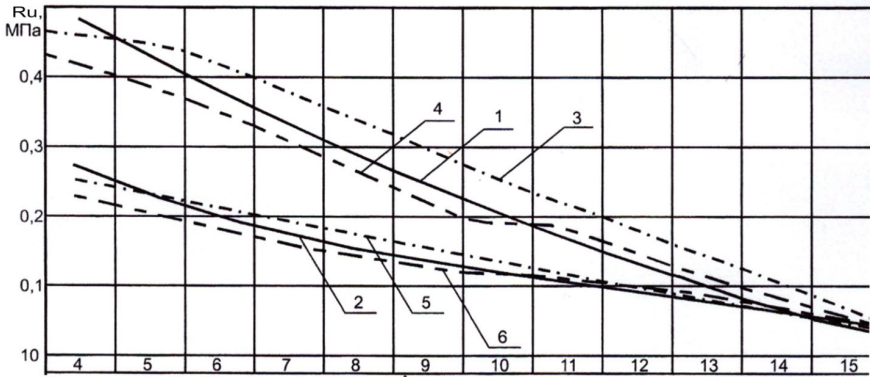

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Fig. 1 – Graphs of spring ice bending strength.

1-2 – according to field studies; 3-4 – according to formulas (3) and (4), respectively; 5-6 – according to formulas (5) and (6), respectively

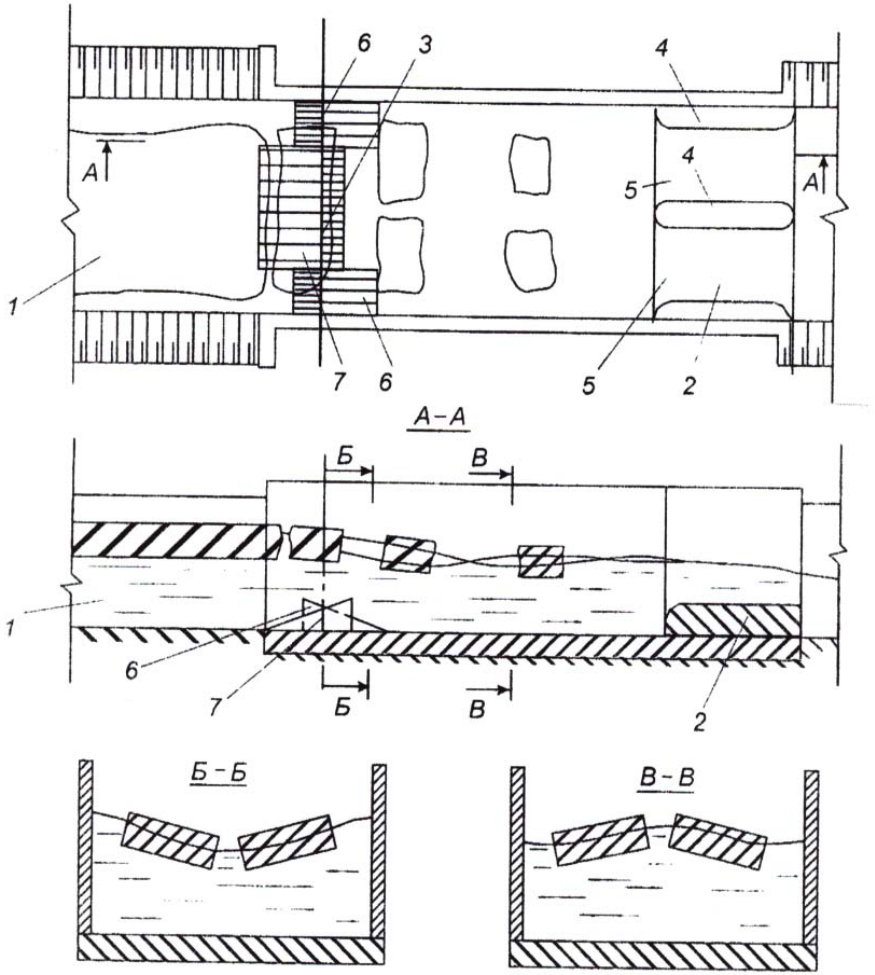

Fig. 2 – Design for passing ice.
1 – channel; 2 – spillway; 3 – threshold; 4 – gobies; 5 – spans;
6.7 – weirs in the threshold

Constructive measures mainly come down to choosing the location of the waterworks in plan, the shape of the gobies and the designation of the minimum width of the passage openings from the conditions of ice passage. During the construction of waterworks, ice is sometimes passed through a comb with a relatively small width of the passage openings. In

this case, the pass is ensured by breaking the ice fields on a concentrated drop, which is formed under the influence of the incompletely dismantled top bridge of the foundation pit of the first stage. A similar idea can be used to ensure the passage of ice through low-pressure waterworks with a limited width of their spillways. To do this, it is enough to arrange an additional threshold in front of the main spillway, which ensures the creation of a difference. In this case, the destruction of the ice occurs before the ice fields meet the bulls of the spillway structure. For more successful ice passage, breaking the ice in both the transverse and longitudinal directions (with respect to the flow) is desirable.

In this regard, designs should be developed that allow breaking ice fields into separate ice floes in two directions. The solution of this problem is supported by copyright certificates [4,5]. The ice passage facility is shown in Figure 2.

When the water flow moves between the spillway and the threshold, a free surface of a complex configuration is formed, which occurs under the influence of the auxiliary threshold. Thus, in the sections BB and BB, decline curves are formed between which ice bands break.

Conclusions

1. To date, the issue of passing spring ice through hydraulic structures remains relevant.

2. To ensure unhindered passage of ice, it is necessary to take into account the physicomechanical characteristics of spring ice and its strength, both the upper and lower layers.

3. Analysis of the research results shows that the strength of ice depends on the direction of the load. With the transition of daily average temperatures from negative to positive, the strength of the upper layers of ice is two times greater than the lower layers for the Novosibirsk reservoir. In the first case, the strength of the upper layers was 0.5, the lower ones - 0.25 MPa. The intensity of lowering the strength of the upper layers is much faster than the lower. This is quite natural, since the upper layers are more susceptible to solar radiation and positive air temperatures. Solar radiation penetrates into the lower layers much less. The main influence on them is provided by water, the temperature of which changes very slowly. So, during the study period at the Novosibirsk reservoir, it increased by 1 °C and amounted to 2 °C.

4. The upper and lower layers of ice that form on reservoirs and rivers, where the average flow velocity does not exceed 0.4 m/s, have different bending strengths. For an approximate assessment of the strength of the lower ice layers for the Novosibirsk reservoir, formulas (5) and (6) can be used.

5. For successful passage of ice through low-pressure hydroelectric facilities, it is necessary to ensure the breaking of ice fields into small ice floes. This is achieved by arranging special structures above the main spillway that create a concentrated drop for breaking ice into separate bands and forming a complex flow surface for breaking these bands into smaller ice floes. The proposed design solutions allow the passage of ice even with small sizes of the passage openings of the catchment structures.

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DEVELOPMENT OF A SOFTWARE AND HARDWARE COMPLEX FOR DETERMINING THE OBJECT COORDINATES IN SPACE

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The article describes a method for determining the coordinates of an object in space and its practical implementation in the form of a prototype device.

Keywords: polar coordinate system, laser range finder, Arduino, stepper motor, robotic arm, machine vision.

Introduction

Currently, robotic manipulators are being actively introduced into the manufacturing process of products at enterprises. This process is due to the highest accuracy of operations, speed, reliability and a continuous cycle of robots. The consequence of this process is the receipt of economic benefits by enterprises that are moving along the path of production automation [1].

One of the promising areas of application of manipulators in the near future is medicine. High accuracy of the robot's movements will make it possible to perform both light minimally invasive procedures and complex surgical operations. A successful example of the introduction of the robot in medicine is the "da Vinci" robot surgeon, which is used in large world clinics to perform a wide range of operations on the spine, genitourinary system, abdominal cavity, chest, head, neck [2]. With its help, benign and malignant tumors are removed, obesity is treated, electronic

cardiac stimulants are established and its mitral valves are restored. The system can compensate for insufficiently smooth and accurate movements of human hands. Accordingly, the risk of complications after such surgery is much lower. The "da Vinci" Robot is controlled by a highly qualified surgeon.

The next stage in the development of medical robotic manipulators is the ability to work autonomously without direct human involvement. For this, the robot must have a machine vision system, i.e. have the ability to navigate in space and interact with surrounding objects using computer vision methods.

To implement computer vision, cameras and special algorithms are used to analyze the image, classify objects by color and geometric shape [3].

One of the important tasks of “machine vision” is to determine the exact position (coordinates) of an object in space. Thanks to this ability, the automatic system will be able to fully navigate in space and interact with surrounding objects. Objects can be medical instruments, individual parts of medical technical devices, a certain point on the patient’s body or special markers, thanks to which the manipulator can work with the target area.

This study is aimed at solving this problem.

Purpose of the study

Develop a hardware-software complex for determining the coordinates of an object in space, intended for use in control systems of industrial manipulators using machine vision technology.

Materials and methods

The basis for determining the coordinates of an object in space is a polar coordinate system. This is a coordinate system in which each point on the plane is determined by two polar angles and a polar radius vector [4].

Using the polar coordinate system, you can define an object as a **material point** in space. The origin of the coordinate system is the location of the device. The distance from the origin of the coordinate system to the point is taken as the radius vector, and the position in space is determined by the polar angles φ and θ.

It is not difficult to transform coordinates from the polar system to Cartesian three-dimensional coordinate system. To do this, project the end points of the projections of the vector on the axis OX, OY, OZ. Point P is projected onto the axis OZ, and point Q on the axis OX, OY (Figure 1).

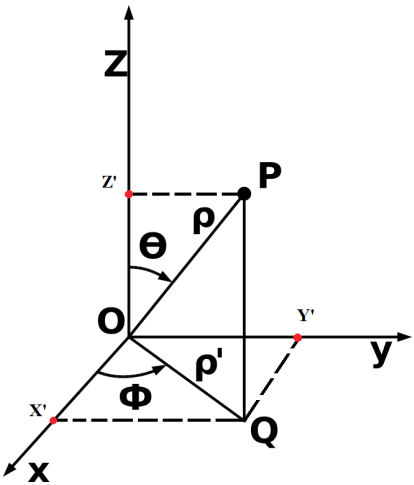

Figure 1 – The projection of the end points of the projections of the radius vector

φ, θ – polar angles
ρ – projection of the polar radius vector onto the OZY plane
ρ' – projection of the radius of the vector on the OXY plane
PQ – auxiliary segment uniting the points of the end of the projections of the vector

The sine of the angle φ is the ratio of the segment OY 'to the projection length of the radius vector P' (1).

$$\sin \varphi = \frac{OY'}{P'} \quad (1)$$

The cosine of the angle φ is the ratio of the segment OX 'to the projection length of the radius vector P' (2).

$$\cos \varphi = \frac{OX'}{P'} \quad (2)$$

The cosine of the angle θ is the ratio of the segment OZ 'to the projection length of the radius vector P (3).

$$\cos \theta = \frac{OZ'}{P} \quad (3)$$

From here you can express the coordinates of X', Y', Z' (4).

$$\begin{cases} X' = \cos \varphi * P' \\ Y' = \sin \varphi * P' \\ Z' = \cos \theta * P \end{cases} \quad (4)$$

Based on this method, a prototype device was developed that can determine the coordinates of an object in space. The device consists of the following nodes: 2 stepper motors, 2 motor drivers, a laser range finder, and an Arduino Mega board.

The block diagram of the device is shown in Figure 2.

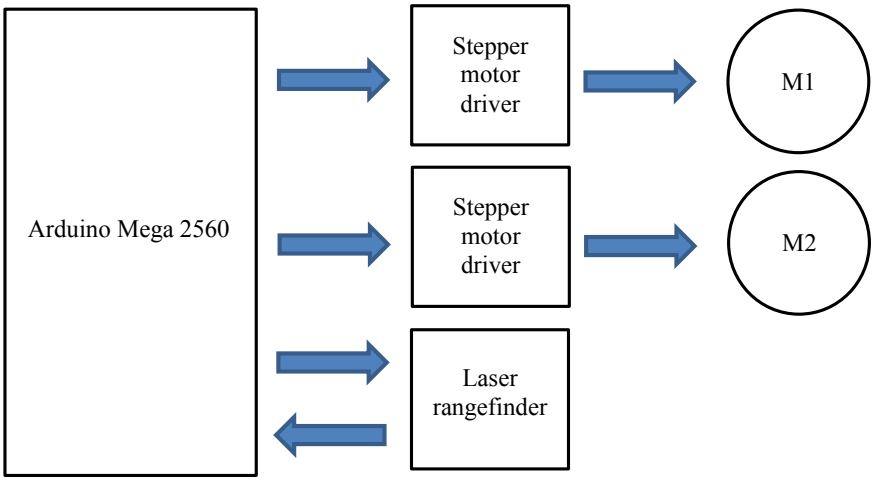

Figure 2 – Device block diagram

The stepper motor M1 provides a horizontal deflection for the head with a range finder, sets the angle φ. Motor M2, in turn, provides a vertical deflection, sets the angle θ. The laser range finder is designed to determine the distance to the object, sets the length of the polar radius vector.

A program was written for the ATMEGA 2560 microcontroller that implements a method for determining the coordinates of an object in space. Interaction with the board is carried out through the serial port. At the input, the program accepts an array of characters containing the type of command and an argument through a tab character (space). The program supports the following types of commands:

1) **h** argument – sets the horizontal angle φ. Takes a value in degrees as an argument;

2) **v** argument – sets the vertical angle θ. Takes a value in degrees as an argument;

3) crd – request for information on the current position of the motor shafts, the distance to the object and the coordinates in the Cartesian coordinate system.

The program analyzes the line with the command. If this is a command to move the shaft of any of the motors (h or v), then the program implements the appropriate method, and after completion it measures the distance to the object using a laser range finder. If a request is received to display the current location of the object (crd), then data is sent to the serial port containing information about the current position of the motor shafts, the distance to the object and the coordinates in the Cartesian coordinate system in the following sequence: horizontal deflection angle, vertical deflection angle, distance to object, coordinates X, Y, Z. Information is separated by a tab character (space). The format of the output quantities corresponds to the international system of units of physical quantities. Figure 3 shows a screenshot of the terminal window through which interaction with the device was carried out.

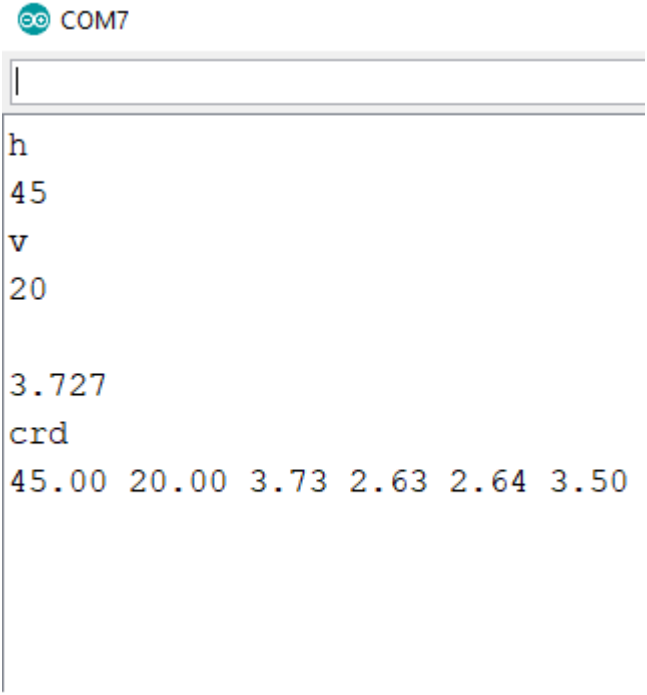

Figure 3 – Interaction with the device using commands

Conclusions

As a result of the work carried out, a hardware-software complex was created for determining the coordinates of an object in space, intended for use in control systems of industrial manipulators using machine vision technologies. At the moment, the device has an accuracy of measuring the distance to the object of ± 1 mm, the speed of measuring the distance is 3 seconds, the nominal rotation speed of the shafts of stepper motors is 15 rpm. The supply voltage - 5 V. The low weight of the transmitted data packets and the ease of parsing strings make the device convenient for use in various digital systems based on microprocessors, which are, in particular, machine vision systems.

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PARAMETRIC DECISION RULES FOR OBJECT RECOGNITION IN MULTI-DIMENSIONAL VECTOR REPRESENTATION OF COLOR IMAGES

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The multidimensional presentation of information under RGB encoding of video images is considered. The possibility of a parametric approach to constructing decision rules for recognizing various objects in video images is evaluated. Options are proposed for constructing two alternative and many alternative decision rules for recognizing objects depending on the formulation of the problem. Numerical values are given and an analysis is made of the differences in the localization regions of the formed input vectors depending on the calculated estimates of the distribution moments. An approach to the formation of multidimensional training and control samples for decision-making rules for recognizing objects in video images is proposed.

Keywords: recognition; video image; decision rule; information; multidimensional vector; pixel sample; normal distribution; random value.

Introduction

Currently, video surveillance systems are constantly being improved. The information obtained can be used for various purposes, including for the detection and recognition of various objects in images. In this case, it is necessary to use the most fully the information contained in the resulting video images. Options for using video systems to solve objects rec-

ognition problems can be different. Multiple camcorders can be used. For training, an object image obtained from one camera can be used, and recognition can be carried out using images obtained from another camera.

The problems of detecting and recognizing objects in video images, as a rule, are solved using digital processing of the video images themselves. Information can be obtained using various types of encoding (or digital model). The most common is CMYK or RGB encoding. Images are presented in discrete form. The color resolution is that the intensities of the basic colors can take a finite number of discrete values. For example, for RGB encoding, each pixel is assigned three levels of brightness. For red, green and blue colors.

For the most complete use of information and improving the quality of recognition of objects in images, it is necessary to constantly improve methods and algorithms for processing video information.

Multidimensional representation of information in RGB encoding of images of objects.

We consider the multidimensional representation of information with RGB-encoded images using the example of images of various objects such as copters.

Figures 1 and 2 show images of unmanned aerial vehicles (UAVs) of the copter type, a) in the RGB configuration, b) - c) in the intensities of the base colors.

a) RGB b) R - red b) G - green c) B - blue

Figure 1 Image of the 1st copter: a) in the RGB configuration, b) - c) in the intensities of the base colors.

a) RGB b) R - red b) G - green c) B - blue

Figure 2 Image of the 2nd copter: a) in the RGB configuration, b) - c) in the intensities of the base colors.

One pixel of the image can be represented as a vector [1].

$$\vec{\mathbf{U}} = \begin{pmatrix} U_r \\ U_g \\ U_b \end{pmatrix} = \begin{pmatrix} U_r & U_g & U_b \end{pmatrix}^{\mathrm{T}}, \quad (1)$$

where: U – the level value in the color channel (palette size) in the bit representation (for example $P = 2^c$, c – bits); r – red; g – green; b – blue; T – transposition sign.

The dimension of such a vector will be equal to 3. The image is a collection of pixels located line by line. For example, the resolution 200 x 100 (the number of pixels in a line per number of lines).

Using representation (1), the entire set of image pixels can be represented as a three-dimensional sample of volume n [1].

$$\mathbf{U}_{(n)} = \begin{pmatrix} U_{r(1)} U_{r(2)} \ldots U_{r(i)} \ldots U_{r(n)} \\ U_{g(1)} U_{g(2)} \ldots U_{g(i)} \ldots U_{g(n)} \\ U_{b(1)} U_{b(2)} \ldots U_{b(i)} \ldots U_{b(n)} \end{pmatrix}, \; i = 1,\ldots, n, \quad (2)$$

where: n - total number of pixels in the image.

An experimental study of differences in the distribution parameters of multidimensional vectors formed from images of various objects.

In the general case, sample (2) is a multidimensional random variable. This is determined by the fact that the process of image formation is subject to random disturbances, the probabilistic nature of which affects all stages. These are the errors of the meter itself, inaccuracies in registration and noise in the channels when transmitting measurement data, rounding errors in the calculations, and a number of other parameters [2]. This assumption allows us to use a statistical approach to obtaining estimates. The probabilistic distribution of the sample can be characterized by two points - the first initial (mathematical expectation) and the second central (covariance matrix) [2]. In statistical processing, it is not the moments of distribution that are found, but their estimates. In the future, we will operate not with the moments of distribution, but with their estimates. The estimate of the mathematical expectation (ME) of the sample (2) is determined by the expression [1]

$$\vec{\mathbf{m}} = \begin{pmatrix} m_r & m_g & m_b \end{pmatrix}^{\mathrm{T}}, \quad (3)$$

where the elements of the vector are determined by the expressions

$$m_r = \frac{1}{n}\sum_{i=1}^{n} U_{r(i)}, \quad m_g = \frac{1}{n}\sum_{i=1}^{n} U_{g(i)}, \quad m_b = \frac{1}{n}\sum_{i=1}^{n} U_{b(i)}. \quad (4)$$

The estimate of the covariance matrix is calculated in accordance with the expression [1]

$$\mathbf{M} = \frac{1}{n-1}\sum_{i=1}^{n}\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}\right)\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}\right)^{\mathrm{T}}. \quad (5)$$

The elements of the covariance matrix (CM) reflect the degree of statistical connection of the elements of the initial vector of fixed parameters with each other.

Since the obtained estimates of ME and the covariance matrix (CM) are statistical, it is necessary to determine the size of the sample to justify the reliability of the estimates. The sample size will be determined by the size of the image and the resolution. Under the assumption that the distribution (Gaussian distribution) of the sample is normal (2), the required sample size will be determined by the dimension of the vectors and the allowable error probability. In [2], the volumes of the necessary samples were determined for various confidence probabilities of the estimates. If the confidence probability of the estimate is 0.98, then the sample size for three dimensional vectors should be at least 3460. Thus, an image measuring about 60 by 60 pixels is sufficient to obtain ME and CM estimates.

It was proved in [3] that the linear manifold $L(\vec{\mathbf{U}})$, in which the random vector $\vec{\mathbf{U}}$, is localized is the subspace $Q(\mathbf{M})$ shifted by the expectation vector $\vec{\mathbf{m}}$, formed by the column-vectors of CM of this random vector

$$L(\vec{\mathbf{U}}) = Q(\mathbf{M}) + \vec{\mathbf{m}}. \quad (6)$$

The subspace $Q(\mathbf{M})$ is otherwise called the directing subspace of the linear manifold $L(\vec{\mathbf{U}})$. The dimension of this linear manifold is equal to the dimension of its directing subspace $Q(\mathbf{M})$, which in turn is equal to the rank *r* CM

$$\dim L(\vec{\mathbf{U}}) = \dim Q(\mathbf{M}) = rg(\mathbf{M}) = r. \quad (7)$$

In what follows, the linear manifold $L(\mathbf{U})$ will be called the region of localization of the vector $\vec{\mathbf{U}}$ of the image of a certain object, or *r*-region of $\vec{\mathbf{U}}$.

Using CM **M**, one can determine the region of the original space within which the random vector $\vec{\mathbf{U}}$ is localized. To do this, you can use a fairly clear geometric interpretation. In particular, for $det\mathbf{M} \neq 0$ we can write the expression for an *r*-dimensional ellipsoid of constant probability density $\mathrm{P}(\vec{\mathbf{U}})$ [3]

$$(\vec{\mathbf{U}} - \vec{\mathbf{m}})^{\mathrm{T}}\mathbf{M}(\vec{\mathbf{U}} - \vec{\mathbf{m}}) = d^2, \quad (8)$$

for any *d*> 0. In the space defined above, the center of this ellipsoid is determined by the components of the vector $\vec{\mathbf{m}}$.

Choosing *d* accordingly, it is possible to specify the dimensions of an *r*-dimensional (in the general case) ellipsoid so that the probability of a

random vector $\vec{\mathbf{U}}$ getting inside the ellipsoid is not less than the given one. Assuming this given probability to be sufficiently close to unity, we can obtain an ellipsoid, which can serve as an approximate model of the localization region of the initial vector $\vec{\mathbf{U}}$ [3]. Differences in the statistical properties of vectors (or images of objects in space), and hence the objects themselves, differing in size, shape, and color, with such a geometric interpretation of the concept of "localization region" (LR), acquire clarity and specific content.

The physical meaning of LR is that its dimension and shape reflect the degree of statistical connection of the elements of the random vector $\vec{\mathbf{U}}$ with each other, i.e. their pairwise correlation.

Expressions (6) and (7), taking into account the geometric interpretation in accordance with (8), predetermine the method of analysis of various properties of images of objects.

Using the above expressions (2-5), the ME and CM estimates were calculated for two different copters, shown in Figures 1 and 2. Copter 1 in Figure 1, Copter 2 in Figure 2.

$$\vec{\mathbf{m}}_1 = (179{,}8 \quad 188{,}2 \quad 192{,}1)^{\mathrm{T}}, \ \vec{\mathbf{m}}_2 = (120{,}1 \quad 161{,}3 \quad 184{,}8)^{\mathrm{T}}, \qquad (9)$$

$$\mathbf{M}_1 = \begin{pmatrix} 2697{,}3 & 2589{,}6 & 2772{,}5 \\ 2589{,}6 & 2550 & 2783{,}7 \\ 2772{,}5 & 2783{,}7 & 3127{,}8 \end{pmatrix}, \ \mathbf{M}_2 = \begin{pmatrix} 3139 & 1874{,}7 & 1044{,}6 \\ 1874{,}7 & 1606{,}5 & 1394 \\ 1044{,}6 & 1394 & 1634{,}4 \end{pmatrix}. \qquad (10)$$

where: $\vec{\mathbf{m}}_1$ and $\vec{\mathbf{m}}_2$ estimates of ME images of copter 1 and copter 2, respectively; $\mathbf{M}_1$ and $\mathbf{M}_2$ estimates of CM images of the images of the copter 1 and copter 2, respectively.

Analyzing the numerical values of the estimates obtained, it is easy to notice that they differ significantly from each other. This allows us to make an assumption that the localization regions of the image vectors of the 1st and 2nd copters are different, despite their undoubted similarity.

As indicators of the proximity of two regions of localization of TACs, for example, the vector $\Delta\vec{\boldsymbol{\lambda}}$ of the moduli of the differences of the eigenvalues λ_k, $k = 1,...,3$, the corresponding spectral matrices $\boldsymbol{\Lambda}_1$ of copter 1 and $\boldsymbol{\Lambda}_2$ of copter 2 [4]

$$\Delta\vec{\boldsymbol{\lambda}} = \begin{bmatrix} |\Delta\lambda_1| \\ |\Delta\lambda_2| \\ |\Delta\lambda_3| \end{bmatrix} = \begin{bmatrix} \left|\lambda_1^1 - \lambda_1^2\right| \\ \left|\lambda_2^1 - \lambda_2^2\right| \\ \left|\lambda_3^1 - \lambda_3^2\right| \end{bmatrix}, \qquad (11)$$

where: the superscript at l indicates the number of the copter, the subscript indicates the number of the eigenvalue of the spectral matrix.

The eigenvalues of $\mathbf{M}$ can be found by solving the characteristic equation, which is written as

$$\left|\dot{\mathbf{M}} - \lambda \mathbf{I}\right| = 0 , \quad (12)$$

where: I – unit matrix.

For the matrices $\mathbf{M}_1$ and $\mathbf{M}_2$ (10) the spectral matrices $\mathbf{\Lambda}_1$ and $\mathbf{\Lambda}_2$ (12), (12) were calculated, as well as the vector $\Delta\vec{\lambda}$ of the moduli of the differences of the eigenvalues

$$\Delta\vec{\lambda} = \left(9{,}9 \quad 1054{,}2 \quad 3059{,}3\right) . \quad (13)$$

After analyzing the values given in (13), we can say that the moduli of the difference in eigenvalues are different from 0. This allows us to conclude that the localization regions of copter image vectors differ in shape and size.

Studies have shown that the statistical moments of the distribution of image vectors can be used in the synthesis of decision rules for the recognition (or detection) of objects in the image. In this case, it is possible to use a parametric approach to constructing the distribution of vectors that are decisive under the assumption of Gaussianity (normality).

Decisive rules for the recognition of various objects in images with multidimensional presentation of information.

The property of Gaussianity (normality) of features greatly simplifies the form of the decisive function. The decisive function turns out to be a linear combination of distributions, and its distribution will again be normal. In a parametric approach, decision rules are based on the formation of a likelihood relationship and its comparison with a certain threshold, the value of which is determined by the selected quality criterion [2,5]. The decision rules are not substituted by the probability densities themselves, but their estimates obtained in the learning process. Therefore, it is not the likelihood ratio itself that is compared with the threshold, but its assessment obtained in the course of training [2].

In this case, the task of parametric training will be to evaluate the parameters ME and CM of the probability densities used in the decision rule.

The distribution density of the generated multidimensional vector (1) of the image can be written in the form [5]

$$P\left(\vec{\mathbf{U}}_i\right) = \frac{1}{(2\pi)^n \left(\det \mathbf{M}\right)^n} \exp\left[-\frac{1}{2}\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}\right)^T \mathbf{M}^{-1}\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}\right)\right], \quad (14)$$

where: $\vec{\mathbf{m}}$ and $\mathbf{M}$ - estimates of ME and CM.

Consider several options for constructing a decision rule.

First option. It is used if it is necessary to detect a specific object in the image. At the same time, training control samples of image vectors (2) are used to obtain ME and CM estimates. Hypothesis H_1 – an object is present in the image. Hypothesis H_0 – there is no object in the image.

The decisive rule is the formation of the logarithm of the likelihood relationship and comparing it with the threshold *C*, which can be written in the form [5]

$$\mathrm{L} = \frac{n}{2}\ln\frac{\det \mathbf{M}_1}{\det \mathbf{M}_0} + \frac{1}{2}\cdot\sum_{i=1}^{n}\left(\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_1\right)^{\mathrm{T}}\cdot(\mathbf{M}_1)^{-1}\cdot\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_1\right) - \right.$$

$$\left. - \left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_0\right)^{\mathrm{T}}\cdot(\mathbf{M}_0)^{-1}\cdot\left(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_0\right)\right) > \ln C\,, \qquad (15)$$

where: $\vec{\mathbf{m}}_1, \vec{\mathbf{m}}_0$ estimates of ME and $\mathbf{M}_1, \mathbf{M}_0$ estimates of CM, with the validity of the hypotheses H_1 and H_0 respectively.

As a training sample, we use a sample obtained a priori from the image on which the object is present. As a control sample, a sample obtained from the image being checked is used.

Such a decisive rule is two-alternative. It is possible to use well-known criteria. The decision threshold can be determined in accordance with the Neumann-Pearson criterion [2,4], setting the probability of an error of the first kind a (false alarm). The smaller the given a, the higher the threshold.

The second option. It is used when a problem arises when it is necessary to make a decision on whether the input (control) sample of vectors belongs to one of the classes of objects. The problem arises of a multi-choice. The decision rule in the multi-alternative case can be written as follows: sample (2) belongs to the class x_l, $1 \le l \le \mathrm{K}$, for which the likelihood function is maximal [6]

$$\mathrm{W}_l = \prod_{i=1}^{\mathrm{n}} \omega_l(\vec{\mathbf{U}}_i) = \max\left\{\prod_{i=1}^{\mathrm{n}} \omega_{\mathrm{k}}(\vec{\mathbf{U}}_i)\right\}, \qquad (16)$$

where: K – total number of classes; k – class number.

The solution $\vec{\mathbf{U}}_i \in \mathrm{x}_l$ is made in the case when $\mathrm{K}-1$ inequalities of $\mathrm{W}_l \ge \mathrm{W}_{\mathrm{k}}$, $\mathrm{k} = 1,2,...,l\text{-}1,l+1,...,\mathrm{K}$ simultaneously satisfied. Passing to the logarithms of the likelihood functions, the decision rule in the multi-alternative case is written in the form: $\vec{\mathbf{U}}_i \in \mathrm{x}_l$, if the conditions are fulfilled [6]

$$\sigma_{\mathrm{LK}} = \mathrm{L}_l - \mathrm{L}_{\mathrm{k}} = \ln\mathrm{W}_l - \ln\mathrm{W}_{\mathrm{k}} =$$

$$= \frac{1}{2}\sum_{i=1}^{\mathrm{n}}[(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_{\mathrm{k}})^{\mathrm{T}}\mathbf{M}_{\mathrm{k}}^{-1}(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_{\mathrm{k}}) - (\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_l)^{\mathrm{T}}\mathbf{T}_l^{-1}(\vec{\mathbf{U}}_i - \vec{\mathbf{m}}_l)] + \frac{\mathrm{n}}{2}\ln\frac{\det\mathbf{M}_{\mathrm{k}}}{\det\mathbf{M}_l} > 0\,. \qquad (17)$$

In this case, the criterion of maximum likelihood was used as a criterion for making a decision, since the probabilities of the appearance of classes and payment for errors are a priori unknown. Errors are formulated differently from the first option.

An error of the first kind is referred to as assigning a sample to the class to which it actually belongs (that is, assigning a sample to some class $\mathbf{x}_k$, different from $\mathbf{x}_l$. An error of the second kind is referred to as assigning a sample to any to a divided class, when in reality it does not belong to it. Consequently, the probability of an error of the first kind can be written in the form [2]

$$\alpha_l = \mathrm{P}\left\{\bigcup_{k=1}^{K}[\mathrm{L_k} - \mathrm{L}_l > 0 \ \left|\mathrm{x}_l\right.]\right\} = 1 - \mathrm{P}\left\{\bigcap_{\substack{k=1 \\ k\neq l}}^{K}[\mathrm{L_k} - \mathrm{L}_l \le 0 \ \left|\mathrm{x}_l\right.]\right\} =$$

$$= 1 - \mathrm{P}\left\{\bigcap_{\substack{k=1 \\ k\neq l}}^{K}[\mathrm{L}_l - \mathrm{L_k} > 0 \ \left|\mathrm{x}_l\right.]\right\}, \quad (18)$$

and the probability of an error of the second kind

$$\beta_l = \frac{1}{\mathrm{K}-1}\sum_{\substack{k=1 \\ k\neq l}}^{K}\beta_{l\mathrm{k}}, \ \beta_{l\mathrm{k}} = \mathrm{P}\left\{\bigcap_{\substack{q=1 \\ q\neq l}}^{K}[\mathrm{L}_l - \mathrm{L_q} \le \mathrm{o} \ \left|\mathrm{x_k}\right.]\right\}, \ \mathrm{q} = 1,2,\ldots,\mathrm{K}. \quad (19)$$

The dimension of the region (space) of localization of vectors for all classes should be the same [6]. In addition, the main requirement is the requirement for the distance between classes. It should be no less than the size of the classes themselves. This condition must be fulfilled at the training stage using training samples for each class of objects.

In the general case, using the parametric approach, it is possible to construct other versions of the decision rule depending on the tasks and the hypotheses formulated.

Conclusion

The article outlined the methods of forming parametric decision rules for recognizing objects of various types in video images. The options for constructing two alternative and many alternative decision rules are considered. It is shown that the option of constructing the decision rule and the decision-making criteria are determined by the statement of the problem.

The proposed approach to the formation of multidimensional training and control samples for decision rules allows the most complete use of the totality of information represented by video images of objects.

Experimental estimates of the distribution parameters of vectors formed using the color configuration of the image of objects showed that it is possible to introduce some indicators of the proximity of localization areas. An analysis of the numerical values of these indicators showed fundamental differences in the areas of localization of objects, even with their visual similarity.

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