



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

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这些会议文结合了会议的材料 – 研究论文和科学工作者的论文报告。它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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上海合作组织成员国的经济举措是摆脱“公地悲剧”系统性陷阱的出路
**ECONOMIC INITIATIVES OF THE COUNTRIES OF THE
SHANGHAI COOPERATION ORGANIZATION AS A WAY OUT OF
THE SYSTEMIC TRAP “TRAGEDY OF THE COMMONS”**

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注解。 本文探讨了上海合作组织国家在采纳和实施经济倡议的基础上走出“公地悲剧”的制度性陷阱的问题。 重点介绍并阐述了上合组织国家在经济合作领域协议的基础上为确保全球安全而开展的活动的特点。

关键词：上合组织，系统性陷阱“公地悲剧”； 全球安全； 上合组织经济发展战略。

***Annotation.** This article considers the problem of getting out of the systemic trap “tragedy of the commons” on the basis of adoption and implementation of economic initiatives of the Shanghai Cooperation Organisation (SCO) countries. The characteristic features of the SCO countries’ activity in the direction of ensuring global security on the basis of agreements in the field of economic cooperation are highlighted and described.*

***Keywords:** SCO, systemic trap “tragedy of the commons”; global security; SCO Economic Development Strategy.*

The relevance of the study of the problem of getting out of the systemic trap “tragedy of the commons” is conditioned by the current situation in world relations. This systemic trap demonstrates the limits of the possibility of using a public resource. Traditionally, the “public resource” in system analysis is considered material resources, such as pastures, minerals, roads, clean air, water, etc. In the framework of this paper, global security is considered as a public resource.

The problem of global security was voiced long ago and in different perspectives, but in modern conditions it has been aggravated to a critical limit: the transition from unipolar to multipolar world is painful and contradictory; the system of law of one state, overstepping national boundaries, provokes instability in other countries; interference in internal affairs deepens contradictions in interstate relations; trade wars and imposition of sanctions reduce the rate of economic growth

of the world and national economies, curtail trade and economic cooperation in the world.

Therefore, the current situation in international relations can be characterised as a systemic trap “tragedy of the commons”, and further safe development of mankind can be ensured on the basis of rethinking the mechanism of using such a limited resource as “global security”.

Global security is a resource that is in public use and ensures independent, sustainable and stable development of national economies in the context of globalisation.

At the present stage, ensuring the security of individual states in the context of analysing the system archetype “tragedy of the commons” is carried out through their increased demand for this resource, intensification of country and regional activities in directions that do not meet the national interests of other countries and reduce the level of their security. Since the link between the state of global security and the decisions of individual countries to ensure their own security is rather weak, the excessive efforts of some countries in this direction cause increased tension throughout the world and in some regions, and, in case of further increased “exploitation” of this resource, the security of other countries becomes unavailable.

Options for getting out of the systemic trap in question were considered in the works, for example, by D. Commons, D. Meadows [1], E. Ostrem, G. Hardin and others. They have made significant contributions to the study of this archetype and proposed various approaches and tools for managing shared resources and preventing the tragedy of the commons. One of the proposed solutions is the establishment of common rules and restrictions on the use of community resources, since the tragedy of the systems cannot be solved at the individual level due to the desire of all participants to use the public good, limiting others in access to this resource.

Let us consider the option of solving the problem by establishing common rules based on agreements on the example of the SCO countries’ activities.

Since the beginning of its unification in 1999, the Shanghai Five has clearly formulated the goals of its activities - to preserve security and ensure stability along its borders. Since then, this international structure has only increased its efforts to ensure security, emphasising the importance of countering separatism, terrorism, extremism, illegal migration, illegal drug trafficking, arms smuggling and others.

The SCO Charter (the association’s charter document, signed in 2002) states that the organisation’s goals are to promote cooperation in political, economic, scientific, technical and other fields in order to maintain and ensure security and stability in the region.

Along with the geographical expansion of the SCO membership (the Islamic Republic of Iran will join the organisation in 2023 and the Republic of Belarus is in the process of completing its accession), this association is increasingly becoming an economic union, especially in the field of internal regional trade and investment, which is facilitated by the economic potential of the member states. Thus, the size of the SCO economies is about 30 per cent of the world's gross product, and the population is 40 per cent of the world's population. Over the 20 years of their existence, the SCO countries have increased the volume of foreign trade within the region by more than 100 times, which today accounts for about 15% of world trade. On the whole, the economic potential of the SCO countries and the use of its integration opportunities allow overcoming modern challenges to humanity, namely, the growth of geopolitical tension, the pressure of trade and sanctions wars, undermining the foundations of international law and reducing the level of security.

Following the meeting of the SCO Council of Heads of State (July 2023), the New Delhi Declaration was signed, reflecting the unity of the countries' positions on "...the formation of a truly just and multipolar world order - a world order based on international law, on universally recognised principles of mutually respectful cooperation between sovereign states under the central, coordinating role of the United Nations" [2]. [2].

Analysis of the SCO Economic Development Strategy until 2030, approved in July 2023, allows us to identify the priority areas of cooperation between the countries, namely in investment and banking and finance, industry, energy, transport and logistics, agriculture, communications, digitalisation and high technology along fifteen sectoral trajectories. In particular:

- development of the SCO Energy Strategy;
- development of the Digital SCO 2030 Programme;
- development of the Roadmap for the use of renewable energy sources;
- development of the Programme of Cooperation in Breeding and Seed Production;
- development of the SCO Brand in the field of green economy;
- development of a Programme for the creation of green industrial parks with a closed-cycle economy;
- development of the Model Platform "Green Economic Region";
- development of a Roadmap for the implementation of the Programme to Stimulate Industrial Cooperation between Businesses;
- establishment of the Association of Investors of the SCO Member States;
- creation of a digital analytical platform - "SCO Low Carbon Technology Platform";

- development of Methodological Recommendations on “green” financing and other documents [3].

Economic cooperation in the SCO region envisages the use of such forms of cooperation as industrial cooperation, removal of restrictions on the movement of goods and services, digitalisation, green economy, development of micro, small and medium-sized enterprises.

Organisational structures have been established and/or are planned to be established to implement the decisions taken in the area of SCO economic development. These include the SCO Economic Forum, the SCO Energy Club, the SCO Startup Forum, the Startup Competition to promote the development of micro, small and medium-sized enterprises, the Managing Commission of the Technoparks and Innovation Clusters Pool, the Consortium of SCO Economic Think Tanks and others.

At the same time, along with the ability to reach an agreement, the SCO countries demonstrate certain problems in their relations with each other. For example, one of the problems is the unresolved issue of the working languages of the association (today it is Russian and Chinese, the issue of a third language - English - is under discussion).

One should also note the contradictions between individual SCO member states, which manifested itself in India’s refusal to join the SCO Economic Development Strategy [4].

The heads of the SCO member states point out such problems as the difficulty of coordinating the forms and mechanisms of joint financing, the lack of a regulatory framework, the insufficiency of investment resources for the implementation of individual projects.

At the same time, the expected results of the implementation of economic initiatives of the SCO countries are:

- Pairing the strategies of socio-economic development of the SCO countries with the strategy of regional and global development;
- creation of modern transport infrastructure and new competitive routes, major strategic ports and logistics centres;
- consolidated approaches to ensure energy security of the SCO countries;
- solving the problem of the “digital divide” between different SCO member countries and social groups;
- creating a base of SCO economic preferences in order to increase the investment attractiveness of national economies;
- transformation of the SCO Energy Club into a global player, additionally stabilising the world oil market, etc. [5,6].

Thus, the economic initiatives of the SCO countries that deepen and expand integration processes provide a real way out of the systemic trap of “tragedy of the

commons” on the basis of clearly defined goals in specifically identified areas of cooperation on the basis of mechanisms that are already working and/or emerging. Practical resolution of emerging problems and existing contradictions is possible through their further theoretical understanding.

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人道主义数字经济分析的新方法 (EFRAGRAPHY)
**A NEW METHOD OF HUMANITARIAN-DIGITAL ECONOMIC
ANALYSIS (EFRAGRAPHY)**

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抽象的。传统的基本宏观经济分析充满了各种指标，很难简化为表征国民经济状况的单一整体形象。新自由主义经济理论的危机加剧了这一问题，在多极世界形成的时代，这一问题相关性也随之增强。如果用人类学政治经济学来解释现有的经济和统计信息，将所有经济过程简化为人力资本的参数，那么这种情况就会大大简化。该方法的本质是确定基本要素的自然成本参数折算为人力资本价值之间的比例积分系，并将这些比例相对于人力资本平衡边界的位置显示在饼图上。国家总生产资本的再生产。因此，作者收到了一份报告，揭示了阻碍国家进一步发展的主要经济和金融失衡。

关键词：数字思维、人文思维、财经分析、人类学政治经济学、新经济思维。

Abstract. *A traditional fundamental macroeconomic analysis is replete with a variety of indicators that are difficult to reduce to a single holistic image that characterizes the state of the national economy. The crisis of neoliberal economic theory exacerbates this problem, the relevance of which increases in the era of the formation of a multipolar world. This situation is greatly simplified if the existing economic and statistical information is interpreted in terms of anthropological political economy, which reduces all economic processes to the parameters of human capital. The essence of this method is to determine an integral system of proportions between the natural cost parameters of the basic factors reduced to the value of human capital, and display the position of these proportions on a pie chart relative to the boundaries of their balance in the reproduction of the total productive capital of the nation. Thus, the author receives an efragraph that reveals the main economic and financial imbalances that impede the further development of the nation.*

Keywords: *digital thinking, humanitarian thinking, financial and economic analysis, anthropological political economy, new economic thinking.*

In the course of field research, the author found that for a holistic description of the state of the national economy, it is necessary and sufficient to determine the four triads of proportions, which are given in this article.

The factor income hypothesis

The starting point for constructing this method is the canonical equation of the UN System of National Accounts (1):

$$U = C + I + G, \tag{1}$$

where U is used GDP; C - total consumer spending; I - total investment; G - total government spending.

If the exchange of types of final products between economic entities has occurred in full, then this means that there is a dual (1) formula for the produced GDP in physical terms (2):

$$Y = Y(H) + Y(K) + Y(S), \tag{2}$$

where, Y is the produced GDP; Y(H) - consumer goods and services produced by human capital H; Y(K) – capital-forming goods and services produced by entrepreneurial capital K; Y(S) – social network (institutional) goods and services produced by state capital S, [3].

The proportions between factors-capitals diagram

All factors-capitals have a heterogeneous structure. The module of their total measurement is the value in the traditional measurements of Marx (labor cost, [1]) or Menger (market value, [2]). Divide all members of the proportion by H and obtain proportions normalized with respect to the total cost of human capital (3):

$$1 : K/H : S/H, \tag{3}$$

We can plot these proportions graphically on a pie chart, as shown in fig. 1.

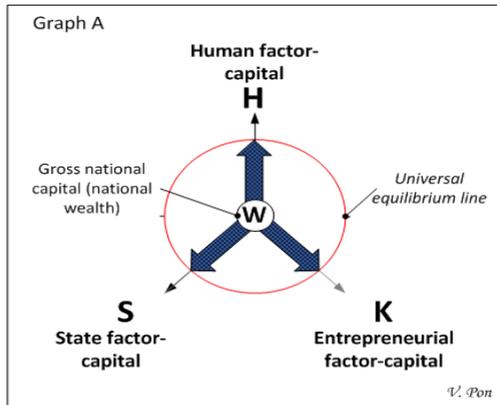


Figure 1. Graph-A option of the main factorial proportions ($H : K : S = 1 : 1 : 1$)

With the help of Marx’s schemes for the reproduction of capital, it is easy to prove that in this situation (A-diagram) the national economy operates in the mode of simple reproduction.

In the mode of the mobilization economy, when the responsibility for the rapid build-up of the defense potential is assumed by the state, the vector S goes beyond the circle of general equilibrium, which indicates the advanced development of the military-industrial complex potential, which belongs to the nation represented by the state.

Calculation of the Gross National Capital – W

Three factors-capitals work together and have a common performance. In fact, we are dealing with three components of the gross national capital W. Therefore, the products produced by the factors-capitals have the same proportions as the factors-capitals themselves, (4) and (5):

$$H : K : S = Y(H) : Y(K) : Y(S), \tag{4}$$

$$h : k : s = U(h) : U(k) : U(s), \tag{5}$$

where: H, K, S and h, k, s are the costs of the constituent factors-capitals;

Y(H), Y(K), Y(S) and U(h), U(k), U(s) are the value of products, which produced and used by types of factor capitals and net factor capitals.

Let us construct the canonical matrix (6), which is the definition of W, Table 1.

*Table 1
Canonical matrix for determining W*

W parameters notation	h	k	s	W	Abstract categories as factors-capitals:	mixed forms
H	C _{hH}	C _{kH}	C _{sH}	W _H	Human	
K	C _{hK}	C _{kK}	C _{sK}	W _K	Entrepreneurial	
S	C _{hS}	C _{kS}	C _{sS}	W _S	State	
W	W _h	W _k	W _s	ΣW=ΣW	Sum	
Real elements of the economy:	Subjects (people)	Fixed assets (equipment and technology)	Social networks of connections (institutions)	Economic system	National economy	
	pure forms					

The main organic consequence of this definition of gross national capital is the full use of the final product (GDP) to increase the types of capital minus their depreciation, (6):

$$U(h) + U(k) + U(s) = \Delta W_h + \Delta W_k + \Delta W_s, \quad (6).$$

In a balanced economy, all GDP produced is capitalized! This is the fundamental position of the AP-theory, which fundamentally distinguishes it from Marx’s or Menger’s political economy. This is the third option of political economy, more precisely, it is a generalization of the first two options that are included in the AP-theory, as special cases in the metatheory, in the form of either natural value or value definition of value.

Proportion diagram between Y and U products

The basic variant of the proportions between the final product Y produced and the final product U used is shown in Fig. 2:

$$(U_h : U_k : U_s = 1 : 1 : 1; Y_H : Y_K : Y_S = 1 : 1 : 1)$$

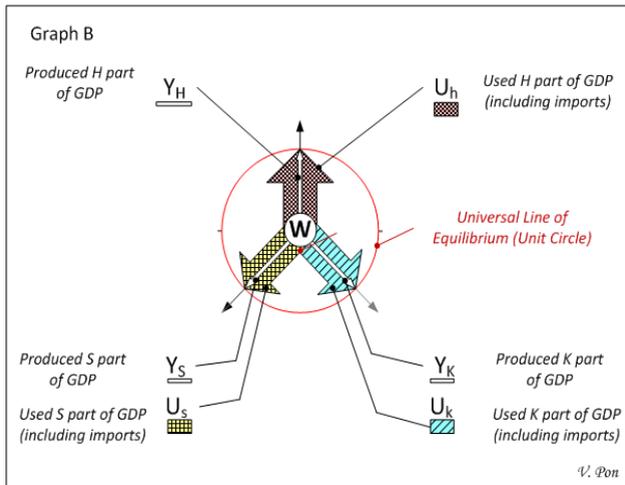


Figure 2. Graph-B option of unit products proportions U and Y:

In the considered case, the export-import balance is equal to zero. In all other cases, we are dealing with vectors of different lengths.

The Target Money Hypothesis

The AP-theory accepts the target money hypothesis, the essence of which is that the traditional monetary aggregates M1, M2 and M3 are written as corresponding increments to the mass of money in the consumer sector M1 (“short money”). Thus, the monetary aggregate ΔM2 (“middle money”) serves the manufacturing sector, and the monetary aggregate ΔM3 (“long money”) serves the infrastructure projects of the state, (7).

$$M = (M0 + \Delta M1) + \Delta M2 + \Delta M3, \quad (7),$$

where, M_0 is traditional cash and M is the total amount of money in circulation.

In each of the listed sectors of the economy, money turns over at a different rate ($v_1 < v_2 < v_3$), which decreases, determining the decrease in the liquidity of monetary aggregates. If the market value of the mass of commodities and the nominal value of the money supply by type correspond to each other, then we have a system of Irving Fisher balance equations (8):

$$\left\{ \begin{array}{l} M_1 = \frac{Y(H)}{v_1} ; \\ \Delta M_2 = \frac{Y(K)}{v_2} ; \\ \Delta M_3 = \frac{Y(S)}{v_3} ; \end{array} \right. \quad (8),$$

There are normative values of the speeds of money circulation $[v_1]$, $[v_2]$, $[v_3]$ for the target sectors of the economy and different levels of development of commodity-money relations, which determine the corresponding normative volumes of money supply $[M_1]$, $[\Delta M_2]$, $[\Delta M_3]$, (9):

$$\left\{ \begin{array}{l} [M_1] = \frac{Y(H)}{[v_1]} ; \\ [\Delta M_2] = \frac{Y(K)}{[v_2]} ; \\ [\Delta M_3] = \frac{Y(S)}{[v_3]} ; \end{array} \right. \quad (9),$$

Let us divide the actual values of the mass of money by types of aggregates into the corresponding standard values, (10):

$$\left\{ \frac{M_1}{[M_1]} ; \frac{\Delta M_2}{[\Delta M_2]} ; \frac{\Delta M_3}{[\Delta M_3]} \right\}, \quad (10).$$

We have obtained the parameters of relative deviations of the actual money supply from its normative non-inflationary values, fig. 3.

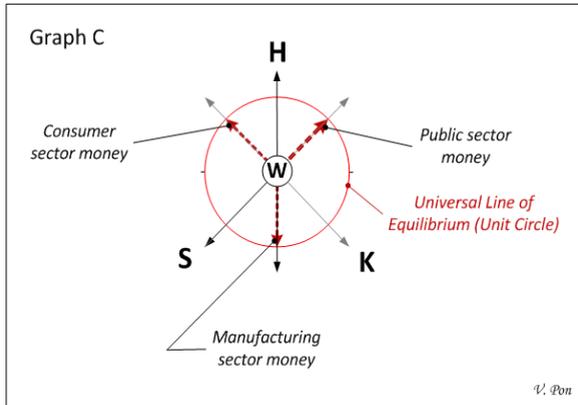


Figure 3. Diagram of unitary proportions of cash flows

Efragraph construction

To obtain a complete picture of the balance both in terms of product-money flows and in terms of capital factors, we combine the diagram in Fig. 1 with diagrams in Fig. 2 and Fig. 3 and obtain the diagram shown in Fig. 4.

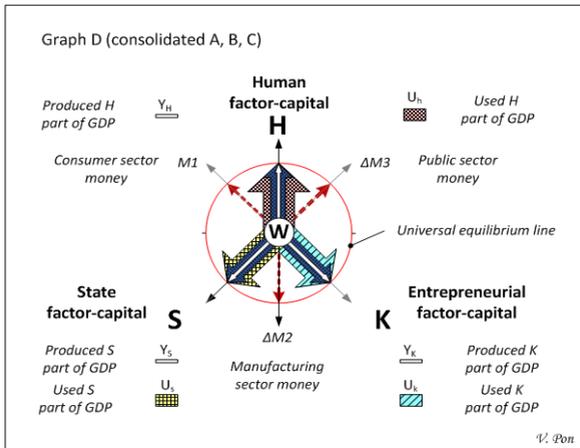


Figure 4. Unitary efragraph of national economy

We will call this diagram (Fig. 4), for a single and any other case, an economic fractal, bearing in mind that the reproduction of the total national capital W is carried out on this stereotypical graph according to the fractal principle of self-similarity.

Two indicators of the level of imbalance Unbi(1) and Unbi(2) follow from this logic, without taking into account, and taking into account external relations, given in the formulas of Table. 2.

Table 2
Formulas for calculating imbalance indices Unbi(1) and Unbi(2)

indicators ratio	Y_H/Y_H	Y_K/Y_H	Y_S/Y_H	U_H/Y_H	U_H/Y_K	U_S/Y_H
code	1	a	b	c	d	e
Unbi(1)	$Unbi(1) = (a + b)/2 - 1$					
Unbi(2)	$Unbi(2) = (a + b)/2 - 1 - ((d - a) + (e - b))/2 + (c - 1)$					

Approbation of the method

Consider the application of this method on a example of Argentina, fig. 6.

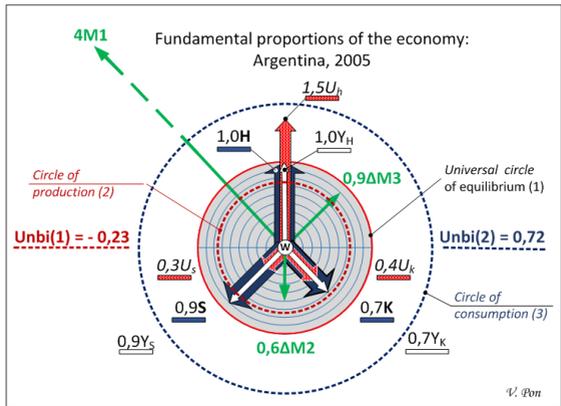


Figure 6. Efragraph of Argentina

Source: UN SNA data [4], and author’s calculations.

In terms of natural value composition, the economy of Argentina is balanced in terms of domestic production potential by 77% (Unbi (1) = -0.23). According to the general complex of internal and external relations (Unbi (2) = 0.72), there is an excess supply of goods and money, exceeding by 72% the potential necessary and sufficient for the reproduction of accumulated W.

The structure of Gross National Capital (W) is highly unbalanced in terms of entrepreneurial capital (0.7K).

The bulk of imported goods and services is used in the consumer sector of the economy, which exceeds the equilibrium value by 1.5 times ($1.5U_h$).

The money supply is 5.5 times the required amount of money serving the economy. At the same time, the bulk of excess money is concentrated in the consumer sector of the economy ($4M1$). At the same time, there is a significant shortage of “medium” money for the business sector ($0.6\Delta M2$).

In fact, we have built a new type of macroeconomic model suitable for long-term strategic forecasting and planning the development of any national economy.

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整合企业文化以实现成功的并购：来自韩国的证据
**INTEGRATING CORPORATE CULTURE FOR SUCCESSFUL
MERGERS AND ACQUISITIONS: EVIDENCE FROM SOUTH
KOREA**

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抽象的。 本文通过分析韩国的两个案例研究，探讨了整合企业文化对于成功并购 (M&A) 的重要性。 该研究探讨了韩亚银行与 Boram 银行和首尔银行的成功合并，以及 KakaoTalk 与 Daum Communications 的失败合并。 研究结果表明，文化一致性在并购过程中提高组织绩效和实现协同效应方面发挥着关键作用。 这些案例证明了强大的企业文化、共同愿景、包容性的管理层代表以及制定明确的整合计划的重要性。 这项研究为企业在并购过程中有效引导文化整合提供了宝贵的见解，从而在动态的企业环境中取得更成功的成果。

关键词：企业文化、并购、并购的成功与失败、文化整合、韩亚银行、KakaoTalk、Daum Communications、整合计划、包容性管理。

Abstract. *This paper examines the significance of integrating corporate culture in achieving successful mergers and acquisitions (M&A) by analyzing two case studies from South Korea. The study explores the successful mergers of Hana Bank with Boram Bank and Seoul Bank, as well as the unsuccessful merger of KakaoTalk with Daum Communications. The findings reveal that cultural alignment plays a pivotal role in enhancing organizational performance and achieving synergy during M&A. The cases demonstrate the importance of a strong corporate culture, shared vision, inclusive management representation, and establishment of a clear integration plan. This research provides valuable insights for companies to effectively navigate cultural integration during M&A, leading to more successful outcomes in the dynamic corporate landscape.*

Keywords: *corporate culture, mergers and acquisitions (M&A), success and failure in M&A, cultural integration, Hana Bank, KakaoTalk, Daum Communications, integration plan, inclusive management.*

I. Introduction: role of cultural integration in M&A process

1. Importance of cultural integration for M&A

Mergers and acquisitions (M&A), while being a widely used form of corporate development, often fail to deliver the expected results in the direction of the objectives set prior to an M&A deal, as evidenced by numerous studies (e.g., Haleblian et al., 2009). In fact, according to Harvard Business Review, as many as 70% to 90% of M&A transactions fail (Christensen et al., 2011). M&A failures can have a variety of causes, including poor acquirer governance, which can be reflected by CEO overconfidence and a lack of institutional shareholder intervention, as well as inadequate merger execution and integration (Renneboog & Vansteenkiste, 2019). A subpar integration of the corporate cultures of companies undergoing M&A is an example of the latter.

Alignment in organizational culture plays a key role in the success of M&A. Disintegration of cultures may not be the main and only reason why M&A fail to achieve their initial goals, but it contributes to a large portion of the failures. According to McKinsey & Company, 25% of executive managers reported a lack of cultural cohesiveness and alignment as the main cause of unsuccessful integration attempts (Engert, 2019). On the other hand, establishing a strong corporate culture, which is a situation where members sincerely support the organization's core values, may assist in preventing many problems from occurring and enhancing synergic effects (Daft, 2015). Undergoing M&A brings radical changes and environments with high uncertainty to organizations, which can be mitigated by the two internal functions of organizational culture: internal integration and behavioral control. A well-established and integrated corporate culture gives a sense of organizational identity to the members, boosts their commitment efforts, and acts as a guideline for their actions.

2. Purpose of the cross-case analysis

This paper analyzes cultural integration during M&A among companies in Korea. Companies of the same country and size were chosen to facilitate the comparison of M&A processes and integration practices. The paper is structured as follows: in Section II, the case in which corporate cultures were successfully aligned will be analyzed, followed by an analysis of the case of unsuccessful cultural integration in Section III. To conclude, the beneficial practices for cultural integration will be deduced in Section IV.

II. M&A that took corporate culture into consideration: the case of Hana Bank

1. Background

The South Korean financial crisis of 1997 had a significant impact on the whole country's economy. Major banks went bankrupt one after another as a result of industrial firms scaling down after relying on excessive quantities of bonds.

Hana Bank, which entered the banking industry relatively late, profited from the series of bankruptcies of major banks. By combining Chungcheong Bank, Boram Bank, and Seoul Bank, they were able to scale up successfully. Two cases—the merger of Boram Bank and Hana Bank and the later merger of Seoul Bank and Hana Bank—will be explored in depth in this section.

2. Merger between Boram Bank and Hana Bank

On September 8th, 1998, Hana Bank initiated the process of merging with Boram Bank through the signing of a memorandum of understanding (MOU) (Park et al., 2007). Both banks shared a similar mission-oriented organizational culture. As newcomers to the Korean banking industry, their employees were united by a clear and singular mission: outpacing rival banks in terms of assets. Evaluations and promotions within both institutions were based on their ability to attract customers, fostering a meritocratic environment that naturally attracted talented individuals from the industry. This approach resulted in rapid growth for both banks. Eventually, Boram Bank experienced setbacks due to the successive bankruptcies of its major customers, leading to its decline and merger with Hana Bank.

There were several actions that could be traced to the success of Hana Bank's merger with Boram Bank. Following the signing of the MOU contract, the integration committee was promptly established just two days later. Their primary focus was to engage in discussions concerning strategies for a successful merger. Among the crucial policies determined by the committee, the most significant one was the adoption of a performance-based salary system. Due to this, new norms and values for the established company could be developed in a collaborative manner shortly after signing the MOU. In alignment with the organizational cultures of the two firms, the new culture was also based on meritocratic principles with a focus on performance and competitiveness. Secondly, the shared vision for the two companies was announced: "Becoming a comprehensive financial service company". These two actions served as a solid foundation for integrating two separate cultures and ensuring the efficiency and satisfactory performance of the new organization in the long run. Thirdly, the top management was constituted of not only Hana Bank executives but also managers from Boram Bank, despite the latter being in a much less powerful position given the exchange ratio of 1:0.2517 (Park et al., 2007). Among 13 C-level managers in an integrated organization, Hana Bank has allowed five managers from Boram Bank to be promoted to C-level managers. This suggests that the merging company took employee morale into account. As a result, both companies were represented and participated in top-level decision-making.

3. Merger between Seoul Bank and Hana Bank

A merger with Seoul Bank that occurred later required more efforts given the misalignment of the two firms on a cultural level. As one of the early pioneers in

the South Korean banking industry, Seoul Bank had a notably bureaucratic organizational culture compared to Hana Bank. Employee promotions were primarily determined by seniority, leading to frequent disagreements between the labor union and executives over various matters (Park et al., 2007). In order to integrate the bureaucratic Seoul Bank into the meritocratic mission-based system, several steps were taken. Firstly, and arguably most importantly, integrated training was conducted. The training's objectives included improving Seoul Bank's capacity to blend in with Hana Bank's meritocratic culture. Instead of making only the employees coming from Seoul Bank participate, it was decided that employees from both organizations should undertake the training. This clearly shows how the management stressed the importance of integration and collective efforts rather than the assimilation and absorption of one culture by a dominant one. Moreover, a shared vision of an "ultra-high-quality financial network" was announced (Park et al., 2007). Lastly, just like in the first merger, both firms were represented at the top level of management, as Hana Bank allowed a manager from Seoul Bank to be promoted to Chief Human Resources Officer of an integrated firm.

4. Comparing the mergers

Many of the actions undertaken during the integration of similar and different cultures overlapped. In both cases, Hana Bank did not just let the integration process develop naturally. Instead, it took immediate control over it, consequently yielding better results. And when Hana Bank was merging with a culturally different organization, besides repeating successful practices from the first merger, it additionally worked with employees individually to make sure that adherence to the new culture was happening not only on the executive level but throughout the whole organization.

III. M&A that did not take corporate culture into consideration: the case of Kakao Corp.

1. Background

KakaoTalk, a widely used mobile messenger in South Korea, gained immense popularity after its launch in 2010. Leveraging its large user base, KakaoTalk expanded into various business areas, including mobile game publishing. In 2014, it merged with Daum Communications to form Daum Kakao, becoming a major player in the communication media industry. Daum Communications, which originated as a community platform in 1995, later transformed into a comprehensive information search platform. Through acquisitions and ventures, it diversified its services but faced fierce competition from Naver in the search engine market. The merger of KakaoTalk and Daum in 2014 marked a significant turning point for both companies (Gwak, 2015).

When the merger between KakaoTalk and Daum Communications was announced in 2014, the market responded positively. Experts believed that the

merger would strengthen core business operations and create positive synergies (Shu, 2014). Moreover, the announcement of the merger caused a 4% decline in the stock price of Naver, Daum's biggest competitor, indicating that the market viewed the merger as a favorable combination (Song, 2014). However, the actual outcomes fell short of expectations due to several problems arising from the lack of consideration for organizational culture during the merger process.

2. Problems arising after the merger

1) Composition of managerial levels

The majority of the managerial positions in the newly established organization were held by former Kakao managers. According to 2017 data, among the vice president-level executives post-merger, only CFO Choi Se-hoon and Vice President Lim Sun-young were from Daum. Internal sources revealed that a few former Daum executives were appointed as vice president-level executives to maintain the external image, but the key positions were predominantly occupied by Kakao employees (Kyung, 2017). This organizational structure is particularly surprising considering that there were 2,000 Daum employees and only 600 Kakao employees at the time of the merger in October 2014. Consequently, many Daum employees felt underrepresented and had difficulty accepting the new governance structure, which had a negative impact on their motivation. Instead of fostering synergy and mutual benefits, this approach encouraged excessive competition within the newly formed organization.

2) One-sided focus

The company created after the Daum-Kakao merger seemed to lack a constructive culture. In other words, some of the decisions made by the new Kakao-centered management team did not consider both parties, and changes to serve broader interests were not initiated. With time, it became evident that while the services previously handled by Kakao were rapidly developing, introducing new solutions and features, the search engine of Daum started to lose its competitiveness. Within a single year following the merger, the Daum portal site experienced a decline in visitor numbers. In September 2014, the site had approximately 26 million PC visitors, which decreased to 23 million in September 2015 (Kim, 2015). Additionally, the number of mobile visitors decreased from around 14 million to 10 million during the same period. After the M&A, the company did not propose any significant changes for Daum portal searches or upgrades to mail or launcher services. Furthermore, the Daum TV Pot service, which had previously been in operation, was discontinued.

3) Absence of an integration plan

Lastly, Daum-Kakao lacked a cultural integration plan and responsible personnel for the process. In a 2014 interview, the CEO justified this approach, stating they wanted to listen to employees and adapt their culture gradually (Lee, 2014).

However, without a structured approach and someone driving the changes, this can lead to undesirable outcomes. The absence of an integration plan can result in a weak culture post-merger, resulting in misalignment in organizational norms and values, causing motivational and productivity issues. If no action is taken, the culture will most likely change on its own over time, and the dominant culture will either absorb or reject members of the other culture (Doolittle, 2019). If this happens, the opportunity to take the best characteristics of both cultures and merge them for better outcomes will be lost. Thus, developing an inclusive and flexible action plan, continuously adjusted based on feedback and results can be highly beneficial for newly merged organizations. Additionally, having an interpreter or coordinator, a decision-maker with proven authority and industrial experience needed to understand the cultures of both companies, is crucial for the successful implementation of the integration plan (Gwak, 2015). An integrated image preached by interpreters plays a very positive role in the formation of the new identity of an integrated organization and the perception of the audience.

3. Current state of the merger

Although the two companies were able to produce some synergic effects, they did not show growth in the expected direction, given the presence of integration issues discussed above. As of 2023, the company-in-company (CIC) in charge of the portal business of Daum was established. It is the first attempt by Kakao and Daum to separate in nine years since the merger in 2014. They hope this will be a way to turn things around after the market share of Daum has shrunk to a single digit (Bae, 2023).

IV. Conclusions on the cross-case analysis

The series of mergers undergone by Hana Bank illustrate some of the useful practices that could ensure successful integration of companies with both similar and different cultures. On the other hand, the case of the Daum-Kakao merger shows the problems that arise when the interests of two companies are not equally represented in a newly established organization in terms of strategy, structure, and culture. If Daum-Kakao had put more emphasis on cultural integration and implemented some of the ideas described in Hana Bank's case, the synergic effects would have been bigger and the merger could have been successful.

Based on the analysis of the two cases, it is evident that companies undergoing M&A should put significant efforts into creating a strong culture and coming up with new sets of shared beliefs, norms, and values that would be accepted by all members involved. Organizations should make sure to integrate not only elements of the visible level of culture but also the invisible elements, which are far more important and impactful. A constructive culture and spirit of cooperation, not competition, should be fostered. The opinions of both firms should be represented in the top management team. Moreover, in situations where M&A is taking

place between two drastically different cultures, more efforts should be made to reach cultural alignment throughout the whole organization. This can be achieved through training and close work with all employees. Most importantly, an action plan should be negotiated and proposed early on to avoid unwanted outcomes such as the development of a weak culture and the unplanned absorption of one culture by a dominant one. Lastly, the process of transparent communication should be facilitated to translate the new values to all members of the organization. Lastly, to ensure the successful implementation of an integration plan, the role of a coordinator should be established.

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俄罗斯远东地区：有子女家庭贫困的区域特征
**RUSSIAN FAR EAST: REGIONAL FEATURES OF POVERTY OF
FAMILIES WITH CHILDREN**

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注解。 本文致力于研究远东联邦区十一个地区有子女家庭的贫困主要特征。确定了数量最多、最容易受到社会影响措施影响且脱贫潜力最大的有子女贫困家庭群体。已经查明了阻碍远东地区有子女的工薪家庭收入增长的因素。

关键词：贫困、贫困家庭、贫困状况、贫困线、远东联邦区。

Annotation. *The article is devoted to the study of the main characteristics of poverty of families with children in eleven regions of the Far Eastern Federal District. The most numerous groups of the poor households with children are identified, the most susceptible to social impact measures and having the greatest potential to get out of poverty. The factors hindering the growth of incomes of the working families with children of the regions of the Far Eastern region have been identified.*

Keywords: *poverty, poor families, poverty profile, poverty line, Far Eastern Federal District.*

Introduction

Poverty reduction and ensuring sustainable income growth are among the main directions of state social policy defined by Presidential Decree No. 474 of July 21, 2020 “On National Goals and Strategic Objectives of the Development of the Russian Federation for the period up to 2030”, according to which the number of the poor population of Russia should be reduced twice - from 12.9% (2017) to 6.6% by 2030.

The achievement of this goal of the poverty reduction is associated with the implementation of the set of measures which are connected with the establishment of conditions favorable for sustainable income growth of the population.

Taking into account the stated goals, regional management teams are responsible to implement anti-poverty programs, taking into account the specifics of the

development of the regions of the Russian Federation, among which the largest macro-region of Russia - the Far Eastern Federal District (FED) occupies a special place.

The FED, having an advantageous geographical position, historically connects Russia with the rapidly developing countries of the Asia-Pacific region, which determines its special place in the state socio-political agenda. The common border of the Far Eastern Federal District with China, Japan, and South Korea, which occupy leading positions in terms of world economic development, opens up new prospects for the sustainable development of the eastern outpost of the country, shaping its development vectors for the coming decades.

At the same time, over the past decades, the population of the Far Eastern Federal District has been steadily declining, the demographic situation is characterized by a low birth rate and an intensive migration outflow from those regions of the Far Eastern Federal District, the indicators of the standard of living in which are significantly inferior to the all-Russian ones.

One of the important factors hindering the realization of the economic potential of the Far East of Russia is the poverty of the population, that is why the reduction of its scale comes to the fore of the state social agenda and forces the adoption of adequate measures of state influence.

Poverty is influenced by many factors, and in order to achieve a multiplicative effect from the implementation of poverty reduction programs, a detailed study of the profile of the poor population is of great importance. It is an indispensable tool for identifying and analyzing the composition of the poor population, its socio-demographic characteristics, determining the factors and causes of poverty, which contributes to the development and implementation of the most effective measures for growth welfare of target groups.

The study of the profile of Russian poverty at the national level is devoted to the work of many authors [1-5], however, a comparative analysis of the structure of the poor population in the context of the regions of the Russian Federation is carried out much less frequently. Meanwhile, such an analysis helps to identify the general and specific features of regional poverty, which can serve as a basis for making managerial decisions on the implementation of measures to reduce poverty and prevent citizens from becoming poor both at the national and regional levels.

Materials and methods

This article is based on the results of studying the structure of the population of the FED with per capita monetary incomes below the established poverty line (PL), which is calculated in each region and is interrelated with the subsistence minimum, taking into account the minimum human needs for life support.

The basis for studying the characteristics of the population groups that found themselves below the absolute poverty line is microdata by Statistical Survey of Income and Participation in Social Programs 2022 (SSIPSP-2022) by the Russian Federal State Statistics Service [7]. On its' basis, using methods of statistical processing of economic information, comparative and logical analysis, classifications and groupings, the socio-economic and demographic characteristics of the most numerous groups of the poor population in the regions of the FED were studied.

For the analytical purposes of the study, a sample of data was made on members of households with per capita incomes below the poverty line, whose characteristics were further studied using the following modal features:

- employment status of the head of household;
- number of children in the household;
- type of locality in which the household lives;
- the size of the locality;
- age of the head of household;
- education level of the head of household;
- type of economic activity (economic sector) of the head of household in the main job;
- the sphere of professional activity of the head of the household.

Also, when collecting, presenting, analyzing and interpreting data, the materials presented in the regional strategic program documents on poverty reduction were used.

Results

An analysis of the SSIPSP-2022 microdata showed that in 2022, about 1.1 million people were below the poverty line in the Far Eastern Federal District. At the same time, only about one tenth of the poor had a cash income deficit that indicated deep poverty (incomes below 0.5 PL). Approximately one in three needed from 50 to 30% of the subsistence minimum to overcome the border of monetary poverty. The largest group of the poor in the Far Eastern Federal District consisted of people with incomes in the range of 0.8-1.0 PL, that is, poverty in the regions of the Far Eastern Federal District as a whole can be described as shallow, and the population with an income deficit at this level is most susceptible to social impact measures and has the greatest potential to get out of monetary poverty.

The analysis of the poverty profile of the population with incomes from 0.8 PL to 1.0 PL at the macro-region level showed that every third family in this income group has three or more children. The second and third places were shared by families with one and two children. The smallest share of the poor population with incomes ranging from 0.8 PL to 1.0 PL fell on families without children (about 7.5%).

It is noteworthy that in the vast majority of households with such incomes (88.5%), one or both parents had the status of employed in the economy, which means that their labor incomes are too low to ensure overcoming the poverty line for each of the family members. Most often, poor families in which working parents have one or two children live in cities. Families with three or more children – in rural areas.

At the same time, different regions of the Far Eastern Federal District have formed their own unique social portrait of the population concentrated at the poverty line, which is important to take into account when implementing social support measures.

For example, in the Republics of Buryatia and Sakha, as well as in the Kamchatka Territory, working poor families with one child live mainly in large cities with a population of 100 to 500 thousand people, while in the Magadan and Sakhalin regions, in the Chukotka Autonomous Okrug and in the Khabarovsk Territory – in small towns with a population of less than 50 thousand people.

Usually the main income of the poor urban families with one child, the main income is formed from the salaries of fathers aged 25-40, who have mainly secondary school education and are employed as hired workers in enterprises and organizations of the formal sector in low-paid positions. However in Zabaikalsky Krai the incomes of such families are mainly formed from the wages of working 35-39 years old women with high education and, due to the current situation on the regional labor market, are not able to realize their educational and qualification potential and are forced to work in low-paid positions as operators of production machines or drivers.

The poor families with two children who live in the big cities (250-500 thousand people) and have income from 0.8 PL to 1.0 PL and a working head of household are concentrated mainly in the Khabarovsk Territory and in the Sakha Republic. At the same time, in the Sakhalin Region, Zabaikalsky Krai, Chukotka Autonomous Okrug poor households with two children live mainly in cities with a population of less than 50 thousand people.

Most often, the responsibility for the well-being of urban poor families with two children is on duty by working fathers, mainly with lower post-secondary vocational education, employed in the formal sector of the economy in low-paid positions. At the same time, in the Chukotka Autonomous Okrug, the heads of poor urban families with two children are often 40-44 years old divorced women with secondary vocational education and employed in the position of a mid-level specialists.

Poor large families of the regions of the Far Eastern Federal District with average income in the range of 0.8-1.0 PL most often live in rural areas, mainly in Khabarovsk Territory, Amur region, Sakhalin Region, Chukotka Autonomous

Okrug. Usually the income of the poor large families is formed from the salaries of working fathers. However, in Khabarovsk Territory the duty of the financial well-being of the family more often lie on the shoulders of working mothers who mainly have secondary vocational education, but are unable to find the proper job in the countryside and are employed as unskilled workers.

Conclusion

Thus, the regional portrait of poverty is very diverse and has specific features related to the differentiation of the regions of the Far Eastern Federal District by demographic, economic, geographical and other conditions that must be taken into account when implementing state measures to overcome poverty and prevent citizens from becoming poor.

The extremely high proportion of working poor families with children in the population groups concentrated at the official poverty line indicates that the fact of having a paid job today does not guarantee protection from poverty. Among the main factors hindering poverty reduction, it is possible to distinguish differences in the rates of economic growth among certain regions of the Far Eastern Federal District, the low level of wages that has historically developed in a number of industries; the predominance in the labor market of demand for low-skilled cheap labor, the impossibility of adequate implementation of the educational qualification level due to the lack of demand in the labor market, the discrepancy between the professions and the level of qualifications to the needs of employers.

The poverty reduction of the working population will be facilitated by the implementation of targeted social support programs for the least protected categories of the population in accordance with the directions that take into account the peculiarities of the poverty profile of each specific region. At the same time, support should be provided not only to those who are officially recognized as poor, but also to families with a significant risk of falling below the poverty line. The reducing the level of poverty in the regions of the Far East is also interconnected with solving the problem of creating conditions for citizens to realize their labor potential through productive and adequately paid employment, which is possible only in the context of implementing a strategy to improve the country's economy aimed at its sustainable growth in the long term.

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中俄地缘战略伙伴关系及其交通物流支持
**PRC-RUSSIA GEOSTRATEGIC PARTNERSHIP AND ITS
TRANSPORT AND LOGISTICS SUPPORT**

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注解。 本文探讨了中俄之间的地缘战略伙伴关系及其运输和物流支持。 作者分析了这种伙伴关系的主要方面, 例如运输走廊、物流一体化和联合项目的开发。 文章还指出了运输和物流基础设施在加强两国伙伴关系方面的作用。

关键词: 地缘战略伙伴关系、中国、俄罗斯联邦、政治、经济、军事合作、地缘政治、国际关系、联合项目。

Annotation. *This article explores the geostrategic partnership between China and Russia, as well as its transport and logistics support. The author provides an analysis of the main aspects of this partnership, such as transport corridors, logistics integration and the development of joint projects. The article also notes the role of transport and logistics infrastructure in strengthening partnerships between the two countries.*

Keywords: *geostrategic partnership, China, RF, politics, economics, military cooperation, geopolitics, international relations, joint projects.*

Geostrategic partnership is a type of strategic cooperation between countries or regions, based on relationships in the field of geopolitics, security and stability in order to strengthen their positions in the global context. Geostrategic partnerships often include information sharing, joint military exercises, coordination within international organizations and the development of joint initiatives.

Relations between Russia and China today can be considered precisely a geostrategic partnership. This partnership contributes to the strengthening of stability and security in Eurasia, the development of the regional economy and integration, and also provides an opportunity for both parties to resist external pressures and resist hegemony. The geostrategic partnership between China and Russia has great potential for the development and strengthening of both countries.

The political aspect of this partnership is based on the mutual maintenance of sovereignty and territorial integrity, as well as on the strengthening of a multipolar world order. China and Russia regularly hold high-level meetings and various consultations to coordinate their positions on international issues.

In economic terms China and Russia are cooperating closely in trade, energy and infrastructure spheres. China is Russia's largest trading partner, and Russia, in turn, is an important supplier of energy resources for China. Both countries are also actively developing joint projects such as "South Stream" and "the Northern Sea Route".

Also Russian-Chinese cooperation includes joint events to strengthen regional security and stability, combat terrorism and extremism. The importance of such events lies in promoting a multipolar world order and strengthening the role of developing countries on the world stage.

Military cooperation also plays a significant role in the geostrategic partnership between China and Russia. Joint military exercises and exchange of experience allow both countries to increase their defense capabilities and strengthen their position in the international arena.

The geostrategic partnership between China and the Russian Federation is of great importance for the geopolitical situation in the region. Both countries stand for the peaceful settlement of conflicts and stability in the Asia-Pacific region. In addition, this partnership also has an impact on the international arena, where China and Russia jointly oppose hegemonism and unilateralism. One of the important components of this partnership is transport and logistics, which plays a key role in ensuring efficient trade and cooperation between the two countries.

One of the most important projects in the field of transport cooperation between China and Russia is the construction of transport and logistics corridors. One such corridor is "the Silk Road Railway": it starts in the city of Yinchuan in China and passes through the cities of Yekaterinburg and Moscow in Russia before reaching the end point in the middle of Germany. This route is one of the most important transport routes for goods, and it plays an important role in strengthening trade cooperation between China and Russia.

Railway cooperation between Russia and China includes the construction, modernization and expansion of existing railway lines and infrastructure to improve transport links between both countries. This aspect of cooperation is an important part of the geostrategic partnership and is aimed at ensuring economic well-being and strengthening political ties.

The main aspects of railway cooperation between Russia and China include the following:

1. Trans-Siberian Railway and Baikal-Amur Railway. These railway lines play a key role in the interaction between Russia and China and provide

- transportation of goods between the countries, as well as from Europe and Asia.
2. Development of new rail routes. As part of the cooperation between the two sides, new direct communications between the cities of the two countries are constantly being opened, which contributes to the amplification of economic integration and the exchange of technologies.
 3. Construction and modernization of existing railway infrastructures. Within the framework of cooperation, there is an active investment in the reconstruction, modernization and construction of the railway infrastructure both from Russia and from China. Examples are the construction of the Blagoveshchensk Railway Bridge connecting Russia with China and improvements to existing railway junctions to create faster and more efficient routes.
 4. Exchange of experience and technologies. Russia and China are actively cooperating in the scientific and technical field, achieving mutually beneficial projects in the field of important technologies and infrastructure management.

Railway cooperation between Russia and China is an important factor of friendship and strategic cooperation between the two countries. This allows them to improve the overall transport infrastructure, increase trade turnover and strengthen their political and economic position in the international arena.

An important element of the transport and logistics infrastructure is the development of ports and sea routes along the Russian coast of the Pacific Ocean. Russia seeks to use its geographical advantage to become an important transport hub linking China and Europe. For example, the port of Vladivostok is one of the key points on “the Silk Road route”, and Russia is actively developing its infrastructure to enable more efficient trade and logistics between the two countries.

The development of transport and logistics support also includes cooperation in the automotive and aviation industries. China and Russia are actively cooperating in the development and production of automobiles and aircrafts, including the establishment of joint ventures and the exchange of technologies. This allows both countries to develop their own auto industries and create employment, as well as improve the quality and competitiveness of products.

Aviation cooperation between Russia and China is also an important aspect of the interaction between the two countries and includes the following areas:

1. Interaction of airlines and regular flights. The airlines of Russia and China are working together to expand and increase regular flights between the two countries, encouraging cultural and tourist exchanges and increasing the volume of cargo delivery.

2. Cooperation in the aviation industry: Russia and China are working together to develop and manufacture aircrafts and engines for civil and military aviation. The key project in this framework is a joint venture to create a long-range aircraft CR929, developed by the Chinese COMAC and the Russian Association of Aircraft Manufacturers.
3. Education and training. Both countries admit the importance of quality personnel training in the aviation field and cooperate in the field of education and research. Russia and China are exchanging experience and technology to train high-level specialists to ensure the development of the aviation industry.
4. Navigation support. Russia and China are cooperating in the development and use of the GLONASS (Russia) and Beidou (China) satellite navigation system to provide more accurate and reliable air traffic and air transport management for both countries.
5. Joint exercises and exchange of experience in the field of flight safety, aviation legislation, safety studies and other issues in the interests of the effective functioning of civil aviation and airspace.

Aviation cooperation between Russia and China contributes to the strengthening of economic and political ties between the countries, the exchange of technologies and the development of innovative projects. It is also an important element of infrastructure development and improvement of the efficiency of international transport, which has a positive effect on world economic growth and international stability.

Thus, transport and logistics support plays an important role in the development and strengthening of the geostrategic partnership between China and Russia. The development and improvement of transport infrastructure helps both countries to expand trade and cooperation, strengthen economic integration and form stronger and more stable ties between them.

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作为预防重犯的一个要素, 对被判劳改的患者的社会影响
**SOCIAL IMPACT ON PATIENTS SENTENCED TO
CORRECTIONAL LABOR AS AN ELEMENT OF PREVENTION OF
REPEATED CRIMES**

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注解。劳教形式的惩罚可以说是对初犯或情节较轻的人最有效的惩罚类型之一。这种惩罚对于没有固定工作场所、不打算自己找工作的罪犯尤其有效。新集体以企业其他员工、罪犯送刑、家庭和经济稳定等形式的影响力,对罪犯的矫正产生了积极的影响,是预防犯罪最重要的因素之一。他们免于重复犯罪。此外,患有疾病的劳教人员的就业对于这些人的社会化和融入社会问题具有积极的影响。

关键词: 惩教工作、就业、患病囚犯、预防犯罪。

Annotation. *Punishment in the form of correctional labor can be called one of the most effective types of punishment for persons who have committed crimes for the first time or of minor severity. The use of such punishment is especially effective for convicts who do not have a permanent place of work and do not plan to find a job on their own. The influence of the new collective in the form of other employees of the enterprise, where convicts are sent to serve their sentences, families, and financial stabilization have a positive effect on the correction of convicts and serve as one of the most important elements of preventing them from committing repeated crimes. In addition, the employment of persons sentenced to correctional labor who have diseases has a positive effect on the issues of socialization of such persons and their integration into society.*

Keywords: *correctional work, employment, sick convicts, crime prevention.*

International criminal law today directs national legal systems to expand the use of punishments without isolation from society, given the negative consequences of the execution of punishment in the form of deprivation of liberty. At the same time, in most countries, the legislator keeps pace with the development of the requirements of international standards, such as in Russia.

The modern penitentiary legislation of Russia provides for 8 punishments not related to isolation from society, 4 punishments related to deprivation of liberty (one of which, arrest, is not applied due to the lack of arrest houses), and the law also provides for the death penalty as the highest measure punishment (not applicable due to the imposition of a moratorium on its application).

Assessing the types of punishments that are not related to the isolation of convicts from society, I would like to note correctional work as one of the most effective ways to correct those convicted of crimes of small and medium gravity, who do not need isolation from society. This type of punishment allows convicts to continue their labor activity, while these persons are under the constant supervision of employees of the penitentiary inspections, receive monthly wages, minus the deductions established by the court to the state.

However, it should be noted that the effectiveness of correctional labor depends on many factors, including the level of education and qualifications of convicts, the state of health, the availability of support from the family, society and the state [1, p.142].

The execution of punishment in the form of correctional labor is defined by the legislator in Article 50 of the Criminal Code of the Russian Federation and Articles 39-46 of the Penitentiary Code of the Russian Federation.

The appointment of corrective labor is permissible only as the main type of punishment for a period of two months to two years with the production of deductions from the wages of convicts on a monthly basis to the state revenue in the amount of 5 to 20%. The amount of deductions is established in the operative part of the sentence. At the request of the penitentiary inspection, the convict himself or the administration of the organization in which the convict is serving his sentence in the form of correctional labor, the percentage of deduction may be reduced by the court if the financial situation of the person who is assigned this type of punishment worsens.

Corrective labor can be assigned to persons who have a permanent place of work, and to persons who do not have one. Employment of unemployed convicts is carried out by penitentiary inspectorates by issuing orders to organizations determined by local governments in agreement with penitentiary inspectorates in the area of the convict's place of residence [2, p.1050].

In addition, the legislator in Article 50 of the Criminal Code of the Russian Federation defines a list of persons who are not assigned correctional labor:

- disabled people of the 1st group;
- pregnant women;
- women with children under the age of three;
- conscripted military personnel;

- servicemen undergoing military service under a contract in the military positions of privates and sergeants, if at the time of the court's verdict they had not served the statutory period of conscription service.

Accordingly, other persons not included in the specified list, with the exception of juvenile convicts, for whom the maximum term is reduced by half - up to one year, correctional labor is assigned in the general manner.

According to the provisions of Article 110 of the Criminal Executive Code of the Russian Federation, the main methods of correction of convicts are moral, legal, labor, physical and other education, which contributes to the correction of the convict. With regard to those sentenced to correctional labor, there are three main most commonly used methods of influence that allow the correction of the convict to be achieved: educational conversations, labor and social influence.

At the same time, in relation to those sentenced to corrective labor, the main method is labor influence, as arising from the very concept of corrective labor, which is reflected, for example, in the ban on refusing the proposed work, the ban on independent dismissal from the organization without agreement with the bodies of the penitentiary inspection, limiting the number of days of basic annual leave, making deductions from accrued wages.

And if the situation does not change dramatically for persons serving sentences at their main place of work, then for persons who have not previously been employed, the changes will be significant. Thus, a convicted person who finds himself in a labor collective will be forced to adapt to the corporate requirements of the enterprise, to comply with the accepted rules of conduct, work schedule, and observe labor discipline.

It will be especially difficult for unemployed convicts suffering from various kinds of addictions to get used to the need to work, because for the quality performance of their work duties they will have to give up addictions. Sometimes this can be done only after seeking medical help in specialized medical institutions (for example, narcological or neuropsychiatric dispensaries).

In this case, the treatment of sick people sentenced to correctional labor will act as an independent tool for their correction, as many penitentiary scientists have repeatedly said, for example, A.P. Skiba and Yu.A. Kashuba [3, p.73].

In addition, raising the level of education and improving the quality of work skills will also create increased motivation for the convict to corrective labor, especially in relation to sick convicts who are not employed at the time of the judgment. As noted earlier, persons who do not have a permanent place of work serve their sentence in the form of corrective labor in organizations determined by local governments in agreement with the penitentiary inspections located in the area of the convict's place of residence. At the same time, often those sentenced to correctional labor do not have special skills and knowledge, they are offered

low-skilled physically hard work, which cannot be refused. With the growth of qualifications and the level of education (for example, specialized courses), the convict can apply for a higher paid job and more gentle working conditions, which has a positive effect on their correction. Separately, I would like to note the fact that any transfers of a convict, both within one organization and between different organizations, must be carried out exclusively with the consent of the controlling body - the penitentiary inspection.

In addition to the obligation to obtain the consent of the penitentiary inspectorate to transfer convicts to correctional labor, the administration of the organization is obliged to correctly calculate and timely make deductions from the wages of convicts to the state revenue, ensure the performance of labor duties by the convict, control his behavior during working hours and assist employees of the criminal executive inspection in carrying out educational work with the convict. Also, the administration may apply incentives and penalties to the convict, provided for by labor legislation, about which it is necessary to inform the penitentiary inspection in a timely manner. The administration's responsibilities include notifying the penitentiary inspectorate of a violation of labor discipline by a convict, transferring him to another position or dismissal from an organization for absenteeism, in connection with the reorganization (liquidation) of production and other reasons provided for by labor legislation [4, p.127].

It is worth noting the fact that despite the fact that the duty to conduct educational work with convicts sentenced to corrective labor is assigned to the employees of the penitentiary inspectorate, quite often labor collectives are involved in such work, which generally complies with the requirements of Rule 88 of the Standard Minimum Rules for the Treatment of Prisoners .

All employees, by virtue of their strictly defined professional duties, in addition to their fulfillment, need to build interpersonal relationships with each member of the work team, since it is thanks to interaction and communication that an analysis and some kind of adaptation of a person to existing professional conditions in a particular organization take place [6, p. 111].

Depending on the nature and characteristics of the labor collective and its members, the impact on the personality of a person sentenced to corrective labor can be both positive and negative. A close-knit team is able to create a favorable professional and working environment that positively affects each individual member and the overall goal. A labor collective, in which members are clearly expressed, striving for the sake of their interests and goals to give up professional and ethical principles in relation to their colleagues, can become the reason for the lack of a favorable psychological climate of the labor collective and not only have a corrupting influence on each individual member, but also force to antisocial behavior, which will negatively affect the achievement of the goals of criminal punishment.

In addition to carrying out educational work by employees of penitentiary inspections, members of the labor collective, volunteers, professional psychologists and other interested persons may be involved in such work. At the same time, family and friends have the greatest influence on the behavior of the convict [7, p.62].

In connection with the foregoing, in order to effectively correct a particular convict, it is necessary to carry out educational work not only with him, but also with those around him both during working hours and outside working hours: colleagues, relatives, friends, with the involvement of medical workers, psychologists and volunteers. Only comprehensive work will allow achieving high results in the correction of a convict sentenced to corrective labor, including those with diseases, and prevent him from committing repeated crimes.

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现代国内外在体育教学实践中引入“备工备辩”考试综合体的经验
**MODERN DOMESTIC AND FOREIGN EXPERIENCE OF THE
INTRODUCTION OF TEST COMPLEXES "BE READY FOR WORK
AND DEFENSE" IN THE PRACTICE OF PHYSICAL EDUCATION**

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注解。 本文讨论了实施复杂的“为劳动和国防做好准备！”的问题。 在体育教学实践中。 对其他国家类似综合体的实施情况、其重要性及其应用的特殊性进行了比较分析。 通过综合体规范的关键目标（个人意义）得到证实。 揭示了GTO 综合体在与学生合作中的缺点和功能。 提供了与学生一起工作的实用方法，以培养通过综合体规范的动机。

关键词：大学、学生、运动员、动机、动机。

Annotation. *The article deals with the problem of implementing the complex "Be ready for labour and defence!" in the practice of physical education. The comparative analysis of the implementation of similar complexes in other countries, the degree of their importance and peculiarities of their application is carried out. The key goals (personal meanings) of passing the norms of the complex are substantiated. The shortcomings and functions of the GTO complex in work with students are revealed. Practical methods of work with students for development of motivation to pass the norms of the complex are offered.*

Keywords: *college, students, athletes, motivation, motive.*

In the modern educational space the state of health, physical capabilities, motor activity of children and youth is characterised by steady tendencies of decreasing indicators. It becomes obvious the need to search for new organisational and pedagogical approaches, effective forms and technologies aimed at improving the system of physical education at all levels of education, starting from preschool organisations [5].

Today we need a clear system capable of determining the effectiveness of physical education processes for prompt adjustment and improvement of the quality of the pedagogical process, which allows to develop motor qualities and determine the level of physical condition of people of all age categories. The system should be flexible and take into account the ever-changing requirements of human labour activity, as well as the preparation of the younger generation for military service.

The health of young people determines the health of the nation and is rightly considered a task of national importance, since the country needs physically and harmoniously developed, active people. The All-Russian physical culture and sports complex "Ready for Labour and Defence" (GTO) can play a major role in the physical, moral and emotional improvement of children and young people.

The All-Russian Physical Culture and Sports Complex "Ready for Labour and Defence" (GTO) is a comprehensive framework for physical education with normative and programme support. This programme was created with the aim of developing mass sports. The development of the GTO complex, organisation and conduct of events of the complex is a promising direction of state policy aimed at improving the health of the nation [4].

In our country, comprehensive tests based on the GTO badge in physical fitness for men and women aged 17 to 33 years were first established in 1931. For schoolchildren in 1934, the complex "Be ready for labour and defence (BGTO) was introduced, which contained 13 norms and 3 requirements.

In the post-war years, research work was carried out to improve the content, preparation and passing of GTO norms for students of schools, secondary and higher educational institutions.

By the end of the 1960s, the GTO complex, in terms of normative requirements and organisation of practical work, no longer corresponded to the tasks in the field of physical culture and sports. University students had to pass the norms and requirements of the 4th stage "Physical perfection". The new complex was widely promoted under the slogan "From the GTO badge to Olympic medals". During the development of the complex, the level of norms was accepted, which could be fulfilled only by 60% of students.

This situation led to the development and introduction of a new, more perfect GTO complex in 1972, which differs in the expansion of the age range of those who pass the standards - from 10 to 60 years old.

Significant changes and additions were made in 1985 and 1988, when the improved complex became operational: its structure was changed and significant adjustments were made to the content of test types. In this version of the GTO, emphasis was placed on the development of endurance, and requirements for a weekly movement regime were introduced.

The GTO complex was used not only for tests in primary physical culture organisations, but also for large-scale championships, such as the Soviet Union's championship in multiathletes of the GTO complex.

The GTO complex played the role of a programme and normative basis for the entire system of physical education of the population, including students, and its standards for many years served as benchmarks of versatile physical fitness. With the collapse of the Soviet Union in 1991, the GTO complex actually ceased to exist, it was excluded from all educational programmes, and the passing of its standards ceased.

2014 was the beginning of the second birth of the GTO complex. Today, the All-Russian physical fitness and health complex "Ready for Labour and Defence" (GTO) is designed to play a decisive role in increasing the number of people actively engaged in physical culture and sports, improving the physical fitness of the country's residents, and developing their civic and patriotic qualities. It is the programme and normative basis for the system of physical education of various population groups (from 6 to 70 years of age and older). In its essence, it is a state-legalised form of testing the physical condition of a person, but the shortcomings in the implementation of the complex affect the effectiveness of the functions that were originally assigned to the GTO complex.

In the 80s-90s of the last century, pedagogical practice knows of cases when the performance of GTO standards was, perhaps, the only means of physical training of students, which significantly reduced the effectiveness of versatile physical fitness and did not solve the social tasks set by the country: the need for physical and moral perfection; education of will qualities, endurance, readiness for labour and defence; regularity of physical training, sports and tourism.

Another shortcoming of the work on the introduction of the GTO complex was the fascination of educational institutions with numerical indicators in passing the GTO standards. Instead of increasing the efficiency of training sessions allocated for physical education, conducting classes in an interesting, imaginative way, instead of emotional movements, competitions, application of new, original forms, means and methods of training, there was "pushing" the achievements of the GTO complex results, and even simply falsification of data [7].

With the revival of the All-Russian physical culture and sports complex "Ready for Work and Defence" in 2014, the modernisation of the physical education system in educational institutions began. In 2015, amendments were made to the law

"On Physical Culture and Sports in the Russian Federation", which enshrined the main provisions on the GTO complex, introduced a new concept of the complex, which is understood as a programme and regulatory framework for the system of physical education of the population, requirements for the level of physical fitness, the level of knowledge and skills in the field of physical culture [1]. To date, the GTO complex has been slightly modified. Its list includes athletics, cross-country skiing, swimming, shooting and tourism - they give students the right to choose five tests to pass, and the norms themselves, compared to the Soviet GTO, are somewhat reduced [2, p.2].

There are analogues of the Russian GTO complex abroad, which also form the basis of physical education of the population [5].

In Germany, the German sports badge (German badge of National Sport sport sportabzeichen) was approved in 1913. Now it is one of the oldest sports honours in Germany, which is still valid. To receive the badge in Germany is very honourable, as it is the highest award outside of competitive sport and is awarded as proof of the harmonious physical development of the person being tested. City burgomasters, dignitaries and foreigners usually receive the badge from the consuls.

In Austria, the ÖSTA - das Abzeichen sports badge has existed since 1920. There are 9 varieties of the badge: for adults there are basic and advanced levels, for each level there are bronze (18-29 years old), silver (30-39 years old) and gold badges (40 years old and above). The Austrian standards are generally much easier than the German and Russian GTOs. For young people (13-18 years old) there are bronze, silver and gold badges. When passing norms for several years, badges engraved with the numbers 5, 10, 15, 20, etc. are issued.

In Sweden, there is a so-called "School Sports Badge". It allows pupils to get more than a grade in PE lessons by showing that the pupil is involved in a sports association. The School Sports Badge is usually awarded in grades 3-6 for completing the required standards. The exercises are divided into 4 groups - speed, strength, agility and endurance. In the 3rd grade an iron badge is awarded. To fulfil the standards it is enough to pass four tests, for their fulfilment a schoolchild receives a bronze, silver or gold badge.

In the USA, the closest to the GTO is the "sports self-improvement" of scouts in various disciplines: from athletics to sports tourism. Depending on the Scout's affiliation to a particular Scouting movement, the awards (knots, patches, badges, etc.) may vary.

Different sporting awards exist in other countries as well. For example, British, Australian and New Zealand universities give out nice clothes with patches testifying to students' sporting achievements (blue blazers).

As we can see, similar systems for assessing physical fitness exist in many countries, which indicates the importance of the GTO complex not only in the

physical development of a person, but also in the process of formation of mental qualities and abilities of a person, since sports competitions and sports activities make high demands on the manifestation of volitional qualities, self-regulation, the ability to win and lose without losing one's dignity and faith in future success.

The positions of modern scientists agree in assessing the functions of the GTO Complex:

The educational function is determined by the impact on the formation of the personality of the participants: world outlook, character, moral qualities, volitional sphere, etc. In the course of sports training and participation in GTO festivals in the process of purposeful interaction of all participants, the formation of a whole set of socially valuable qualities, attitudes, beliefs, acting as means and ways, realising ethical norms, opening a wide space for the activation of human potential is ensured.

The principle of unity of motor, intellectual and socio-psychological is the basis of educational and transformative functions of sports activity. In addition to motor culture, the wide potential of culturological values (intellectual, mobilisation, communicative, moral, aesthetic, etc.), the performance of the complex stimulates the desire for improvement. A person has the opportunity, together with his peers, to really participate in the manifestation of such values as goodness, justice, duty [1].

The socialising function of the GTO complex as an element of sports activity follows from the fact that sports competitions are a powerful factor in involving people in social life, forming the experience of social relations in sports competition. Socialisation [from Latin *socialis* - social] is a process of assimilation by a human individual of a certain system of knowledge, norms and values that allow him/her to function as a full member of society (Philosophical Encyclopaedic Dictionary, 1983).

The communicative function is revealed in the formation of skills and skills of interpersonal interaction promoting mutual understanding. Participation in joint training sessions and competitions on all standards of the GTO complex forms common interests, is relaxed, takes place within the framework of emotional communication, and generates a strong sense of community, cooperation and belonging to a collective among very different people. The surrounding sporting world promotes an atmosphere of friendliness, readiness for friendship, and the search for friends. The interests that arise among spectators in the process of watching sporting events create conditions for people who were previously complete strangers to each other to begin to communicate freely. The universal "language" associated with the simplicity and clarity of the uniform rules of the competition makes it relatively easy to overcome the language barriers of communication. The appeal of an emotional spectacle makes it possible to establish business and friend-

ly contacts between people, makes sport a factor in strengthening interpersonal, intergroup and international ties, and gives a powerful impetus to the growth of mutual understanding and cultural co-operation.

It is impossible not to recognise the economic function, which is manifested in obtaining economic profit from the funds invested in this system through the creation of the industry for the production and provision of services that meet the various needs of the population in physical improvement, in sports spectacles, as well as in the formation of economic relations with other sectors of social life and social production [3].

With all the significance of the complex, its effectiveness is possible only on the basis of creating psychological and pedagogical conditions and stimulating the mechanisms of value appropriation, taking into account the mental and pedagogical processes carried out in the course of learning activities [3, 6]. A meaningful attitude, sustainable interest in physical education and GTO norms passing are undoubtedly formed in educational institutions through lectures, conversations, professional training, students' after-hours sports and health-improving activities, when students get full satisfaction from their studies, see progress in their activities and physical development.

To create a comfortable psycho-pedagogical atmosphere of students' appropriation of the values of physical culture and sport, the teacher must possess methodical techniques of personal-activity approach. For this purpose, from the first classes with the help of observation, questionnaires, surveys, individual conversations, analysis of behaviour and learning activities it is necessary to study the level of attitudes, subjective experience of students in the field of physical culture and sport.

Classes should be aimed at the formation of motives and meanings of students to physical culture and sports activities. Motivation can arise both in spontaneously formed and in specially organised conditions of activity that systematically satisfy the positive needs of students [3].

In theoretical classes on physical education and in the process of holding sports competitions at Kaluga Industrial and Pedagogical College we often use the method of persuasion together with the method of demonstration - demonstration and analysis of biographies of famous athletes who achieved high results.

In addition, the method of project activity is actively used in research activities, allowing students to discover the essence of physical culture and sports activities themselves. The teacher here only guides the student, accompanies him in his independent search for the truth.

In the course of fulfilment of the norms of the complex, students independently engage in physical exercises, forming the motivation to achieve sporting success. And here the method of personal example is the "working" method of introducing

students to the GTO norms. Of course, a great responsibility falls on the personality of the teacher, who must unlock the inner sporting potential of each student. The Kaluga Industrial and Pedagogical College employs teachers who have sports titles, still train and compete in various competitions. They are able to motivate even the most unprepared students, because the combination of work and training process requires from the teacher perseverance and competent distribution of his working time, the presence of discipline.

The task of both teacher and coach is to maintain the level of motivation of students actively involved in sports, to multiply it, to make it a driving force that determines the process of personal development.

The educational function of passing sports norms is successfully realised if passing the norms of the complex contributes to the formation of firmness of character, discipline, if moral relations dominate. Sports activity can contribute to their consolidation and strengthen the moral basis of personal manifestations. The main goal of passing the GTO norms in an educational institution is not to lose the main thing - aspiration for physical perfection, improvement of the atmosphere in the educational community, increasing the usefulness and spirituality of modern sport.

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各教育专业主体群体学生统计协调发展动态

**DYNAMICS OF THE DEVELOPMENT OF STATISTICAL
COORDINATION AMONG STUDENTS OF THE MAIN GROUP OF
VARIOUS EDUCATIONAL SPECIALIZATIONS**

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注解。本文介绍了应用 Romberg 检验来监测西伯利亚联邦大学 (SFU) 主要教育专业“拳击”和“乒乓球”学生统计协调情况的结果。从第一年到第三年,学生的协调能力发展呈现出积极的动态。

关键词: 龙伯格测试、监控、主力组、拳击、乒乓球、统计协调、协调能力。

Annotation. *The article presents the results of the application of the Romberg test in monitoring the statistical coordination of students of the Siberian Federal University (SFU) of the main group of educational specializations “boxing” and “table tennis”. A positive dynamic in the development of students’ coordination from the first to the third year was revealed.*

Keywords: *Romberg test, monitoring, main group, boxing, table tennis, statistical coordination, coordination abilities.*

Introduction. Nowadays, researchers have found that the success of studying at a university has a close relationship with the functional state and health, since problems associated with poor health lead to a decrease in working capacity and an increase in student fatigue [1]. And as a result, scientific and applied research aimed at improving pedagogical technologies for planning and organizing

physical culture in order to preserve and improve the health of young students is considered as an urgent task facing teachers of educational institutions. A causal relationship between the incidence of students, their level of physical development and physical activity was also determined.

All above mentioned allows us to conclude that the control of the level of development of various physical abilities, as a result of the use of exercises, acquires a rather high significance, reflecting to a certain extent the “quality” of physical activity. At the same time, it should be taken into account that the training of a person with insufficiently developed statistical coordination will be significantly difficult.

Coordination of movements, agility, coordination abilities, motor coordination, control of movements, regulation of movements - these concepts are often used as synonyms. We understand coordination abilities as a set of psychological, morphological, physiological components of the human body, the unity of which within the boundaries of a functional system ensures productive motor activity, that is, the ability to purposefully build a movement, control it and, if necessary, quickly rebuild it.

Modern physical culture and sports are sufficiently equipped with methods for assessing coordination abilities. Four main methods for assessing coordination abilities have been developed and are actively used in practice: observation, expert assessments, tests and instrumental methods.

The level of development of statistical coordination in practice is determined by using simple and complicated Romberg tests. The use of this method is justified by the fact that a person needs at least two of the following three senses to maintain balance in a standing position: proprioception (the ability to know the position of one’s body in space); vestibular function (the ability to know the position of the head in space); and vision (which can be used to track and correct changes in body position).

Thus, **the purpose** of the present study is to assess the dynamics of the development of statistical coordination through the use of the Romberg test in the educational specializations “boxing” and “table tennis”.

Methodology, organization, material and methods of research. General scientific research methods are represented by methods of analysis, observation, experiment, measurement, hypothesis and logic.

Private research methods are:

1. Romberg test - a method for assessing statistical coordination;
2. Mathematical methods - ranking, scaling and methods of mathematical statistics.

Organization of the study. The study was conducted from November 2022 to April 2023, in the Sports Complex No. 7 of the Siberian Federal University,

Svobodny avenue 79b, House of Physical Culture SibFU, Borisova st., 20 A., Multifunctional complex No. 1 SibFU, Svobodny avenue 82. Page 11. The study involved students aged 17 to 22 years old, boys and girls, 1-3 courses from various institutes of the Siberian Federal University, a total of 139 people, of which: students of the main group of specializations “boxing” - 72 people and “table tennis” - 67 people.

Results and its discussion. The study was conducted in the first half of the day from 08:30 to 11:30, before classes, taking into account the physical condition of the students. A complicated Romberg test with closed eyes was used. The results were evaluated on a five-point scale proposed by researchers V.P. Mandrikov and M.P. Mitsulina [3] table 1.

Table 1
Romberg test scale (V.P. Mandrikov and M.P. Mitsulina 2000)

Evaluation	Indicators (c)
«5»	41 and above
«4»	30-40
«3»	20-29
«2»	19-10
«1»	9 and lower

The average indicators of the Romberg test of the main group of educational specializations “boxing” and “table tennis” are presented in Table 2.

Table 2
Average indicators of the Romberg test in the boxing and table tennis specialization groups.

Group/specialization	evaluation	Indicators (c)
Boxing	3	20
Table tennis	2	19

The revealed minor differences in the average values of the Romberg test among students of the educational specializations “boxing” - 20 seconds and “table tennis” - 19 seconds, are not critical and are typical for healthy young people. The revealed minor differences in the average values of the Romberg test among students of the educational specializations “boxing” - 20 seconds and “table tennis” - 19 seconds, are not critical and are typical for healthy young people.

The dynamics of indicators of the development of statistical coordination of the educational specializations “boxing” and “table tennis” from the first to the third year are presented in Table 3.

Table 3

Average indicators of the development of statistical coordination of students of the specializations “boxing” and “table tennis” from the first to the third year.

Group/ specialization	I grade		II grade		III grade	
	evaluation	time (c)	evaluation	time (c)	evaluation	time (c)
Boxing	2	17	3	21	3	23
Table tennis	2	16	3	20	3	22

Analysis of statistical equilibrium indicators in the studied groups showed different positive dynamics in all subgroups. The dynamics of the Romberg test in units of the scale (seconds) from the first year to the third year - 6 seconds, was revealed in both subgroups of students. It should also be noted the change in the level of the indicator from below the average in the first year to the average in the third year in both subgroups.

Analyzing the obtained data, we can summarize the following:

1. Classes in special and main groups of the discipline “applied physical culture” have a positive impact on the development of statistical coordination of students;
2. In all subgroups of the studied students, an increase in the levels of development of statistical coordination was noted.

In conclusion, it should be noted that earlier studies [2] showed differences in the indicators of students of the main and special medical groups.

Thus, it can be concluded that the use of the Romberg test is a safe and not energy-consuming way to assess the coordination abilities (CS) in the main groups. At the same time, it should be taken into account that the studies will be most effective when conducted in the first half of the day with a frequency of three times in the academic year.

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在 OWG 和 WSC 上对代表世界竞赛滑雪品牌的高级滑雪运动员的表现进行评估
**EVALUATION OF THE PERFORMANCE OF HIGH-CLASS SKIERS
REPRESENTING THE WORLD BRANDS OF RACING SKIS AT
THE OWG AND WSC**

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抽象的。 该研究致力于对使用世界主要品牌滑雪板的最强运动员的表现进行统计分析。 目前，为冬季奥运会、锦标赛和世界杯参赛者提供现代高品质竞赛滑雪板的领先制造商是奥地利 - Fischer 和 Atomic、挪威 - Madshus、法国 - Rossignol 和 Salomon [1]。 对 2018 年至 2023 年期间使用不同品牌滑雪板的运动员在主要国际比赛中的表现进行了评估：奥运会（2018 年和 2022 年）和世界锦标赛（2019 年、2021 年和 2023 年）。 揭示了六年间各个比赛获奖的总体趋势。 Rossignol (+22.2%)、Salomon (+80%) 和 Atomic（从 3 个奖项增加到 11 个奖项）的制造商呈现出积极的动态。

关键词：冬奥会、世锦赛、越野滑雪、世界品牌竞赛滑雪板。

Abstract. The study is devoted to the statistical analysis of the performance of the strongest athletes performing on skis of the main world brands. At the moment, the leading manufacturers of modern high-quality racing skis for participants in the Winter Olympic Games, championships and World Cups are Austria - Fischer and Atomic, Norway - Madshus, France - Rossignol and Salomon [1]. An assessment is given of the success of the performance of athletes on skis of various brands at the main international starts in the period from 2018 to 2023: at the Olympic Games (2018 and 2022) and at the World Championships (2019, 2021 and 2023). A general trend in awards won from competition to competition over a six-year period was revealed. Positive dynamics among manufacturers is

present at Rossignol (+22.2%), Salomon (+80%) and Atomic (increase from 3 to 11 awards).

Keywords: Olympic Winter Games, World Championships, cross-country skiing, world brands of racing skis.

Introduction. Cross-country skiing is a sport that includes 6 competitive Olympic disciplines for both men and women, respectively. These include: individual sprint, team sprint, individual race from a separate start, skiathlon, relay race, mass start. Since OWG and World Championships are the most important sports events in the professional career of a ski racer when studying super-achievement sports, these competitions are usually considered as the most long-awaited and spectacular in world sports [3].

Main part. One of the main concepts of the competitions of the considered rank is social marketing [1], as a result of which, in this study, the performance of the strongest ski racers performing on racing skis of various manufacturers was evaluated.

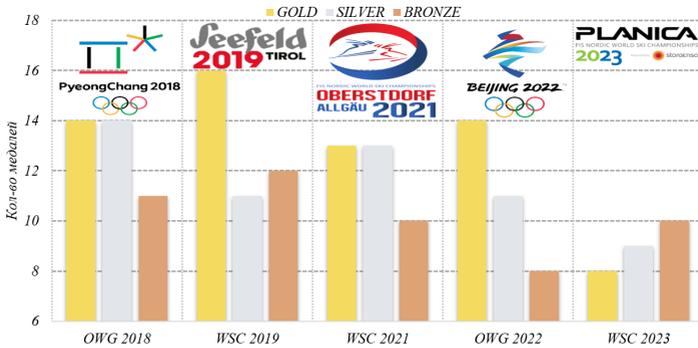
The success of athletes' performance at international competitions, as a rule, is assessed by the personal-team indicator of the number of awards won of various denominations (unofficial medal count), where the number of awards won by athletes, representatives of various countries is calculated [4].

Between 2018 and 2023 60 competitions were held within the framework of the Winter Olympic Games and World Championships. In total, 100 sets of awards (300 medals) were raffled off, distributed among athletes performing on racing skis of five leading world brands (Table 1).

Table 1
The number of medals of various denominations won by athletes performing on various world brands at major international competitions.

	OWG – 2018, Pyeongchang, South Korea				WSC – 2019, Seefeld, Austria				WSC – 2021, Oberstdorf, Germany				OWG – 2022, Beijing, China				WSC – 2023, Planica, Slovenia				TOTAL			
	1	2	3		1	2	3		1	2	3		1	2	3		1	2	3		1	2	3	
	14	14	11	39	16	11	12	39	13	13	10	36	14	11	8	33	8	9	10	27	63	58	51	174
FISCHER	14	14	11	39	16	11	12	39	13	13	10	36	14	11	8	33	8	9	10	27	63	58	51	174
ROSSIGNOL	2	4	3	9	0	6	3	9	4	3	3	10	4	4	4	12	6	4	1	11	16	21	14	51
SALOMON	1	0	4	5	3	0	5	8	1	1	3	5	1	4	5	10	1	2	6	9	7	7	23	37
ATOMIC	2	1	0	3	0	0	0	0	1	2	2	5	1	1	2	4	5	4	2	11	9	8	6	23
MADSHUS	1	1	3	5	1	3	0	4	1	0	2	3	0	0	1	1	0	1	1	2	3	5	7	15

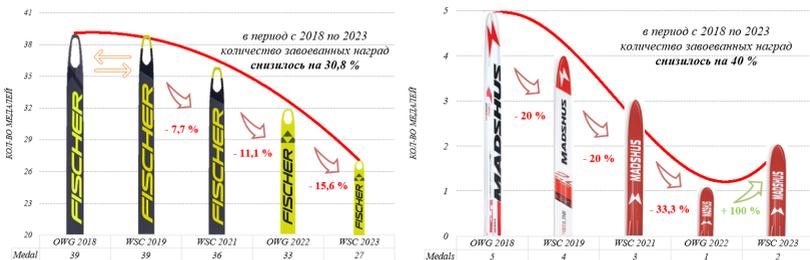
The greatest number of medals was won by athletes skiing the Austrian manufacturer Fischer. At each of the competitions, they became leaders in the number of awards won, which, in general, is 58% (174) of the total number of medals of various denominations played (Pic. 1).



Picture 1. Statistics of the performance of Fischer ski athletes in the main starts of the season (2018-2023), in terms of won awards of various denominations.

Second in terms of winning awards at major international competitions are cross-country skiers representing the French brand Rossignol. They won 51 medals (17% of the total number of awards played). Among the remaining representatives of other world brands, the medals were distributed in the following number: Salomon - 37 medals (12%), Atomic - 23 medals (8%), Madshus - 15 medals (5%).

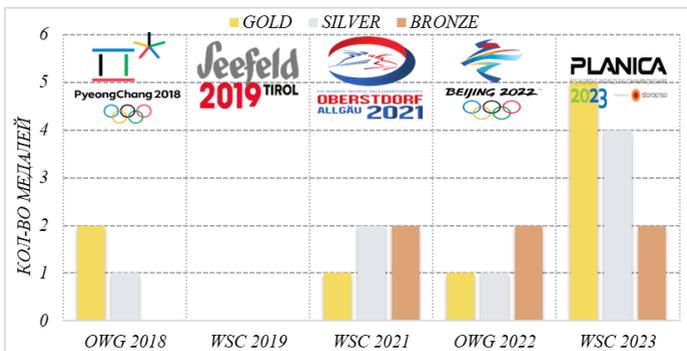
With regard to the overall trend in the number of medals won from competition to competition, it was found that despite the clear dominance of athletes performing on Fischer brand skis, the dynamics in the number of awards won is downward (a decrease of more than 30%). Similar dynamics is observed among representatives of the Norwegian company Madshus, the number of awards won decreased by 40% (Pic. 2).



Picture 2. Dynamics of the total number of medals of Fischer and Madshus companies in the period from 2018 to 2023.

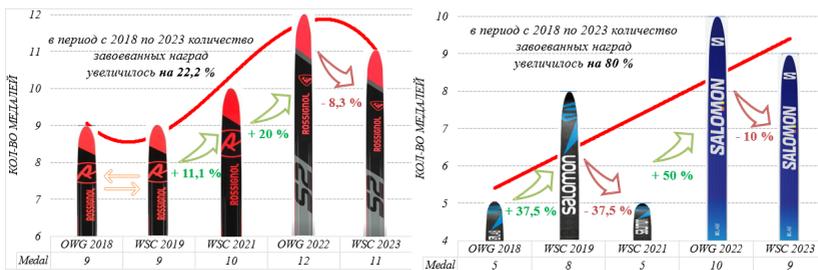
When evaluating the performances of athletes representing the Austrian brand - Atomic, it was determined that the number of medals increased almost three times (Fig. 3).

Atomic and Rossignol skiers at the 2023 World Championships (Planica, Slovenia) won 5 and 6 top medals respectively, Fischer skiers won 8 awards, which once again confirms the increased competitiveness of these brands in major international competitions.



Picture 3. Statistics of the performance of Atomic ski athletes in the main starts of the season (2018-2023), in terms of won awards of various denominations.

Having determined the number of medals won by athletes on skis of French manufacturers of racing skis, a positive trend was revealed (Fig. 4). The representatives of manufacturing companies - Rossignol and Salomon - increased the number of awards of various denominations won by 22% and 80%, respectively. The performance of athletes on Rossignol skis is characterized by stability (10.2 ± 1.3 medals).



Picture 4. Dynamics of the total number of medals of Salomon and Rossignol companies for the period under review.

Conclusion. Thus, the data obtained in the course of the study made it possible to determine the rating of racing ski manufacturers, the criterion of which is the number of medals won in various denominations at international competitions. According to this indicator, representatives of the Austrian manufacturer Fischer are the leaders with 174 medals. Despite their clear dominance, the overall trend in awards won from competition to competition is on a downward trend, indicating an increase in competition among global ski brands.

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包容性背景下学习过程主体的新机遇

NEW OPPORTUNITIES FOR THE SUBJECTS OF THE LEARNING PROCESS IN THE CONTEXT OF INCLUSION

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摘要: 本文分析了普通教育机构中从事残疾儿童或特殊教育需求的教育工作者所需的包容性能力。考虑了包容性、包容性教育、包容性文化的概念。所选主题的相关性是由于俄罗斯联邦残疾儿童状况恶化等因素；完善国民教育体系的新方向。该研究强调了教师和教育工作者在组织包容性学习时可能面临的困难；描述了包容性能力的类型和阶段；就包容性教育环境中教育过程中所有参与者的机会提出了新的观点。

关键词: 全纳教育、全纳文化、教学能力、残疾儿童。

Abstract. *This article analyses the inclusive competence of practising educators required for working with children with disabilities or special educational needs in general educational institutions. The concepts of inclusion, inclusive education, inclusive culture are considered. The relevance of the chosen topic is due to such factors as the aggravation of the situation of children with disabilities in the Russian Federation; the new directions for improving the national education system. The study highlighted the difficulties that teachers and educators may face in organizing inclusive learning; described the types and stages of inclusive competence; offered a new point of view on opportunities for all participants in the educational process in an inclusive educational environment.*

Keywords: *inclusive education, inclusive culture, pedagogical competence, children with disabilities.*

1. Introduction

In the modern world, reforms are taking place in absolutely all spheres of human activity: politics, economy, industry, culture. Education, one of the main social institutions, is no exception. At the same time, the transformations are manifested not only in the improvement of the structure, its content and technological aspects, but also in the change for the better of moral and value orientations of all subjects

of the process. A clear example of this we consider the trend towards the development of inclusive education (subsequently IE), which has become widespread in the established education system in the last two decades. A significant role in this issue is played by the document of title, namely the Federal Law “On Education in the Russian Federation”. According to the Law, adopted on 21 December 2012, inclusive education is understood as “ensuring equal access to education for all students, taking into account the diversity of special educational needs and individual capabilities” [3, article 2, paragraph 27]. [3, article 2 paragraph 27]. This definition is supplemented by Makariev I. S. in the Brief dictionary of the system of concepts of inclusive education. Makariev defines the key term “inclusion” (from Latin *inclusio* - “inclusion”) as follows: “it is a process of integrating children into the general educational process regardless of their gender, ethnicity, religion, previous educational achievements, health status, level of development, socio-economic status of parents and other differences” [7, p. 24]. [7, c. 24]. In his opinion, the IE is based on the accessibility of education for everyone. In this case, the fundamental requirement is the creation of such conditions that all children can learn comfortably. Often under inclusive education is meant exactly the possibility of education of children with disabilities or limited health capabilities (LHC), or special educational needs in general education organisations.

The relevance of the topic is due to two factors. Firstly, domestic education should meet the world standards and requirements, which are primarily based on the principles of humanism and equal opportunities. The aspiration to make “the world for all” extends to all aspects of social life. Inclusive education is an important resource for creating such conditions in this sphere. Secondly, statistical data for the last five years [11] show a decrease in the total number of people with disabilities (by 1.2 million people), but the number of children in this category is relentlessly growing.

Despite the decrease in the number of children with disabilities in recent months, it has increased significantly between 2017 and 2022. Thus, the increase in the percentage of children with disabilities is one of the factors behind the increased attention to the issue of developing an inclusive culture in schools.

Article 79 of the Law of the Russian Federation “On Education”, which defines the process and procedure for the education of children with disabilities, states that their education is possible both in specialised schools and in general education schools together with other students. If necessary, special conditions should be created, which implies providing schoolchildren with disabilities with additional assistance, using different resources in education and developing special programmes and methods that will open new opportunities for special children and help them adapt to life in the community [3].

The approval of entitlement documents is an important step towards the creation of a society in which IE will create favourable conditions for learning for all children. However, a necessary condition for realising this goal is to understand the tasks and principles of IE, as well as the opportunities it provides, understood by all participants (subjects) of the process: students, including children with disabilities, their parents, teachers and educators. We cannot say that schoolchildren fully understand the essence, tasks and features of inclusive education. However, the general idea that education of children with disabilities on an equal basis with all other students is possible is extremely necessary for all participants of the education process for their successful socialisation and learning. The same can be said about the importance of a friendly or at least neutral attitude on the part of schoolchildren towards special classmates.

Thus, the problem of low level of inclusive culture among pupils in general education institutions is the key to this paper. The aim of the research is to identify solutions to this problem by analysing various aspects of the inclusive education process, such as difficulties for teachers in working with children with disabilities; inclusive competence of teachers; new opportunities for the subjects of the learning process in the conditions of inclusion.

2. Materials and methods

The reasoning and results of the work on the development of inclusive education, culture and relevant competences in teachers are based on the data obtained through the application of the following methods:

- integrative, logical-methodological and comparative analyses, analysis of previously conducted research on the chosen topic, specialised literature;
- quantitative and qualitative analysis of digital data;
- method of synthesis of concepts and definitions of terms;
- observation;
- illustrative and graphic method.

The research also used methods for identifying and assessing the personal and professional qualities of teachers, described by I. A. Sakhnova [10]. The main basis for the study is the results of previously conducted and published scientific and research works, data from web resources.

3. Results and discussion

Inclusive education is a complex, multifaceted and very labour-intensive process. Its primary tasks are the provisions prescribed in Article 19 of the Federal Law “On Social Protection of Disabled Persons in the Russian Federation” [2]. Education of people with disabilities in addition to the main tasks - teaching the school curriculum - should contribute, firstly, to the implementation of rights and responsibilities on an equal basis with all citizens of Russian society; secondly, the development of a person as a personality, the formation of various skills and abili-

ties; thirdly, favourable social integration of the individual, improving his communication skills. In the process of implementation of inclusive education the teacher faces many difficulties, such as underdevelopment of one of the sensory organs or motor skills of children with disabilities, difficulty or distortion of information perception, which can, among other things, cause misunderstanding or problems with communication with classmates, bullying. In such cases it is also difficult for the teacher to use the usual methods of teaching (lectures, independent study of the topic in the textbook) and working out the material (retelling, outline, etc.). That is why, taking into account all the nuances of inclusive education, the competences of a teacher who teaches children with disabilities have long been subject to certain requirements on the part of different subjects of the learning process (students, their parents, educational organisation).

Speaking about the competence of a teacher who works with children with disabilities or special educational needs, first of all we should refer again to normative-legal documents. Such in this matter is the Order of the Ministry of Labour and Social Protection of the Russian Federation “On Approval of the professional standard “Teacher (pedagogical activity in the sphere of preschool, primary general, basic general, secondary general education) (tutor, teacher)” [1]. [1]. According to the order, teachers should master psychological and pedagogical methods in general and inclusive technologies in particular. Their application in practice implies the provision of targeted assistance to students, the development of special programmes for the development and socialisation of special children, the formation of various qualities and skills necessary in school and everyday life.

The authors of studies and scientific articles on the competences of a teacher in the field of inclusive education have different approaches to the topic. For example, A. F. Dzhumagulova in the process of inclusive education prioritises the preparation of the educational environment and identifies such necessary competences as personal qualities, the ability to establish contact and establish relationships with children with disabilities, to understand and influence their emotional state, the ability to organise individual and group work and unite team members [5]. V. Z. Kantor and Y. L. Proekt took a different approach: they presented the results of a study based on the views and attitudes of schoolchildren’s parents [6]. From the parents’ point of view, the most significant competences are those described in the Order of the Ministry of Labour and Social Protection, which has already been mentioned above. Such skills as consulting parents, creating a rehabilitation programme, organising children’s leisure time, etc. were identified as less important or unnecessary at all. In our opinion, this point of view of parents is caused, firstly, by their distrust in the issues of more active and serious participation of teachers in the education of children with disabilities; and secondly, by their lack of understanding of the importance of forming an inclusive culture among school-

children from an early age. A more structured approach can be observed in the article by I. A. Romanovskaya and I. N. Khafizullina [9]. The authors distinguish levels and types of competence: general, professional, special, private - thanks to which it becomes easier to identify their key content and functional components. This structure can be extended by describing in more detail what the teacher's responsibilities are and what actions he/she should take in the course of realising the listed competences. We consider E. B. Yusupova's structure to be the most complete, which is based on the stages of formation and development of content and operational competences [12, 13]. At the same time, competence is assessed not by specific skills, but by developed criteria and their indicators (Table 1).

Table 1
Stages of formation of inclusive competencies

Stage	Stage content	Criteria	Indicators
Information-orientated	To develop interest in inclusive education and to learn its principles	Motivational	<ul style="list-style-type: none"> Awareness of the problem of socialisation of people with disabilities; Formation of motivation to organise inclusive education
		Cognitive	<ul style="list-style-type: none"> Availability of knowledge and experience, mastering special methods for working with special children; understanding of the specifics of work; understanding of the problems that can be encountered
Quasi-professional	Preparing to apply the knowledge learnt in the first stage in practice	Reflexive	<ul style="list-style-type: none"> Analysing the experience of implementing inclusive education; adequate evaluation of own results and mistakes in work; Personal growth and improvement of inclusive competences.
		Operational	<ul style="list-style-type: none"> Practising ways of implementing specific actions in the process of inclusive education and improving them
Activity-based	Development and application of competences in practice		<ul style="list-style-type: none"> Organisation of productive educational process in conditions of inclusion

Resources: [12, 13].

Thus, realising the requirements for competences, the teacher after mastering the theory independently learns to implement the learning process in practice, de-

veloping the necessary skills in accordance with the demands. The most important thing in this process is to understand the benefits for all participants of inclusive education and strive to realise them to the fullest extent. In our opinion, inclusive education presents the following opportunities for all subjects of the learning process:

- 1) students with disabilities or special educational needs:
 - learning the school programme on an equal footing with other children;
 - socialisation in society and development of communication skills;
- 2) students without special needs:
 - experience of socialising and working together with children with disabilities or special educational needs;
 - formation of correct moral and value orientations;
 - development of appropriate behavioural skills and etiquette;
- 3) parents of pupils:
 - discussing and practicing with their children various situations related to interaction with classmates in the reality of the school and helping them to build a behavioural strategy;
 - accessibility of educational services, regardless of the physical and behavioural characteristics of students;
- 4) to teachers:
 - Professional development;
 - development of inclusive competences and gaining experience in working with special children and mixed teams, skills in selecting special methodological materials;
 - mastering new teaching methods, application of multimedia technologies;
 - study of new ways of organising the learning process: discussions, group work, game-based lessons, etc..;
- 5) educational organisation:
 - Raising the standards of education;
 - expansion of the market of services provided (teaching both special and non-specialised children);
 - improvement of the system of assessment of teachers' competences.

It is important to note such a significant advantage for inclusive education as the absence of discrimination of children with disabilities or special educational needs in schools. Social equality is one of the fundamental principles of healthy education.

It is only possible for participants in an inclusive education process to recognise the above opportunities if their inclusive culture is sufficiently developed. By inclusive culture we mean a set of attitudes and opinions of society on joint education of students with disabilities or special needs together with other stu-

dents. Each participant has some responsibility for the success of the educational process, but teachers and educators, of course, have more responsibilities in this matter. One of these is to foster an inclusive culture in the younger generation and to instil the principles of equality and humanity for all, as well as to explain the importance of these processes to parents.

4. Conclusion

Inclusive education opens up many opportunities for all participants in the educational process. Firstly, it promotes good morals and ethics, recognises the principle of equality, and prevents discrimination and bullying in society. Secondly, inclusive education opens up new directions for teachers, educators and educational organisations to develop and improve. And most importantly, it is an opportunity for children with disabilities or special educational needs to receive education on an equal basis with everyone else, to develop social skills and feel a full part of society.

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«DAO DE JING» AND THE PHILOSOPHY OF THE EMBODIMENT OF THE LIFE OF THE HUMAN SPIRIT AND MIND

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注解。 本文提出了在科学与艺术、G.黑格尔的精神哲学和K.S.的体现理论的交叉点上发展一种新的哲学学说的问题。 斯坦尼斯拉夫斯基将它们结合起来，发展了体现人类精神和心灵生活的哲学，并用古老的道路和尊严哲学源泉——“道”来思考哲学知识与心灵和精神生活的关系。 德经”。

关键词: 哲学、道、体现、精神现象学、精神生命、心智。

Annotation. *The paper raises the question of developing a new philosophical doctrine at the intersection of science and art, the philosophy of spirit of G. Hegel and the theory of embodiment of K.S. Stanislavsky, which in their combination allow to develop the philosophy of embodiment of the life of human spirit and mind, and considers the relationship of philosophical knowledge and the life of mind and spirit with the ancient source of philosophy of the way and dignity - "Dao de Jing".*

Keywords: *philosophy, Dao, embodiment, phenomenology of spirit, life of spirit, mind.*

In developing a philosophy of embodiment of the life of the human spirit and mind, the aim is to unite the best developments in this field of knowledge and develop a new stage of philosophy based on the integration of knowledge of science and art, Hegel's philosophy and Stanislavsky's theory of embodiment. Hegel and K.S. Stanislavsky's theory of embodiment. The developed doctrine also has practical significance for the full realisation by people in life of their spiritual, intellectual and physical qualities - their personality through the embodiment of their spirit, mind and deeds. Thus, this aspiration is explained by both theoretical needs and practical side: in the conditions of diversity of various information processes, loading and saturation of life itself with changes in various spheres, this philosophy is necessary. A whole life in science and art gives man an opportunity to realise his spiritual and intellectual qualities through ideas and actions.

In the philosophy of embodiment of the life of human spirit and mind, aspects such as expression, realisation, embodiment to the fullest extent of reason and spiritual qualities in life and activity will be considered. Spiritual and intellectual is related to informatics and intelligence, morality and morality, action and creation. And if the life of spirit and mind, as well as their embodiment, were devoted to the works, how this embodiment is made - about it in this philosophy.

The embodiment of spirit and reason is possible precisely through creative, creative activity, and this can be thinking and action, and through them and in them the life of the spirit and reason of man is embodied, in the arts and sciences. To continue that unbroken line of life through the embodiment of the human spirit and the active mind is life. Where this unbroken line of life begins and what it is like - history and ancient knowledge provide the answer to this. One of the ancient sources, along with philosophy and religion, about the path of life and the embodiment of spirit and mind in it is the “ Dao de Jing”. And in connection with philosophy, this paper considers two examples that inspired the development of the doctrine - on the embodiment of the life of the human spirit and mind of G. Hegel as the founder of the philosophy of spirit and K.S. Stanislavsky as the creator of the theory of embodiment.

“ Dao” as a path - one of the first philosophies of spatial and temporal understanding of life, philosophical and practical approach to its perfection and direction along the given path-line. “ Dao is the innermost essence of the whole infinity (multitude) of things, and it is the highest value for the real man, and that which grows and sustains” [1] - this is how Lao Tzu’s “ Dao de Jing” defines the concept of this complex universal law and at the same time the philosophy of the world, “the beginning and the spiritual path”.

In the understanding, taking into account all the knowledge accumulated by mankind since the writing of Lao Tzu’s work, it is the Universe itself and the path in it of everyone, which must be followed, a “mighty river”, and this path cannot be changed - the action of universal laws of the world. “De” forms form, originating from “ Dao”, and Dao moves everything. In understanding not only the macrocosm, but also applied to the microcosm, man and his life, it is a kind of moral law and movement in this world. But “the path that leads to the goal is not the eternal path”.

Obviously there are universal, universal laws, but there are also human aspirations even among these laws of being, and Lao Tzu therefore writes about the Dao of heaven and human [2].

How this path of dignity in life continues - let us consider through the philosophy of the embodiment of life of the human spirit and mind.

Let us take a broader look at K.S. Stanislavsky’s notion of embodiment in the creative process, projecting it onto the whole life activity. And let us begin this

transference of meanings and integration with other teachings, for which I will adapt phrases to a common understanding of the embodiment of the life of the spirit and mind. “Making the invisible (creative) life visible” [3] is the task of embodying every moment of being so that no part of life itself is missed without its “visible” embodiment - it is activity, creation, the path to purpose, the realisation of the meaning of life, one’s own understanding of purpose, or objectively, as in the Dao, following the path of life.

“External embodiment is important because it conveys the inner life of the human spirit” [3] - what is interesting here is the very nature of the workings of the spirit and mind, their need for expression, internal or external - decided again by the individual, but the very physics of the processes requires the release of energy.

A comparison can be made with intuition and the unconscious, that “limitless realm” [3], from which experiences are drawn, just with the example of nature - the world. And if man tries to control these processes with consciousness, the world itself does it naturally with the help of those universal laws which are in the Universe. But the other part - the embodiment of the mind - the work on the consciousness so that it corresponds, or better - aspires to these natural laws, is necessary - in this way man will approach the essence of things in the world itself for the fulfilment of the life of both mind and spirit. Thus, “following the path” in the teaching of the Dao in the theory of K.S. Stanislavsky can be expressed in his own words - “to bring everything to natural perfection” [3].

To make the inner spiritual life a real, external world is the task of incarnation. K.S. Stanislavsky notes this movement from the embodiment of the purely external appearance of the external physical life [4] - to the embodiment of the inner life. And this life has several lines, from semiotics and content to the sensual side.

Armed with knowledge from various spheres for the embodiment of the life of mind and spirit, man can improve himself, increasingly striving to comprehend the laws of the world and to develop his own matter, spirit and mind in proportion to the natural and natural order in the universe. Just as in the philosophy of G. Hegel’s philosophy, which gives us an idea of spiritual development, K.S. Stanislavsky in his memoirs about the instructions of his teachers writes that this spiritual, “immaterial”, we, like many things in nature, are given to embody through the matter we possess, developing the body.

The life of mind and spirit is also “to act justified from within” [3]. Imagine the perfected daily work on yourself in life on justifying an action, a feeling, a word, but not following yourself, but developing a habit, a precision. There should be no unnecessary or superfluous things for the embodiment of spirit and mind, because life itself has enough circumstances weighing down this process of realisation. As in the score of a role [5], there should be no superfluous things, and therefore

everything should be clearly defined in the philosophy of the embodiment of a particular person's life.

K.S. Stanislavsky further improved the formula he created, adding: "to act internally and externally" [6]. This is both action and constant development, internal and external, material and spiritual - this is the embodiment of spirit and reason in life in their fullest measure. And another complement to justified both external and internal action is the logic and consistency of spiritual, intellectual and physical action[6]. The constant analysis of justified inner and outer action, logical and consistent, enables the ordering of the path of life, in which given mental, intellectual and physical aspirations have a natural justification by the naturalness of action, but their careful elaboration, analysis, systematisation, and direction are required.

How the embodiment of the very life of the spirit and mind of the individual is realised is also a diverse concept, as it is both an activity and an idea. For K.Stanislavsky it is life in art and the theory of embodiment itself, which became practice - and in one life of spirit and mind there was a multiple embodiment of them. In thinkers and figures of science also the embodiment of spirit and mind rushes to the embodiment in the idea, information, which acquire the life of their spirit.

In K.S. Stanislavsky's book "My Life in Art" you can find a chapter on the implementation of the system in life - it is already the embodiment of the doctrine itself, the idea of reason and aspirations of the spirit in the life of the maestro himself. And this embodiment Konstantin Sergeevich decided to fulfil by the word, "penetrating not the mind, but the heart" [4] - that is, it acts as an informational tool. [4] - that is, the informatics of the mind and philosophy of the spirit. And for this incarnation it is spiritual practice and work, realised thanks to a special atmosphere and feeling ("creative feeling" - in K.S. Stanislavsky's words) and will that is important.

In his life journey every responsible person asks himself not only a philosophical, but also a vital question - what has been done by him in this life, and this is just a question to the fullness of the embodiment of the life of the human spirit and mind. And a person who understands the inner obligation to realise his own abilities in his life, always asks himself whether he has succeeded in achieving his own realisation in life.

So K.S. Stanislavsky at the end of his work "My Life in Art" summarises the results for the present moment and plans the future, and this is the whole way of "soulful actor's creativity" [4] - this is the embodiment of the actor's abilities. [4] - such is the embodiment of the spirit and mind of Konstantin Sergeevich - through the struggle with the "external-staging" side of the process of embodiment for the transformation of the inner work of the soul and mind, the embodiment of

this most complex in its structure world of feelings and ideas of the inner reality - in the world of reality outside. This embodiment in a “simple but saturated background” of “the richness of imagination” - this is what K.S. Stanislavsky wrote about a talented artist, and this is how we can say about the requirements and aspirations of the human being as a whole.

The system itself, expressed in two parts [4] - work on himself and on the role - is projected on the work of a person on his inner world and its embodiment in life.

Konstantin Sergeyevich’s “Dao” is his “Way of Mastery” - it also embodies the active living spirit itself on a par with the embodiment of the idea and its life as the spirit of the absolute. And the task of embodiment of each person’s spirit - in the words of K.S. Stanislavsky - is “to create” [6] this process.

With this knowledge, let us rush to the goal of the philosophy of the incarnation of the life of the human spirit and mind. Setting a goal, competent determination of the ratio of abilities, strengths and weaknesses of a person, objective and subjective circumstances of reality - and constant labour to achieve the embodiment of spiritual, intellectual and physical qualities in their full measure in life.

In G.W.F. Hegel we find the concept of “*anderwerden*” [7] of becoming something else - this too is a process of embodiment. But to incarnate one’s own spirit or to change it, when the process of incarnation itself really leads to the creation of something completely different from the original - in the context of constant changes in the world, it is most likely the aspiration of the original spirit to incarnate its own new self.

Regarding the perfection of man, the concept of the spirit “possessing the authenticity of itself”, i.e. the moral spirit [7], draws attention, while the philosopher sees the general aspiration of development through consciousness, reason, spirit - to absolute knowledge. And in the future the mind more and more with the help of technologies will not only aspire to this knowledge-absolute, but also to its real unification and mastery, although the process of creation of new knowledge always continues.

And in G. Hegel the process of embodiment of the spirit represents the “transformation of reasonable consciousness into reality” by this mind itself [8]. And here the path and embodiment of the spirit represent aspirations to achieve this world universality and to become a universal mind.

The very life of the philosopher and thinker and the embodiment of his spirit and mind - his Dao - is precisely embodied in the writings devoted to phenomenology and philosophy of spirit, it is its intellectual embodiment.

How the spirit and mind of the thinker and philosopher himself embodied in life, in what form and content - let us consider through his biography, life journey, in which, in conjunction with all the factors of objective and subjective nature, the spirit and mind struggling for its embodiment. And at G.W.F. Hegel it is his

doctrine of spirit itself, in which the study itself is carried out by the sciences of subjective and objective spirit. The movement of G. Hegel's spirit and mind in his life to its realisation in philosophical doctrine was through the movement from the philosophy of spirit to phenomenology, and began, as one might expect, with the emergence into the world.

From biographical studies we can learn about this. For example, about his teacher and mentor, as one of the best examples, Wilhelm Hegel left an entry in his diary: "the most honest and impartial man... his main task was to benefit his students, himself and the world (meaning knowledge and teaching)" [9]. This example was influential and Hegel himself became a teacher in Switzerland, where he was influenced by philosophy, after which he moved to Frankfurt and began to sketch his teachings, starting with religion and philosophy and moving towards the idea of absolute spirit, engaging in literary and academic activities, writing philosophical works and giving lectures.

Hegel's education from childhood consisted of home schooling, Latin school and gymnasium, and his teachers noticed his diligence and ability, which one of his teachers assessed as "felix futurum omen" [9], i.e. a happy sign of the future - Hegel's thinking combined a variety of ideas. Hegel's thinking combined many approaches, which he applied in a complex. The young philosopher's circle of attention included history, philosophy, languages, fiction (prose, drama, poetry). And each book was reconsidered - these were Hegel's own thoughts, for recording which he kept diaries. This is the way of a true thinker - his own thoughts, his own mind to solve the question, just as René Descartes wrote about it. This is the way of the philosopher, the embodiment of his mind and spirit. Even then, the philosopher paid attention to the transposition of ancient texts in Latin, and made a note that the form remains, but the content, the spirit of these texts is lost.

The academic years followed, and the impetus for the movement of thought on spirit and natural morality was given by theology, Hegel received his master's and candidate's degrees. And if in childhood everyone has a huge period to sort out his thoughts, then after the university years this sorting out of thoughts is repeated with the already accumulated baggage of knowledge. And G.W.F. Hegel rushes to the position of a teacher of philosophy, to which a long preparation is necessary, and for the studies for this time, the philosopher in mind and spirit, not a future philosopher, chooses the role of home teacher and governess, these were the years of the way to his goal of realising his world of ideas. The environment in which Hegel found himself by his decision, staying and teaching in the cities of Switzerland, contributed to the realisation of his spirit and mind. At this time he familiarised himself with the philosophy of Kant, Fichte and Schelling, the poetry of Schiller. The thought matured in Hegel's mind, and he began to publish works, opening them with the theme of aesthetic education of man.

In philosophical research required a mentor, and Hegel corresponds with the young Schelling. Through the communication of the two philosophers begins the movement of thought, from inspiration to discussion, leading to the constant improvement of the minds of both and the birth of new knowledge. The thought of unity captivates the philosophers. And it was already a global movement towards the unity of knowledge, its universality. And in philosophy the thinker sees a deep meaning for the development of society in history: about modern philosophy G. Hegel said that it is “the epoch expressed in thoughts” [9]. [9].

For the embodiment of the whole world of Hegel’s spirit and mind, the philosopher needed not only research and time for writing to achieve his goals. Only by acquiring financial opportunity, Hegel approached the fulfilment of his plans. He was sufficiently prepared scientifically, and therefore headed to the “capital of philosophy” of the time - Vienna.

What was maturing in the mind of the thinker, began to be embodied in the outline of his work. And Hegel begins by solving the problem of the essence of religion and its ultimate goal. So one sphere, and more - one thought or phrase can give birth to an idea from which a whole doctrine develops - it is a powerful informational process of creation, which is in nature and which should be studied. “Where religion begins, philosophy must end” [9] - G. Hegel comes to this conclusion in his way of reason and spirit, but he develops this thought and discovers the purpose of philosophy - to carry that “magic” word, knowledge, and this concept of absolute spirit and reason.

What was happening in the world, human society, also brought its changes in the way of embodiment in the life of the spirit and reason of the philosopher. For example, it was political events, which gave birth to a number of articles in response to them.

Hegel continues literary activity, writes philosophical works and publishes with Schelling philosophical journal. And, having accumulated this knowledge, begins academic activity, lectures and the struggle for the “Phenomenology of Spirit” - so it is necessary to defend the life of ideas, their embodiment in it. The criticism of the work was followed by editorial, journalistic and teaching activities, running a gymnasium and teaching a philosophical encyclopaedia. It was in connection with the achievement of the sphere in which the aspirations and genius of the philosopher himself are revealed that G. Hegel wrote that one no longer has to expect and demand anything from fate, since there is an opportunity to fulfil what one can [9].

Researchers note that the most successful and complete account of Hegel’s lectures is made by Hotho, who also described the manner of behaviour, habits and appearance of the philosopher, in which he noticed a calm passionless directness, and as if the very appearance spoke of “revealing the grain of a long happily found truth”, this “reconciliation of life and art, reality and poetry” [9]. [9].

And then - this is the full embodiment of the life of his spirit and mind of a philosopher: G.G. Gehl becomes a professor of philosophy and translates his ideas into works. Later in his researches the thinker touches upon the “world spirit”, politics, state, philosophy of law, philosophy of art, history of philosophy, and continues the way to the philosophy of spirit - the achievement of absolute knowledge through logic, the development of which he is engaged in already as a teacher of philosophical and propaedeutic sciences.

By his own way - the goal of realisation, which the philosopher aspired to, G. Hegel captured in the works. In “Phenomenology of Spirit” [8] is the movement of reason and spirit to absolute knowledge. Through consciousness, self-knowledge “absolute subject” strives for the authentic and true with the help of reason and spirit, the transformation of reason into reality. In fact, the mind itself not only through cognition and self-knowledge, but also through the ability to informational creation has the ability to transform itself, as according to G. Hegel, into reality, and aspire to unification with absolute knowledge. Through the achievement of harmony between the mind and its reality, Hegelian realisation takes place.

This is a brief overview of the life of the spirit and mind of the two men who inspired the unified philosophy of the embodiment of the life of the human spirit and mind as a new stage in the development of philosophical thought. As can be seen, in their life’s journey all the masters are striving for constant improvement, the methods of which they endeavour to pass on to the next generation and beyond for continuous improvement. This is the scientific criticism of G. Hegel to reveal the true philosophy, this is the activity of K.S. Stanislavsky to eradicate prejudices for an objective vision of the system.

So different spheres, philosophy, sciences and arts, draw methods from each other - that is why this philosophy of the embodiment of the life of the human spirit and mind is integrated. And the continuation of the “Dao de Jing” in modernity as the way of dignity can be united with the philosophy of the embodiment of the life of the human spirit and mind being developed - in the human “way of dignity”.

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终极利己主义是社会价值意识宣泄的表现
**ULTIMATE EGOISM AS A MANIFESTATION OF THE
CATHARSIS OF SOCIETY'S VALUE CONSCIOUSNESS**

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*I wanted to express god in my works...
I am a monster, I thought I was going to god,
but in fact I was moving further away from him
(Michelangelo Buonarroti's words in
A. Konchalovsky's film Sin, 2019)*

Analysing the regularities of transformation of value imperatives in the evolution of mankind, as well as in the course of comprehension of the foundations of the evolution of value consciousness [1], we came to the conclusion that there are certain regularities that clearly determine the direction of development of value consciousness of society and the sequence of change of basic values in the historical process. In addition, we identified the logical scheme of actualisation of the levels of human value consciousness [2]. The main resultant conclusion of this work was that it is the self-actualising person who has passed the stage of self-identification and self-realisation, reaching a certain climax in the disclosure and development of his/her own potential, inevitably comes to a conscious creative cognition of himself/herself. This is a peculiar apotheosis of egoism, the separation of a person from the rest of the world for its own sake, the social foundations of which were laid in the period of the emergence of the world's major religions. However, the next level of actualisation of human value consciousness becomes the opposite - self-denial. That is, there is a radical change of worldview: a person comes to understand the unity and mutual dependence of various elements of the universe, the interdependence of events in the spiritual and cultural-historical processes, the universality, which was once written about by Russian cosmist philosophers.

Indeed, egoism implies focusing the attention of a person on himself: his needs, his desires, his worldview, his states. In our time we can state that mankind

has passed a long way of consciousness evolution from gradual separation of man from the surrounding world (nature), awareness of his subjectivity, expressed in ancient myths, through the assertion of subjectivity in religions, creativity and science, to the absolutisation of these boundaries in liberal culture and philosophy of existentialism. In parallel with the separation of the self from the surrounding world, man gradually lost his spiritual connection with it: the pace and scale of the discovery and practical use of the laws of physical reality clearly exceeded and still exceeds the pace and scale of the actualisation of new levels of the transcendental value system. As a result, humanity gradually acquired more and more possibilities, but less and less comprehension and perception of meanings. Ultimately, this was expressed in the realisation of hopelessness, futility of efforts and total loneliness. In its essence, it is the philosophy of existentialism that reflects the beginning of catharsis of the value consciousness of society, which came in its evolutionary development to the ultimate level of egoism, when the surrounding world, as such, ceases to be a carrier of value beyond individual interests. And then the personality faces the experience of the abyss, existential vacuum, about which Victor Frankl wrote [3], because she herself and her existence outside the surrounding world lose all meaning.

The social foundations of this process were laid in the period of change of mythological worldview to religious, rational, philosophical (the period of human awareness of reason and personality, which was described by Karl Jaspers) and were maintained throughout the long period of social evolution - the golden rule of morality defined the essential foundations of Abrahamic religions, ancient philosophy, Confucianism [4]. The New Testament instructs: "Love your neighbour as yourself" (Gospel of Matthew, Matthew 22:37). We find similar duties in the Jewish Pentateuch (Leviticus, Lev. 19:18) and in the Islamic Sunnah: "Do unto all men what you would have men do unto you, and do not do unto others what you would not have men do unto you" [5]. [5]. What do we discover in these religious maxims? Love or some good, the self-conscious personality for whom this good has value, and its neighbourhood. It is the personality that is put in the first place here: "as itself". And this is not accidental: according to, for example, the Christian tradition, a person can only realise God, who has the highest, absolute value, in his inner world. Thus the Venerable Isaac the Syrian asserted: "Do not exchange love for your brother for love for any thing, because by love for your brother you have realised within yourself the One who is more precious than anything else in the world" [6]. [6]. Thus, love for oneself is actually elevated to the degree of reference, ideal. At the same time, it can be imperfect, but through the comprehension and deeds of a person, gradually bringing a person closer to the ideal, active, transforming.

For the last 2 millennia in the history of mankind it is necessary to point out a long stage when religious power total dominated over secular power and determined it. At this stage of evolution, society manifests a desire to control resources (fertile land, fresh water, forest, bioresources, people), to achieve a controlled surplus of these resources, the predictable possibility of their replenishment. This is achieved in the course of struggle for leadership, dominance of some strata of society over others, of some state formations over others. It was quite natural at this stage to strive to suppress man's selfhood, which was achieved by opposing him to the supreme being, separating him from the universe, and pointing to his ignorance, vulnerability and damage. Thus, we know the positions of the German theologian Martin Luther (1483-1546), who argued that egoism should be eradicated because there is nothing in man worthy of pride [7], and the French theologian Jean Calvin (1509-1564), who pointed out the criminal nature of egoism [8].

But it was this separation that gave rise to a natural compensatory process that manifested itself in the Renaissance - humanity once again came to the affirmation of individualism and personal benefit, egoism was recognised as the universal beginning of human activity: "the end justifies the means", declared Niccolo Machiavelli [9, p.18]. And later Benedict Spinoza (1632-1677) already emphasised the search for self-interest as the most reliable basis of human virtue [10]. The theory of egoism was considered in the works of Immanuel Kant (1724-1804), the founder of German classical philosophy and the scientist who laid the foundations of future axiology. In his book "Anthropology from a Pragmatic Point of View" he argues that a person becomes egoistic at the very moment when he starts to speak in the first person and realises his "I", and egoism itself can be logical or aesthetic or practical [11]. One of the most powerful examples of the assertion of egoism as a good that determines the evolution of man as a species is the concept of Superman developed by Friedrich Nietzsche [12].

In modern times, the issues of egoism are considered not so much through the prism of philosophical and anthropological understanding, but in the focus of psychology, sociology and economic relations, including under the influence of Freudianism. Erich Fromm noted: "Disclosure of human potentials according to the laws of his nature should be considered as the goal of human life [13, p.395]. A similar idea can be found in Jean-Paul Sartre: "No universal morality will tell you what to do... man is nothing but his project of himself. Man exists only insofar as he realises himself" [14]. Antonio Meneghetti, the founder of ontopsychology, argued in the same vein: "Life is continuous narcissistic pleasure, triumphant egoism... Happiness is the constant practice of the aesthetic inclination. The aesthetic inclination is the perfect realisation of the preconditions already inscribed in our nature." [15, c.272].

In general, the 20th century can be called the time of rapidly increasing egoism, which reached its apogee, its limit at the beginning of the 21st century. Egoism triumphs today in scientific and everyday thought: the expression of self in art, fashion, public and personal communications, business (customisation), individual behaviour, exponential increase in the number of subcultures, reflecting the atomisation of society... Here is how the famous Kabbalist Michael Lightman describes this state of society: “Today mankind is immersed in animal egoism, which constantly pushes it only to enjoyment, satiation, filling with everything possible: food, sex, family, money, honour, power, fame, knowledge. Everyone wants it all and at once, and to have more than the others” [16]. These are what can be called the expression of ultimate egoism.

It is no coincidence that during the 20th century three humanist manifestos appeared in succession, actually placing Homo Sapiens on special positions in the system of the universe, where human life is declared the highest value, and the goal of society development is formulated as “the realisation of the potential of each human individual - not a selected minority, but the whole of humanity” [17]. [17]. As a result of a long process, the beginning of which was laid in the “axial time”, mankind has come to such a worldview position, in which in fact the existence and development of our biological species is placed above the global (cosmic) evolutionary process, or, at least, is declared its peak. At the same time, as mentioned above, humanity has come to the loss of meanings - existential vacuum.

It is important to ask: at what point does the egoistic individual reach the limit of expressing and following his or her self and discover the meaninglessness of his or her own existence as a world in itself? Reflection leads us to the following answer: it happens naturally - at the moment of full cognition of one’s nature through the self-realisation of the personality. Then this cognition finally loses the properties of meaning: the personality, which in ultimate egoism has cognised and expressed itself fully as the act and concrete content of the creation of being, finally becomes self-identical, i.e. embodies the truth. That is, it is possible either to continue meaningless existence, to lose vitality, or to pass to self-actualisation and meaning-making. And for this a person needs not only to realise himself being in the context, but, first of all, to accept himself as an organic part of this context, as a unit performing the role of a guide of evolution of the whole. That is why Michael Lightman speaks of the need to realise and renounce egoism, and mystic, thinker, nourisher, spiritual figure, composer George Gurdjieff in the first half of the 20th century, ahead of his time, called for egoism as a step towards the realisation of the individual in the context of being: “first of all, you must think of yourself, you must try your best to elevate yourself. You must be selfish. Selfishness is the first step towards altruism, Christianity” [18].

As a result of our reflections we can point out that the highest level of development of human value consciousness is self-denial. Here such values as Life in the broad sense, harmony, service, self-sacrifice are actualised. And the dominant value orientations are eternal life (realisation in being, as an act of realisation of being itself), God, logos (as the supreme law), ecology, cosmos, truth, ideal, beauty, beauty, beauty, integrity, simplicity, feat, joy, happiness. These are precisely the value orientations that Vladimir Sergeyevich Soloviev, Nikolai Fyodorovich Fedorov, Nikolai Onufrievich Lossky, Vladimir Ivanovich Vernadsky, Konstantin Eduardovich Tsiolkovsky, Nikolai Konstantinovich Roerich pointed out to us with special foresight back at the beginning of the 20th century, drawing attention to the transcendental imperatives that lead mankind to oneness.

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医生自我效能水平研究
RESEARCH OF LEVEL OF SELF-EFFICIENCY AT DOCTORS

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概括。在文章中，自我效率的概念考虑了医生活动的特定现象的作用。在对医生样本进行研究的基础上，得出关于性别区分医生在活动 and 对话中形成自我效能水平的结论。

关键词：自我效能、医生、活动、对话、区别水平。

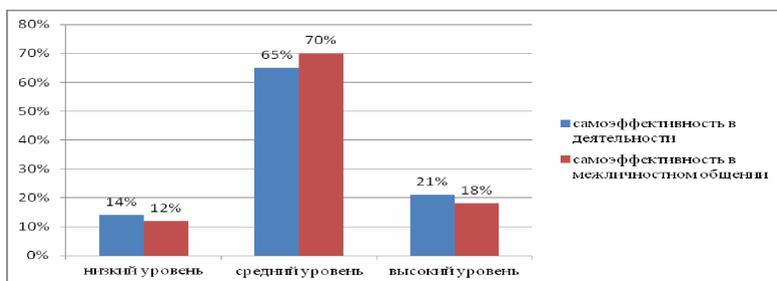
Summary. *In article the concept of self-efficiency, a role of the given phenomenon of activity of doctors is considered. On the basis of the carried out research on sample of doctors, conclusions about formation self-efficiency level in activity and in dialogue at doctors on gender distinction become.*

Keywords: *self-efficiency, the doctor, activity, dialogue, levels of distinctions.*

The subjective relation to carried out activity is realised in обращенности the person to internal reserves, development potentials, possibilities of a choice of means of actions and constructions of certain strategy of activity, behaviour, a life. And this relation is in turn caused by self-efficiency of the person. Modern working conditions show to professionalism of employees a number of necessary requirements among which the main things are ability of subjects of professional work to self-development, to self-actualisation, to personal self-efficiency. In this connection the problem of studying of self-efficiency as necessary condition of effective preparation and competence of the further activity [1, p. 99].

Dynamics of self-efficiency at doctors has nonlinear character: in the beginning of professional formation crisis in development of all components of self-efficiency, as in detail-dejatelnostnogo, and communicative is observed. The doctors possessing an operational experience, including received in the course of practice, have higher level of personal self-efficiency in comparison with the colleagues who do not have such experience [2]. Thus, dynamics of level of self-efficiency as subject of activity directly is connected with perception of own competence, with change of personal features and with vocational training stages.

Research of indicators of self-efficiency of activity of doctors was spent with questionnaire use «self-efficiency Diagnostics» D.Madduxa and M.Sheera. According to a questionnaire self-efficiency indicators in activity and self-efficiency in dialogue have been revealed. Self-efficiency in activity is «representations and confidence of the person that the knowledge, abilities, skills, the experience, developed earlier in a concrete kind of activity, it can apply in similar activity in the future and will achieve thus success. Self-efficiency in dialogue is a combination of representations of the person that it is competent of dialogue, and its confidence that it can be successful communicator, structurally solving communicative problems» [3, p. 77]. Visually percentage distribution of doctors on self-efficiency level in activity and in dialogue is presented in drawing 1.



Drawing 1. Self-efficiency Level in activity and in dialogue at doctors, %

The obtained data allow to ascertain, that at the majority of doctors the average level of an indicator of self-efficiency in activity and self-efficiency in dialogue (at 65 % and 70 % accordingly) is revealed. Doctors with average estimations of self-efficiency in subject activity quite adequately estimate themselves, correctly regarding the possibilities. Doctors with average estimations self-efficiency indicators in interpersonal dialogue adequately build the relations with surrounding people.

High level of self-efficiency in activity has been revealed at 21 % of doctors. Doctors with a self-efficiency appreciation in activity inadequately estimate themselves and the possibilities, overestimate the potential in activity. High level of self-efficiency in interpersonal dialogue has been revealed at 18 % of doctors. Doctors with high indicators of self-efficiency in interpersonal dialogue overestimate the possibilities in productive construction of relations with other people, show the self-confident relation to associates.

Low level of self-efficiency in activity has been revealed at 14 % of doctors. Doctors with low estimations of self-efficiency in activity underestimate own potential in the given area, do not feel confidence of activity carried out by them,

doubt the skills and knowledge. Low level of self-efficiency in interpersonal dialogue has been revealed at 12 % of doctors. Doctors with low indicators of self-efficiency in interpersonal dialogue are not assured of themselves at dialogue with associates, doubt the abilities in the course of an establishment of contacts.

For the analysis of indicators on self-efficiency scales indicators of descriptive statistics have been counted up: an average, standard deviation, a minimum and a maximum on all sample of doctors (n=300). Results are presented in table 1.

Table 1
Indicators of descriptive statistics on scales of a technique of diagnostics of self-efficiency on all sample (n=300)

Scale	Minimum	Maximum	Average	Standard deviation
Self-efficiency in activity	2	57	23,7	14,9
Self-efficiency in interpersonal dialogue	4	20	11	4,1

According to authors of the adapted variant of the test, average indexes of level of self-efficiency in subject activity are located in the range from 7 to +53, and in sphere of interpersonal dialogue are in an interval from +7 to +15. Thus, indicators which lay behind the specified standard limits, can testify or to the overestimated estimation of own potential in studied sphere of ability to live, or - about underestimated.

The obtained data allow to define, that on separate components of self-efficiency following features are revealed: in structure of self-efficiency at doctors above indicators on a self-efficiency scale in interpersonal dialogue. This component of self-efficiency describes a combination of representations of the person that it is competent of dialogue, and its confidence that it can be successful communicator, structurally solving communicative problems.

The estimation of self-efficiency of activity of the doctor is considered as a condition of unmistakably put diagnosis and a choice of the scheme of treatment. If the doctor is assured that it is capable to carry out a problem on rendering assistance to the patient, last also starts to trust in happy end. How the person subjectively represents the reasons of the successes and failures is meant style of an explanation of a situation. It defines pessimism or optimism level on what ability to represent itself as the subject in a certain situation depends. As an example of adequate style of an explanation of a situation the decision of the attending physician on necessity of joint discussion of a case can serve. The subject approach allows to consider the medical worker as the subject of professional work, the subject of the environment of medical institution who realises itself as a source of activity and independently joins in labour activity.

Self-efficiency in activity includes the following components providing success in a trade:

- cognitivour (knowledge, abilities, skills, and also experience of the practical activities got by them, which experts can successfully apply in professional work);
- Motivatsionno-valuable (values, interest to a speciality, motivation of professional work);
- Reguljativno-behavioural (presence of the purposes, aspiration to success, the efforts spent for perfection of in a trade, self-management and self-checking).

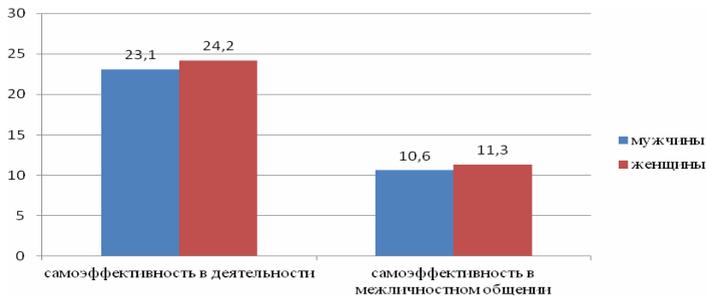
Self-efficiency in dialogue of the doctor represents «a self-estimation of communicative readiness for interaction. It testifies that it possesses potential and experience which allows it to be competent of dialogue, in a combination with confidence, that he will manage effectively to realise them in situations of interaction with other people, having applied adequately to these situations means of dialogue available for it.

Self-efficiency is considered as a determinant of individual behaviour with which help it is possible to predict its success.

According to D.Madduksa persons with low self-efficiency, most likely, have low motivation, avoid challenges and have the limited representations how to solve arising difficulties. It was revealed, that high self-efficiency of the doctor is connected with high cognitive efforts and successful training by means of various means as which they consider difficult, and with smaller efforts and less effective which they estimate as lungs. Qualitative study is connected with strong self-efficiency in a combination to a choice more challenges [4, p. 14].

Comparing the given approach with A.Bandury's concept, it is necessary to notice, that in the theory social nauchenie the choice of behaviour and persistence of efforts is caused more likely perceptami self-efficiency, rather than by stimulus conditions. Self-efficiency arises from the various sources of the information directly influencing behaviour, and also mediated through kognitive sources. Insufficient level of feeling of own efficiency for achievement of demanded behaviour can promote decrease in activity of the subject. The subject assured of the abilities, also can lower activity. These two independent sources of expectation of feebleness have absolutely different reasons.

On technique indicators «self-efficiency Diagnostics» D.Madduksa and M.Sheera is revealed level of expressiveness of each component of self-efficiency at men and women, their comparative characteristic is spent. Visually percentage distribution of men and women on self-efficiency indicators is presented in drawing 2.



Drawing 2. Indicators of self-efficacy at men and women (mean scores)

On the basis of the presented data it is visible, that on various indicators of self-efficacy mean scores in group of men and women are located approximately at one level, the expressed distinctions is not observed. On separate indicators of self-efficacy data correspond to standard average or high indicators as a whole on group of men and women. It specifies that at the majority of respondents a self-efficacy average index.

T-criterion Stjudenta was applied to revealing of sexual distinctions in characteristics of self-efficacy of doctors for independent выборок. Data are presented in table 3.

Table 3
Distinctions in indicators of self-efficacy at men and women according to D.Madduxsa and M.Shera's technique

Scale	Men (mean score)	Women (mean score)	t	p
Self-efficacy in activity	23,1	24,2	-0,617	0,538
Self-efficacy in interpersonal dialogue	10,6	11,3	-1,430	0,154

As a result of statistical processing it was not possible to reveal significant distinctions between men and women on self-efficacy indicators. On an indicator of subject self-efficacy factor $t = -0,617$ at $p = 0,538$, on an indicator of interpersonal self-efficacy factor $t = -1,430$ at $p = 0,154$. Thus, both for men, and for women of doctors self-efficacy average indexes are characteristic basically. Both among men, and among women to the same extent there are persons low and high indicators of self-efficacy.

The obtained data will be co-ordinated with results of other researches. In particular, E.A.Badagova has established, that perceived self-efficacy represents the important component of mental health and well-being of doctors [5, p. 25].

Communication is based on that fact, that they regulate alarm and motivations, activity, efforts and persistence promote. On this basis it is possible to reveal ways of interaction of factors and to predict perceived self-efficiency, paying special attention to positive support.

In J.S. Filatovoj's research with co-authors it has been established, that at doctors the low indicator of self-efficiency is connected with low indicators of efficiency of professional work [6, p. 205]. It is expressed as follows:

1. The requirement for planning at them is developed poorly, plans are subject to frequent change, the object in view seldom happens is reached, planning is not effective, littlerealistic.

2. Such experts prefer not to reflect on the future, the purposes put forward situationally and usually dependently. Hence, weak formations modelling processes leads to an inadequate estimation of significant internal conditions and external circumstances that is shown in imagination which can be accompanied by sharp differences of the relation to situation development, to consequences of the actions.

3. Doctors often have difficulties in definition of the purpose and the program of the actions adequate to a current situation, they not always notice situation change, that also often leads to failures. Low indicators of self-organising of behaviour testify to a low level of development of programming that speaks about inability and unwillingness of the subject to think over sequence of the actions.

4. Doctors with low self-efficiency prefer to operate impulsively, they cannot independently generate the program of actions, often face inadequacy of the received results to the purposes of activity and thus do not bring changes in the program of actions, operating by trial and error. The expert does not notice the errors, is noncritical to the actions. Subjective criteria of success are insufficiently steady, that conducts to sharp deterioration of results at increase in volume of work, deterioration of a condition or occurrence of external difficulties.

5. Doctors with low indicators of self-organising of behaviour in dynamical, quickly varying conditions feel uncertainly, hardly get used to changes in a life, conditions and way of life change. In such conditions несмотря even on formations regulation processes, they are not capable to react adequately to a situation, quickly and in due time to plan activity and behaviour, to develop the program of actions, to allocate significant conditions, to estimate a mismatch of the received results for the purpose of activity and to bring corrections. As a result they inevitably have регуляторные failures and, as consequence, failures in activity performance.

6. Plans and programs of actions are developed dependently, doctors with low self-efficiency often and noncritically follow another's councils. It is essential, that at development of the high realised level of self-organising there is to a cer-

tain extent a levelling of influence of character and temperament on an individual profile of activity [5].

Higher indicator of self-efficiency is connected with high indicators of efficiency of professional work. It is expressed as follows:

1. At the doctor the requirement for the realised planning of activity is generated, plans in this case are realistic, detailed, иерархичны, are effective and steady, the activity purposes are put forward independently. Doctors with high self-efficiency are capable to allocate significant conditions of achievement of the purposes both in a current situation, and in the perspective future that is shown in adequacy of programs of actions to activity plans, conformity of received results to the accepted purposes.

2. In the conditions of unexpectedly varying circumstances, at change of an image of activity, transition to other system of work doctors with high self-efficiency are capable to change flexibly model of significant conditions and, accordingly, the program of actions. High indicators of self-efficiency speak about the requirement generated at the person to think over ways of the actions and behaviour for achievement of the planned purposes, detalizations and developed programs. Programs are developed independently, they flexibly change in new circumstances and are steady in a situation of hindrances.

3. At discrepancy of the received results to the purposes correction of the program of actions before reception of success comprehensible to the subject is made. High indicators of level of self-organising testify to development and adequacy of a self-estimation, formations and stability of subjective criteria of an estimation of success of achievement of results.

4. The subject adequately estimates as the fact of a mismatch of the received results for the purpose of activity, and the reasons which have led to it, flexibly adapting to change of conditions. Doctors with high indicators of self-efficiency show plasticity of all регуляторных processes. At occurrence of unforeseen circumstances such examinees easily reconstruct plans and programs of performing actions and behaviour, are capable to estimate quickly change of significant conditions and to reconstruct the program of actions.

5. At occurrence of a mismatch of the received results with the accepted purpose in due time estimate the fact of a mismatch, bring correction in regulation. Flexibility of regulation allows to react adequately to fast change of events and successfully to solve a task in view in a risk situation. Presence of high indicators of self-efficiency testifies to high level of independence that speaks about autonomy in the organisation of activity of the person, its abilities independently to plan activity and behaviour, to organise work on achievement of the put forward purpose, to supervise a course of its performance, to analyze and estimate both intermediate, and end results of activity [5].

On the basis of the spent analysis of data it is possible to conclude, that ability of doctors to consult with difficult and not ordinary situations, to affect success of activity and ability to live of the person as a whole it is caused by self-efficiency. The individual realising own efficiency is capable to apply much more efforts on overcoming of barriers, the decision of problems and problems, than the individual who constantly doubts the potentials.

Trust lack to the behavioural actions and abilities are expressed in low own efficiency. High self-efficiency influences the doctor in such a manner that periodically arising problems or barriers, are perceived by it not as the way end, and as the original call giving to possibility to check up the abilities, to confirm them and to realise. The given estimation of a situation leads to mobilisation of all internal resources of the person.

Self-efficiency is the major cogitative scheme which influences behaviour of subjects and its results through cognitive, motivational, selective, affective, physiological processes. However it is necessary to understand, that own efficiency does not concern abilities to carry out the main impellent functions. To such functions carry walking, etc. Therefore it is necessary to understand, that any actions of the developed strategy or the developed plan should lay in borders of physical potential of the subject.

High self-efficiency is capable to change thinking of doctors and promotes increase in the judgements, self-approving character. Also it promotes occurrence of stability of motivation to any activity and causes force of such motivation. Such to a thicket it is more expressed in cases when before the subject there are barriers on a way to strategy realisation. In affective area high own efficiency promotes reduction of level of uneasiness, display of negative emotions which arise at failures.

The main source of growth of self-efficiency is the gone through experience of success. To make all necessary actions, to make possible and impossible, and to receive desirable result - means to feel itself successful and more confident. Only in processes of the vigorous activity which is directed on achievement of result and the permission of the problems dictated by a situation, arise and acquire stability of belief.

By means of development kognitive abilities of construction of the behaviour, experience acquisition development of self-efficiency of the individual is provided. High efficiency in connection with success expectation always leads to positive outcomes and, hence, to increase of own efficiency.

Thus, self-efficiency is kognitive konstrukt, expressed in belief of the doctor in the ability to operate successfully in concrete conditions at the decision is subjective challenges with display of persistence on their achievement, despite arising difficulties the category of self-efficiency of activity of the doctor and possibility of its actual use in modern conditions remains the least investigated theme. Self-

efficiency of activity of doctors is the structured and dynamic formation. It undergoes changes in training process. Self-efficiency of activity of doctors has various structural components (activity and a communicative component). At present foreign and domestic experts have spent set of researches on self-efficiency studying as success factor in various kinds of professional work. However the fragmentariness and isolation of researches explains presence so-called «white stains» in the scientific analysis of structure, the maintenance, functions, determination of self-efficiency of doctors, its dynamics. Despite considerable number of publications on self-efficiency studying, there is not enough an interrelation of self-efficiency investigated a problem with emotional intelligence and professional identity of doctors. Hence, at present there is a problem in the further qualitative working out of proceedings in this area.

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阿卜迪卡德尔·奥罗兹别科夫是吉尔吉斯人民的国家领导人
**ABDIKADYR OROZBEKOV IS A STATE MAN OF THE KYRGYZ
PEOPLE**

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注解。对吉尔吉斯斯坦杰出人物的研究和恢复历史正义是我们这个时代最紧迫的任务之一，他们是我们共和国作为一个主权国家形成的起源，并得到了国际社会的承认。他们忠诚地为人民和祖国服务，为祖国的发展壮大不遗余力。他们和成千上万的诚实人、真正的祖国爱国者一样，成为诽谤公司的受害者，无法逃脱1930年代的恐怖和镇压。他们的生活和活动仍然是我们州历史上的白点。

关键词：杰出人物、祖国、镇压、共和国。

Annotation. *The study and restoration of historical justice in relation to prominent figures of Kyrgyzstan, who stood at the origins of the formation of our republic as a sovereign state with its recognition by the world community, is one of the most urgent tasks of our time. Faithfully serving their people and fatherland, they spared no effort for the development and development of our country. They, like thousands of honest people, true patriots of their fatherland, fell victim to a slanderous company, could not escape the terror and repressions of the 1930s. Their life and activities are still white spots in the history of our state.*

Keywords: *Eminent figures, fatherland, repression, republics.*

One of these people with a tragic fate is the first head of state of Kyrgyzstan, Abydykadyr Orozbekov. He went a long and thorny path from an ordinary member of the primary organizations of the unions to the largest Soviet worker-chairman of the Central Committee of the Executive Committee of the Kyrgyz ASSR. From his autobiographical memoirs it is clear that he was born in a poor family and from childhood he experienced all the hardships of slave labor for the manaps. It was a hopeless life of thousands of people like him, and until the end of his days he retained hatred for any form of exploitation of man by man.

The February Revolution of 1917 radically changed the public consciousness of the peoples of Central Asia. In February 1917, the “Union of Craftsmen, Work-

ers and Employees” was organized, A. Orozbekov¹ was elected to the presidium from the bakers.

He actively joined the struggle for the interests of ordinary people, consistently defending their rights and basic demands - wage increases, an 8-hour working day, etc. From that time Orozbekov’s social and political activities began.

During the October Socialist Revolution of 1917, he was elected a deputy from the soldier-peasant representatives of the Fergana region and became a member of the presidium of the Margilan City Executive Committee. He heads the committee for the liquidation of the Basmachi movement and actively fights for Soviet power.

Modern historians and researchers have begun to present events after the October period one-sidedly, showing them only in a critical way. This point of view does not fully take into account the complex socio-political system of the Kyrgyz, the difficult economic and social conditions in which our people lived. Taking into account the limited illiteracy, hunger, diseases, due to which there was a high mortality among the population, tribal strife, as well as the thirst for freedom, it becomes obvious the desire of the advanced people of that time to wrest the country from gradual degeneration and extinction. From time immemorial, from generation to generation, such concepts as unity, freedom, peace had the same meaning for our ancestors as the grandiose epic “Manas” passed by word of mouth.

In 1918, A. Orozbekov was accepted into the ranks of the All-Union Communist Party of Bolsheviks for his active participation in the fight against counter-revolutionary rebellions and the Shura-Islam party.

In 1920, he was elected a chairman of the Chelynsky district military commissariat, and then the district executive committee.

From 1923 until December, he was sent to eliminate the Basmachi gangs in the Fergana region.

Since 1923, the chairman of the Markhamat district military commissar, and then at the regional and party conference, was elected a member of the bureau of the regional executive committee.

Each position and responsibilities have its own rules and its own system. And the first Kyrgyz head of state went through all these steps to the fullest extent, he was formed as a talented organizer and a skilled leader.

In 1926, at the congress of the council of the Kyrgyz Autonomous Region, he was elected chairman of the regional executive committee, was represented as a delegate at the All-Union Congress of Soviets, and was elected a member of the All-Russian Central Executive Committee.²

As chairman of the Osh executive committee, he worked tirelessly to raise the economy of the region, personally visiting districts, villages, meeting with people, asserting Soviet power in the field.

¹ Elistrova.A. “About the first Kyrgyz president himself // Soviet Kyrgyzstan № 280 (19481) 612 1989

² Isakov.I. Abdykadyr Orozbekov. History and personality. B 1995.p.24

In 1927, during the formation of the Kyrgyz Autonomous ASSR from the Kyrgyz Autonomous Region, at the Congress of Soviet Republics, he was elected its chairman. He was nominated for this position twice. Being in this position for 10 years, A. Orozbekov made an invaluable contribution to the formation of the Kyrgyz statehood and solving the main problems.

The main ones are:

- Land and water reform;
- Elimination of Basmachi bands in the Ferghana Valley;
- Expropriation of private property of the manaps;
- Introduction of the settled policy;
- Raising the economic and social status of the poor;
- Elimination of illiteracy of the population;
- Writing writing;
- Achievement and acquisition by the Kyrgyz of a strong independent state.

A. Orozbekov did not go to school, but due to constant self-education, he managed to become an educated person of his time. According to eyewitnesses, he was fluent in Uzbek, Tajik languages, independently mastered the Russian language, graduated from the Tashkent Higher Party and Soviet School.³

Despite the fact that he did not graduate from universities, he was an outstanding personality: coming from the very bottom of the poor strata, he thoroughly understood their problems. Hardened in hard work, he was well-versed in agriculture, cattle breeding - he was a strong handyman and a far-sighted politician.

He made a huge contribution to the education of the Kyrgyz people.

In 1928, when they switched to the Latin alphabet, he opened 21 classes in the villages of Uch-Korgon, Tajik-Kyshtak, Kara-Dube of the Osh region, and taught 16 teachers in 12 schools. He contributed to the construction of new schools, where teaching was conducted in the Kyrgyz language.⁴

As an internationalist leader, he promoted in every possible way the strengthening of friendly ties between the fraternal peoples, respecting the original culture of each nation.

In the 30s, when A. Orozbekov was at the head of Kyrgyzstan, 50 enterprises were set up during his 1st five-year plan. And in 1932, about 1500 worked, of which 106 were large. If the number of the working class in Kyrgyzstan in 1924 was 1.6 thousand people, then in 1937 there were 25.9 thousand households, 300 settlements were built. In 1937, there were 1700 collective farms in Kyrgyzstan, which owned 97% of arable land.

In 1937 there were 10 maternity hospitals and 123 feldsher points in the republic. 60% of employees had secondary and higher education. There were news-

³ Elistrova.L. The first Kyrgyz president himself. Soviet Kyrgyzstan 6.12.89.

⁴ Isakov.I. A. Orozbekov B 1995. p.30

papers and magazines, textbooks in their native language. All these facts, the improvement of life, also testifies to the merits of the first president, A. Orozbekov. The success of building a new life in Kyrgyzstan is the tireless work of ordinary workers and thousands of advanced people of Kyrgyzstan, declared enemies of the people, including A. Orozbekov.

In 1937, he was arrested on charges of plotting against the Soviet government and declared an enemy of the people. As a result of the heinous slander, having ended up in prison, he did not lose his self-esteem, he tried to prove his innocence. From 1937 to 1938 Orozbekov was kept in cells for 10 people, where 50-60 people were kept. Many could not stand the inhuman conditions, torture and bullying of the NKVD investigators.

In the notes of Orozmamatov, Dadabaev, who was in the same cell with A. Orozbekov, you can find out that he was called for interrogation only at night. They beat him with special cruelty, put him on a chair upholstered with nails, and tortured him with electric current. Interrogations were conducted until the morning, the investigators succeeded each other. Orozbekov was not allowed to sit down, they demanded to sign papers. His iron health gradually deteriorated as a result of systematic torture. His whole body was one massive bruise, but he stubbornly denied all accusations. A. Orozbekov did not change his views and beliefs until the end of his days. Nothing could break this strong man, his great will and devotion to his people.

In the 1950s, the first head of state of the Kyrgyz people was posthumously rehabilitated. The great son of his people received the title of “people’s aksakal” and forever remained in the memory and hearts of grateful descendants.

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世纪之交吉尔吉斯斯坦和俄罗斯的战略伙伴关系

**STRATEGIC PARTNERSHIP OF KYRGYZSTAN AND RUSSIA AT
THE TURN OF THE CENTURIES**

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注解。对吉尔吉斯共和国来说,由于两国人民历史文化的共性、传统友好关系、安全、政治领域的共同利益,发展和深化与俄罗斯联邦全面、多方面的合作尤为重要。、经济、军事技术、科学、文化和人道主义领域。

关键词:安全、国家、伙伴关系、影响力、利益。

Annotation. For the Kyrgyz Republic, the development and deepening of comprehensive multifaceted cooperation with the Russian Federation is of particular importance due to the historical and cultural commonality of the peoples of the two countries, traditional ties of friendship, common interests in the field of security, political, economic, military-technical, scientific, cultural and humanitarian fields.

Keywords: Security, states, partnership, influence, interests.

The most important component of the formation of Kyrgyzstan and any other independent state is the establishment and development of ties with the outside world. In recent years, the region in which we are located has become an object of close attention both from the side of the nearest metropolis (Russia), and from virtually all other centers of the modern world: the United States and the West as a whole, China, and the leading states of the Near and Middle East, Eastern Asia. They are drawn here by considerations of the most varied order - from economic to geopolitical: obtaining economic dividends, control over resources, prevailing political influence.

Kyrgyzstan, like other countries in our region, is vitally interested in the closest cooperation and comprehensive integration with Russia in the long term.

Over the past years, the fundamental foundations of Kyrgyz-Russian relations in all areas of interaction have been created. An extensive contractual base of bilateral relations has been created, which forms the legal basis for interaction between Kyrgyzstan and Russia. On July 21, the Treaty on the Basics of Interstate

Relations between the Kyrgyz Republic and the Russian Federation was signed, on March 20, the Protocol on the Establishment of Diplomatic Relations between the Kyrgyz Republic and the Russian Federation, on June 10, 1992, the Treaty of Friendship, Cooperation and Mutual Assistance between the Kyrgyz Republic and the Russian Federation Federation [1].

Diplomatic relations between the countries quickly acquired a full-scale character: embassies were opened, the heads of state were presented with credentials of the first ambassadors of sovereign republics. In Kyrgyzstan it was the Ambassador Extraordinary and Plenipotentiary of the Russian Federation M.A. Romanov, and the Ambassador Extraordinary and Plenipotentiary of the Russian Federation A. Nanaev became the envoy of Kyrgyzstan in Russia.

The activity, dynamism of the work of the diplomatic departments of the two countries, despite the difficulties of the first years, created favorable contractual, legal, organizational and psychological conditions for the development of bilateral Kyrgyz-Russian relations.

The diverse historical ties between the two countries are developing in the spirit of the fundamental provisions of the Declaration of Eternal Friendship, Alliance and Partnership of July 27, 2000.

Close cooperation in the field of foreign policy and coordination of practical steps in the areas of global and regional diplomacy, collective security, defense and border protection, migration policy, illegal arms and drug trafficking are of great importance for the Kyrgyz Republic. The coincidence of the positions of both countries on the issues of strengthening the CIS, improving interaction within the framework of the Collective Security Treaty Organization, the Eurasian Economic Community and the Shanghai Cooperation Organization is noted.

Constant contacts are maintained at the highest level, through the parliaments, governments, ministries and departments of the two countries. The first visit of the President of the Russian Federation B. Yeltsin to the Kyrgyz Republic took place on July 20, 1991. The main outcome of the visit was the signing of the Treaty on the Foundations of Interstate Relations.

On March 26, 1996, the first official visit of the President of the Kyrgyz Republic to the Russian Federation in the history of Kyrgyz-Russian relations took place, which summed up the first results of mutually beneficial cooperation between the two countries [2]. As a result of the visit, the Declaration on the expansion and deepening of the Kyrgyz-Russian cooperation was signed. Agreement on issues of jurisdiction in cases related to the presence of military units of the Russian Federation on the territory of Kyrgyzstan, Agreement on the procedure and conditions for the distribution of Russian television and radio broadcasting organizations on the territory of the Kyrgyz Republic, etc.

An important event of the Kyrgyz-Russian relations was the official visit of the President of the Kyrgyz Republic to Moscow on July 26-29, 2000. This visit gave a new impetus to the development of multifaceted bilateral cooperation. The heads of the two countries held extensive talks on topical international issues and issues of bilateral cooperation. They expressed their desire to continue to build bilateral relations on the basis of constructive partnership, to work towards making bilateral cooperation in various fields more qualitative and meaningful in the 21st century. As a result of the visit, the Declaration of Eternal Friendship, Alliance and Partnership, the Joint Statement of the Government of the Kyrgyz Republic and the Government of the Russian Federation, the Treaty on Economic Cooperation for 2000-2009 were signed.

Implementation of the Economic Cooperation Agreement for 2000 - 2009 created wide mutually beneficial opportunities for increasing trade, developing industrial cooperation and other forms of integration cooperation in priority sectors.

Trade and economic relations with Russia are one of the most important priorities of foreign economic activity and meet the vital interests of Kyrgyzstan, since all communications and infrastructure of the republic are oriented towards Russia and neighboring states.

The trade regime between the two countries is determined by the intergovernmental agreement on the free trade regime of October 8, 1992. Agreements on trade and economic cooperation are signed annually, which determine priority supplies of the most important types of products (energy resources, timber, non-ferrous metals, antimony, tobacco, textiles, etc.), as well as interconnected supplies of the most important types of products on an equivalent basis, the possible restoration of the existing specialization of production and processing of agricultural raw materials.

Direct partnerships between Kyrgyzstan and Russian regions are developing. With some of them, for example, Tatarstan, Chuvashia, Sverdlovsk region, agreements on trade, economic, scientific, technical and cultural cooperation have been signed. Another form of cooperation is the establishment of direct links at the level of the regions of Kyrgyzstan and Russia. For example, in June 1993, an agreement was signed to promote economic cooperation and the development of cultural ties between the Chui region of the Kyrgyz Republic and the Moscow region of the Russian Federation.

A genuine rapprochement of states and peoples is unthinkable without openness and communication in the spiritual sphere, in the field of culture. This is the most subtle sphere where the world of human passions, quests, emotions takes on living flesh and blood. Recently, more and more attention has been paid to the human dimension of politics. It's the right way. Without such an approach, peoples, states, specific people will not learn to understand each other.

Kyrgyz-Russian cultural and humanitarian ties are developing quite successfully. The Days of Culture of Kyrgyzstan in Russia and the Days of Culture of Russia in Kyrgyzstan are held. Russian pop stars and theater troupes are actively touring in our country.

Bilateral cooperation in the field of education is fruitfully developing. An important step in this area was the opening in September 1993 of the Kyrgyz-Russian (Slavonic) University. The uniqueness of this university is well known. Its discovery meant a precedent not only in the CIS, but also in world practice. At present, the Slavonic University is a major educational, scientific, cultural center of the republic, which contributes to the rapprochement of peoples [3].

A special area of contact of mutual interests is the cooperation of Kyrgyzstan with Russia within the framework of the Shanghai Cooperation Organization. The holding of the next summit of the SCO member countries in Bishkek on August 24-25, 1999 was a notable event in the foreign policy of the Kyrgyz Republic.

The visit of Russian President B. Yeltsin to Kyrgyzstan to participate in the summit was evidence of Russia's interest in developing and deepening the multilateral dialogue. With the active support of Russia in November 1999, during a meeting of the heads of law enforcement agencies and special services of the Shanghai Cooperation Organization, a decision was made to create the "Bishkek Group".

Joint efforts in the fight against international terrorism have become positive aspects of the Kyrgyz-Russian cooperation. The common threat looming over our region in connection with the growing cross-border armed interference in the internal affairs of the states of Central Asia and Russia by the extremist forces of Islamic fundamentalism objectively stimulates the further rapprochement of our countries in the field of defense and state security. Evidence of this is the formation in the region within the framework of the CSTO of the Collective Rapid Deployment Force, a branch of the CIS Antiterrorist Center, as well as the SCO Antiterrorist Center with headquarters in Bishkek. The decision to create the Collective Rapid Deployment Forces of the Central Asian Collective Security Region was made at the session of the CSC of the heads of state, held on October 11, 2000 in Bishkek, in which Russian President V. Putin took part. In October 2003, with the participation of the President of the Russian Federation, the official opening of the Russian air base in Kant (Kyrgyzstan) took place, which was another confirmation of the strategic course towards rapprochement between our countries [4].

Kyrgyz-Russian multifaceted interaction takes place in almost all areas of bilateral cooperation, which includes: political and diplomatic ties, trade and economic relations, security issues, military-technical ties and cultural and humanitarian relations, including maintaining a single information space. The year 2002 was a truly "breakthrough" year in strengthening and developing relations between our

countries and a record year in terms of the number of meetings between the heads of our states. Contacts at the intergovernmental level have especially intensified. The visit to Moscow of the Prime Minister of the Kyrgyz Republic N. Tanaev and the head of the Foreign Ministry A. Aitmatov, the work of the intergovernmental commission on trade and economic cooperation, the growing ties with the Russian regions, the intensification of contacts within the SCO, the CSTO, the EurAsEC - all this testifies to the transition of relations between Kyrgyzstan and Russia to a qualitatively new level. The visit of Russian President V. Putin to the Kyrgyz Republic in December 2002 was another confirmation of Russia's interest in a strategic partnership with Kyrgyzstan [5].

Kyrgyz-Russian relations are developing on a harmonious basis. As partner states, we have the same approaches on the vast majority of issues of bilateral and multilateral cooperation. At the same time, there are a number of problems that are being solved without proper dynamism, with bureaucratic delays, which damage the interests of both countries. It is important to supplement relations at the state level with regional cooperation and connections at other levels.

Currently, special attention is being paid to working out a clear mechanism for the implementation of dozens of previously signed treaties and agreements. A thorough revision of each of them is carried out for the possibility of operational implementation and compliance with the changed situation. Such work will give a new impetus to cooperation and eliminate the causes of negative trends.

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全球化背景下的美食文化发展：问题、挑战、解决方案
**GASTRONOMIC CULTURE DEVELOPMENT IN TERMS OF
GLOBALIZATION: PROBLEMS, CHALLENGES, SOLUTIONS**

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抽象的。 本文讨论了全球化背景下美食文化发展的特殊性。 民族美食文化发展过程的积极和消极方面都有其特点。 强调保存和推广民族美食文化对于形成文化认同、保存和传播文化记忆、形成国家国内外形象的重要作用。 提出了克服与全球化进程相关的威胁和挑战以保护民族美食文化的方法。

关键词：美食文化、全球化、民族美食、烹饪主权、烹饪实践的转变。

***Abstract.** The article deals with the peculiarities of the gastronomic culture development in terms of globalization. The positive and negative aspects of the processes of national gastronomic culture development are characterized. The important role of preserving and popularizing the national gastronomic culture for formation the cultural identity, preservation and transmission the cultural memory, formation the domestic and international image of the country is emphasized. The ways of overcoming the threats and challenges associated with the processes of globalization in order to preserve national gastronomic cultures are presented.*

***Keywords:** gastronomic culture, globalization, national cuisine, culinary sovereignty, transformations of gastronomic practices.*

Introduction.

At the present stage of the world civilization development society is undergoing socio-economic, socio-political, socio-cultural transformations caused by the processes of globalization, changes in all spheres of human life. In the context of the cultural space globalization, it becomes relevant to study the transformation processes in culture, including the gastronomic culture.

Contemporary culinary art characterizes not only high, but also everyday cuisine. Cooking goes beyond the private, routine, chamber, everyday life and is becoming more and more public: numerous videos, master classes, culinary blogs, author's channels of professionals and gastronomy amateurs have filled the Inter-

net space; various culinary shows are broadcast on television; exhibitions, festivals, culinary competitions are held; gastronomic tourism has become widespread; collaborations of restaurateurs and creative industries are actively developing, etc .

In the era of globalization, norms, rules, traditions and customs of cooking and eating, taste preferences, the ratio of universal and unique in national gastronomic cultures, trends in gastronomic fashion, mechanisms of dissemination, actualization, translation and manifestation of elements of gastronomic cultures of different peoples are being transformed, which requires cultural understanding.

In the context of the analysis of gastronomic culture transformations in terms of globalization, the works devoted to the analysis of gastronomic traditions in the culture of the peoples of Asia and Africa are significant for studying [8; 9; 5; 7].

There are few dissertation studies carried out from the culturalogical standpoint. Thus, the phenomenon of gastronomic culture in the culturological aspect is considered in the candidate dissertation of M.V. Kapkan [3], the concept of “food” in the context of the dialogue of cultures – in the work of N.S. Marushkina [4], the formation of a new alimentary space in the post–Soviet era – in the dissertation of V.V. Palatkin [6], the issues of gastronomic tourism – in the work of V. G. Den [1]. Despite a significant number of studies in the field of nutrition, the issues of the gastronomic culture development and functioning, undergoing transformation in terms of globalization require scientific understanding, which determines the topic relevance.

Main part.

The research purpose consists of revealing the features of the gastronomic culture development in globalization terms, characterizing its current problems and possible solutions.

Following M. Kapkan, gastronomic culture is understood as “a culturally specific system of norms, principles and patterns embodied in (a) methods of cooking, (b) a set of products accepted in a given culture and their combinations, (c) the practice of food consumption, as well as (d) reflection on the processes of cooking and eating” [3, p.9].

Gastronomic culture performs a number of functions: regulatory, the function of marking the social and cultural status of an individual, communicative, translational, cultural and aesthetic, identification and integration functions. At the same time, the leading ones are the regulatory function and the function of marking social and cultural status. The development of gastronomic culture is influenced by natural-geographical, socio-economic, technological, cultural factors.

Globalization has caused intensive processes of interaction between cultures, mutual influence of global and local, as a result of which the categories of “universal” and “unique” in cultures undergoing significant transformations [2, p.310].

Each national group within, as a rule, one country has its own gastronomic code, which determines the methods, place, time of eating, etc. Each gastronomic culture of everyday life is characterized by certain products and their combinations, meal consumptions traditions. For example, blini (Russian pancakes), salted herring, pelmeni (Russian dumplings), pirozhki (mini-pies) in Russia; tea with milk in England; croissants in France; rice, Peking duck in China, etc.

However, in terms of globalization, the ambivalence of the processes of the national gastronomic culture development is obvious: on the one hand, traditional dishes and tastes characteristic of the national cuisine are preserved and reproduced, and on the other hand, new dishes, tastes, and their combinations arise, which is associated with gastronomic borrowings, the development of culinary technologies, the influence of fashion trends spread by marketing and advertising means. Globalization is also making cooking global today, which is facilitated by lifestyle changes, mass population migrations, mass media, and social networks.

An urgent problem of the gastronomic culture development in terms of globalization is fast food. The processes of Americanization and Westernization of the food sphere associated with the spread of fast food pose a certain threat to the traditional national cuisine. The loss of gastronomic authenticity leads to a rapid loss of national identity.

Today, it is impossible to imagine the restaurant business in the post-Soviet space, in Western countries without sushi and rolls. Restaurateurs everywhere hold Chinese tea ceremonies, which allows you to learn more about the culture of China, but at the same time levels, reduces the value component of such borrowings, because for the Chinese, for example, the tea ceremony is not just an element of gastronomic culture, but age-old traditions, art and philosophy. Representatives of other cultures largely simplify the meaning of these traditions, turning unique elements of Oriental culture into a profitable business.

The gastronomic culture of a globalizing society is undergoing a number of transformations, such as: destructions related to the status of food, caused not by the real need for food, but by the desire of the person to demonstrate its symbolic potential; devaluation of the status of traditions and rituals of eating – the concepts of family lunch / dinner are reduced, the practice of snacking on the go is spread, often profaned and /or exaggerated healthy eating practices, etc.

Cardinal changes in the field of gastronomic culture and gastronomic consumption practices cause the threat of creating a universal technogenic diet, a “cosmopolitan” gastronomic culture, unified gastronomic practices of food consumption.

At the same time, penetrating into various spheres of human activity, gastronomy promotes effective intercultural communications, the development of gastronomic tourism, has a positive impact on various economic, social and environmental processes.

Of particular note is the active integration of gastronomy and art. Modern gastronomic culture is characterized by tendencies of its aestheticization, creativization, which is manifested in the development of such new directions as food styling, food design, carving, the development of the gastronomic sector of cultural industries. Gastronomic festivals, gastronomic art schools, presentations, museum exhibitions and expositions, various non-traditional creative installations are widely spread in the sphere of cultural industries.

In the information society, the media play an important role in the processes of development and transformation of gastronomic culture. The mass media have a unique opportunity to reflect the peculiarities of national cuisine, broadcast information about it to a mass audience, popularize it in the world, and create a positive image of the country. The social significance in this case is determined by the fact that the consumer of information is approaching the understanding of the specifics of the ethnoculture of a particular people. This is especially important for Russia, which is a multinational, multicultural state.

In this context, there are problems of preserving the national gastronomic culture, culinary, and therefore cultural sovereignty of the country. The preservation and popularization of the national gastronomic culture play an important role in the formation of cultural identity, the preservation and transmission of cultural memory, the formation of the domestic and international image of the country.

As ways to overcome threats and challenges associated with the processes of globalization, in order to preserve, for example, the traditional Russian gastronomic culture, the gastronomic culture of the peoples of Russia, it seems appropriate to emphasize materials on national gastronomic culture while studying the disciplines “History of Russia”, “Culture of Russia” in the Russian Federation secondary and higher educational institutions, to implement to Russian secondary educational institutions the individual electives for the study of national gastronomic culture or special sections within the framework of the home economics electives, to activate the gastronomic tourism in the Russian Federation, to develop the gastronomic sector in cultural industries, to expand collaborations of restaurateurs and the socio-cultural sphere employees, to actualize the gastronomic national-cultural component in the media sphere, including the shift of media content thematic accents from the demonstration of culinary recipes to presentation content on gastronomic cultural and historical, literary and artistic themes, etc., popularization national gastronomic cultures.

Conclusion.

Gastronomic culture has undergone significant changes in recent decades, and against the background of socio-economic, socio-political, socio-cultural transformations caused by the processes of globalization, it is logical to assume that it will be transformed in the future. At the same time, it seems that the factor of Russia’s

turn to the East determines the activation of intercultural communication between representatives of traditional cultures and religions, which can potentially contribute to mutual respect of national cultures, counteracting the negative influence of the West in the field of culture, including gastronomic culture.

Research prospects.

The analysis of the cultural and aesthetic function of gastronomic culture seems to be promising areas for further research. The subject of separate studies may be the analysis of cultural and aesthetic features of food design, including the use of art in food styling.

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美国和中国的军事学说：现代条件下威慑的地缘政治方面
**US AND PRC MILITARY DOCTRINES: GEOPOLITICAL ASPECTS
OF DETERRENCE IN MODERN CONDITIONS**

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抽象的。 本文分析了美国和中国这两个世界超级大国军事学说的主要规定。军事建设活动的规划和组织方法以及军事安全威胁的分析和评估方法之间存在异同。

关键词：军事政策、武装部队、军事发展、军事规划、武装部队改革、中国、美国。

Abstract. *The article analyzes the main provisions of the military doctrines of the two world superpowers: the USA and China. Similarities and differences are shown in approaches to planning and organizing military construction activities, as well as approaches to the analysis and assessment of threats to military security.*

Keywords: *military policy, armed forces, military development, military planning, reform of the armed forces, China, USA.*

Due to the high degree of instability and uncertainty in the development of the military-political situation, the leading countries of the world rely primarily on military force to ensure their security and interests. The development of the forces and means of armed struggle, the increase in their combat capabilities, leads to an increase in the scope and intensity of military operations, their expansion into new spheres, and the complexity of the forms and methods of using the armed forces. It is assumed that armed struggle will be characterized by highly maneuverable actions of troops, transience, the global scope of the use of weapons, the widespread use of space assets and forces of cybernetic operations, the participation in hostilities of irregular armed formations, the integrated use of political, economic and information measures implemented by the use of financed and controlled from outside political forces, social movements and terrorist organizations.

An analysis of open sources of information shows that in the first quarter of the 21st century, two superpowers, the United States and China, achieved the great-

est development in the field of military planning. In these countries, an original school of planning and organizing activities for military development and military reforms has been formed in the context of a change in foreign policy. At the same time, the formed network of research and private analytical organizations allows us to constantly improve the old and look for new approaches to the analysis and assessment of threats to military security in an uncertain future. In the new conditions of the international situation, the study of foreign experience in military planning is of particular interest to domestic specialists, since it allows one to reasonably adjust the directions for ensuring the national security of the state, taking into account Russia's national interests in the field of defense and security¹.

The military doctrine of the United States as a system of official views (settings) that determine the foundations for ensuring the military security of the state and the use of the armed forces to achieve national goals and promote national interests is disclosed in documents issued by the president, the secretary of defense and the chairman of the committee of chiefs of staff (CNS), as well as in statements and practical actions of the American military-political leadership, reflecting its military-political course, military strategy and strategy for the development of the armed forces.

The military-political course of the United States is developed and implemented on the basis of the premise that the United States is and in the foreseeable future should remain the only military and economic superpower, a global leader who has the right to single-handedly shape such conditions in the international situation that would contribute to the maximum extent to the promotion of key interests Washington in various regions of the world.

The United States will intensify its efforts aimed at comprehensively strengthening its positions in the post-Soviet space by reorienting the republics of the former USSR to Washington as the main and most profitable partner in the most important areas. The US administration believes that in the context of maintaining traditionally close trade and economic ties between the CIS countries and Russia, the priority development of dialogue with them in the field of combating terrorism, defense and security will allow the US to ensure its involvement in regional processes and thus have a direct impact on their development.

In Europe, the main focus of the United States is now on maintaining its leading role in building a system of collective security in the region, of which the Alliance must remain a central component. Washington is trying to block any possibility of granting European countries broad independence in resolving military-political issues and creating regional military structures autonomous from NATO.

¹ Gerasimov, V.V. Vectors of development of military strategy: report at the conference of the Academy of Military Sciences of the Russian Federation / V.V. Gerasimov. - Moscow: interregional public organization "Academy of Military Sciences", 2019.

The United States is persistently pursuing a policy aimed at further expanding the North Atlantic Alliance, trying to ensure that European countries are tied to the infrastructure of the bloc, to strengthen their dependence on NATO, and, in particular, on the United States in the field of military-technical cooperation².

In the Asia-Pacific region, Japan and the Republic of Korea remain the main allies of the United States. The main directions of US military policy in the Asia-Pacific region are to strengthen the leading position in this region of the world, maintain the American military presence, expand the access of the US Armed Forces to the infrastructure elements of the states of the region, and prevent the proliferation of weapons of mass destruction.

In the Middle East, the main tasks of the United States are to protect its military-strategic and economic interests and ensure the security of sea and air communications. Washington, using political and economic levers of pressure on Israel and the Arab countries, intends to seek their assistance in resolving the Palestinian-Israeli crisis according to a scenario favorable to itself.

In Africa and Latin America, the US administration intends to continue its course of maintaining control over the foreign and domestic policies of the countries of these regions by using economic leverage, diplomatic pressure, and direct military pressure in order to consolidate its influence here and protect American interests in military-political, energy, and trade. - economic areas.

According to the views of the American military-political leadership, in the foreseeable future, the use of the US armed forces will be carried out with the involvement of allied troops (forces). At the same time, the United States will independently determine the goals of the war and, based on them, form coalitions.

The essence and content of the US military strategy is revealed in a whole set of official documents. The main ones are the US National Security Strategy, the US National Defense Strategy, and the US National Military Strategy. At the same time, the geopolitical and geo-economic aspects of the American military strategy are covered in the “National Security Strategy”, the military-political ones - in the “National Defense Strategy”, and the military-strategic ones - in the “National Military Strategy”.

According to the views of the American leadership, the change in the nature of the future military confrontation is determined by a significant expansion of the spectrum of threats to US national security in the world. The underlying “national strategies” divide existing and anticipated threats into four categories:

Traditional military threats arising from the presence of regular armed forces in other states, equipped and trained to conduct full-scale military operations on land, in the air and at sea;

² People’s Republic of China: politics, economics, culture. 2019-2021 : monograph / Ros. acad. sciences; Institute of the Far East. - M. : IFES RAN, 2022.

Irregular threats posed by irregular militias of countries and non-state actors using methods such as terrorism and guerrilla action to neutralize the advantages of the US armed forces or carrying out criminal activities (piracy, drug trafficking) to destabilize regional security;

Catastrophic threats, which include the acquisition and use of weapons of mass destruction (WMD) by states or non-state actors. According to American estimates, these threats come from a growing number of hostile regimes and terrorist groups seeking to possess and use WMD.

Disruptive threats that are caused by the possibility of other countries using new technologies (nano-, cyber- and space, directed energy weapons, etc.) to level the US military superiority. Among the countries that in the future will be able to challenge American superiority in the military sphere, China is considered, first of all. The US military leadership also lists Russia and India among the powers capable of changing their attitude towards the United States to a hostile one and effectively counteracting them in the future.

The use of the US Armed Forces in the 21st century will have the following main characteristics: close interaction at all levels; focus on achieving results; formation of a single information space; high firepower and accuracy of hitting targets; mobility of expeditionary formations of the Armed Forces; use of superiority in space; possibility of using nuclear weapons.

For the next decades, the main efforts in the US military development will be focused on improving the equipment of the Armed Forces and preparing them for combat use without a full-scale mobilization reinforcement.

The American military leadership, recognizing that the US Armed Forces remain the strongest in the world, does not exclude the possibility of the appearance of opponents who, using new approaches to the conduct of armed struggle, will be able to neutralize this superiority, which will undermine the leading position of the United States in the world. In this regard, the US military power is being built up in the framework of the so-called transformation of the Armed Forces. At the same time, the main attention is paid to the comprehensive implementation of the new military strategy and new concepts for the construction and combat use of the Armed Forces, aimed at strengthening the military superiority of the United States and the ability to protect the country from asymmetric threats using preventive actions.

The creation of the technological potential necessary for reforming the Armed Forces is planned to be carried out through the development and implementation of new technologies that contribute to the achievement of the goals of the US national military strategy and the implementation of promising concepts for the use of the Armed Forces.

To implement the concept of “Comprehensive Deterrence”, the United States plans to use a triad designed to achieve strategic goals in the course of future hostilities. It will include: 1) an offensive component (both nuclear and non-nuclear means of air and space attack); 2) defensive component (unified global missile defense/air defense system, advanced air defense system); 3) a flexible infrastructure capable of recreating its capabilities for the production, storage and testing of nuclear weapons. To combine the components of the triad, it is planned to build a unified system of control, intelligence and planning using advanced information technologies³.

Chinese military theorists use the term “military doctrine” in a sense different from that adopted by the military science of the Russian Federation. It is often identified with the concepts of “national security strategy”, “national strategy”, “defense strategy”. Sometimes the term “military doctrine” is extended to any particular area of military affairs (“nuclear doctrine”, “offensive doctrine”). In other cases, this term acts as a veiled expression of the military-political goals of the state and ways to achieve them.

The most appropriate in meaning to the American term “national security strategy” is the Chinese term “da zhanlue”, literally translated as a grand strategy. In a broad sense, “grand strategy” is understood as “the strategy of using the resources of the state to achieve the main national ideas.” China has its own unique system of views on the nature of military threats and ways to counter them, as well as on the role of the Armed Forces in ensuring national interests, that is, what is called military doctrine in military science.

The leadership of the PRC considers the concept of “living space and strategic borders” as the basis for achieving its military-political goals. This concept directly substantiates the claims of the leaders of the Chinese state to create their own spheres of influence in the Asia-Pacific region and the formation of an economically and politically favorable “living space” for the Chinese within the “strategic borders” that do not coincide with the state borders of the People’s Republic of China. At the same time, the state and military leadership of China believes that these strategic boundaries should expand as the “complex power of the state” grows. At the present stage, Beijing intends to achieve its goals through the use of peaceful means, implementing the concept of “soft power” in foreign policy.

When assessing the degree of external military threat, the PRC proceeds from the fact that the roles of countries and the balance of power in world politics do not remain constant, therefore, one should be prepared for any change in the international situation, including in a direction unfavorable for China.

³ Fundamentals of national security [Electronic resource]: teaching aid / Comp. S. Yu. Makhov - Electron. text data. - Eagle: MABIV, 2019. - 88 p.

In accordance with the views of the political and military leadership of the Chinese state, threats to national security, sovereignty and territorial integrity of the PRC are divided into “traditional” and “non-traditional”.

Among the main “traditional” threats, it includes:

- unresolved Taiwan problem;
- the potential for direct external aggression due to territorial disputes between the PRC and neighboring states, as well as the involvement of the US and Japanese armed forces in an armed conflict in the Taiwan Strait zone;
- a high degree of probability of solving problems on the Korean Peninsula by forceful methods;
- the desire of the United States to contain China by strengthening existing and creating new bloc structures of anti-Chinese orientation;
- the spread of nuclear weapons, the gradual militarization of outer space;
- activation of international terrorism, religious extremism and national separatism.

As “non-traditional” threats, the PRC considers threats in the information, economic, environmental and humanitarian fields, as well as threats related to the struggle for sources of raw materials and markets, control over the resources of the oceans and strategic transport communications.

It should be noted that if earlier the leaders of the Chinese state attributed the threats associated with international terrorism, religious extremism and national separatism to “non-traditional”, then at this stage they refer them to “traditional” threats.

Based on an assessment of likely military threats, China’s state and military leaders classify their adversaries as “most likely” and “potential.” It lists the United States and Japan among the most likely adversaries, while noting that a direct armed clash with them in the near and medium term can only take place if the Taiwan problem is resolved by force. Among the potential adversaries, the leaders of the Chinese state include India and a number of countries in the Asia-Pacific region, such as Vietnam, Malaysia and the Philippines, with which there are territorial disputes.

Analysis of trends in the development of the world community since the mid-80s. last century to the present day allows Chinese strategists to conclude that there is little likelihood of a large-scale war involving China. In the short and medium term, while maintaining the existing trends in the development of the military-political situation in the region, it is considering the possibility of unleashing a high-intensity armed conflict against an adversary with technological superiority⁴.

⁴ Xi Jinping. On public administration. Beijing: Foreign Language Literature Publishing House, 2014, p. 299.

The concept of a “limited nuclear counterstrike” does not refute the commitment made by Chinese leaders not to be the first to use nuclear weapons, but provides for a retaliatory nuclear strike against an adversary who intends to launch a nuclear attack on China. The development of the PRC Armed Forces within the framework of this concept is carried out in accordance with the policy of nuclear deterrence pursued by the state and military leadership of the country.

The concept of “local wars” allows the PRC to carry out measures to build modern armed forces capable of solving assigned tasks in armed conflicts of any intensity and against any adversary⁵.

The state and military leadership of China, carrying out measures for the military and economic support of the country’s defense, proceeds from a number of principles generally accepted in world practice. The most important of these is the creation of the so-called system of small military representation and large mobilization capabilities, in which the limited-scale production of peacetime military products serves as the basis for its intensive build-up in wartime. The peacetime production potential provides for the current needs of the armed forces in armaments, the creation of new types of equipment, as well as the needs of the arms trade in the foreign market. Mobilization opportunities based on the scientific, technical and production potential of peacetime include the full use of the production capacities of the defense industry, as well as the civilian sector of the country’s economy.

In general, the US state and military leadership seeks not only to achieve overwhelming military-technical superiority over potential adversaries, but also to have the same superiority in relation to their strategic allies and partner countries. The consequence of this may be a further increase in the importance of military force in achieving the goals of US foreign policy, which in the future may become the main factor determining the formation of military threats to the Russian Federation. The development of forms and methods of using the US Armed Forces testifies to their preparation, first of all, for a war with opponents comparable in military power, which are considered to be Russia and China⁶.

The modern foreign policy course declared by the Chinese leaders is peaceful in nature, excludes joining any blocs and allows to ensure military security and defend the country’s territorial integrity in an unstable world situation. A further build-up of military power will allow the PRC not only to protect its own national interests at the regional and global level, but also to attempt to resolve controversial issues by force.

⁵ Tavrovsky Yu.V. Ukrainian threats to Beijing. – M.: Knizhny Mir, 2022, – 170 p.

⁶ Assessing the Prospects for Great Power Cooperation in the Indo-Pacific / By Scott W. Harold, Nathan Beauchamp-Mustafaga, Soo Kim. RAND-Corp., 2023. 210 p.

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早期压力对黑猩猩的影响

THE EFFECTS OF EARLY STRESS IN CHIMPANZEES

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注解。 这项研究是在两只黑猩猩兄弟姐妹身上进行的，它们的母亲有焦虑加剧的迹象。 其中一只过早断奶所形成的应激是广泛性焦虑症发生的原因，这种应激并不影响认知活动的成功，但反映在认知活动进行过程中心率的适应和调节机制中。

关键词：黑猩猩，早期应激，适应，心率。

Annotation. *The work was carried out on two chimpanzee siblings born to a mother with signs of increased anxiety. The stress formed as a result of early weaning of one of them was the cause of development of generalised anxiety disorder, which did not affect the success of cognitive activity, but was reflected in the mechanisms of adaptation and regulation of heart rate during its performance.*

Keywords: *chimpanzees, early stress, adaptation, heart rate.*

The strongest anxiety-disruptive reactions when a child is separated from its mother are observed at the age of 2-3 years, often becoming the cause of generalised anxiety disorder (GAD). Anthropoids, like humans, are impulsive, prone to stress, anxiety and depression [De Waal, 2019; Goldsborough et al., 2022 et al.]. Therefore, early separation of chimpanzee cubs from their mothers and in them leads to the development of early stress [Tamashiro et al., 2011; Capitanio et al.,

2022 et al.]. Early stress is particularly severe in anxious low-ranking individuals in small social groups.

Conducting experiments on humans is unacceptable, and using chimpanzees as a natural biological model of humans, allows us to model and investigate different variants of psychopathology.

The study was conducted on two chimpanzee siblings, 6 and 8 years old, born by a mother with signs of deviant behaviour, raised in the same conditions of the laboratory of the Institute of Physiology.

The older female was taken from her mother as usual at the age of 16 months, born prematurely from a term third pregnancy. Her physical and mental development corresponded to her age, she was active, balanced, and contactable. She adapted well to the laboratory situation, reacted calmly to new stimuli and people.

The younger female was born prematurely from the fourth term pregnancy, her initial physical and mental development corresponded to age norms, but her early weaning from her mother at the age of 8 months, which is six months earlier than usual, led to the development of early stress and subsequently to GAD.

Psychological differences of the sisters served as a stimulus for a comparative analysis of adaptation mechanisms in the process of cognitive activity on the example of their heart rate (HR) dynamics.

The aim of the work was to carry out a quantitative analysis of correlation rhythmograms of RR intervals in the process of cognitive activity in a normal situation and during emergency introduction of a stressor.

Materials and Methods.

The study was conducted on two chimpanzee sisters aged 6 and 8 years, born by a mother with signs of deviant behaviour, while they were performing a familiar task - assembling structures from 7-8 cubes according to their flat image in a normal situation and when a stress factor was introduced.

Registration and analysis of HR is a non-invasive, the most informative method of research, both physiological and psychological functional state of the subject in real time [Baevsky, Berseneva, 1997; Kildal et al., 2021; Jarczok et al., 2022]. The rhythmocardiogram was recorded in chimpanzees during the construction of figures from 7-9 cubes according to their image in the 2nd thoracic standard leads using the Mitsar ECG amplification unit in the Mitsar WinHRV application. A non-linear method of correlation rhythmogram analysis (CoRG) was used, based on the graphic representation of RR intervals on the area of the scatterogram (Poincaré spots) [Baevsky, Berseneva, 1997; Mikhailov, 2002], which were built automatically in the Mitsar WinHRV application. Quantitative evaluation of the spots was calculated using the tension factor “K” using the formula $K=L/w-1.618$, where activation of the sympathetic nervous system (SNS) was characterised by the length of the spot (L) and activation of the parasympathetic nervous system (“PSNS”) by its width (w); 1.618 - “φ” - the “golden ratio”. The participation of

sympathetic and parasympathetic nervous system in the adaptation of the organism reflects the L/w ratio [Kuznetsova, Korniyushina, 2010].

Results

The chimpanzees were familiar with the different variants of constructing figures from cubes, the experimental room, the ECG recording and the experimenter himself. At baseline before task presentation, the tension factor (“K”) value of both females did not differ significantly and ranged from 0.8 to 0.95 units, indicating their satisfactory adaptation (Fig. 1).

The first female reacted calmly to the presentation and performance of different variants of designs in a standard situation, concentrated on looking at the images and started to perform the task, which, like any activity, required the tension of the functional system and was accompanied by a decrease in “K” relative to the background to the level of 0.19 ($p < 0.001$, $t = 7.6$, $df = 8$, Paired t test), but the average value of “K”, being in the zone of positive values (Fig. 1, a), indicated the predominance of the parasympathetic nervous system (PSNS),

The second female, when presented with drawings, looked at the images uncertainly, picked over the cubes, scratched herself, fidgeted on the chair, looking at the experimenter. Her K scores decreased relative to background to (-)0.07 ($p < 0.01$, $t = 3.9$, $df = 8$, Paired t test) and became negative (Fig. 1, b), indicating the activation of the sympathetic nervous system (SNS).

When a stressor was introduced in both females, the construct was accompanied by a significant decrease in “K”, moving its values into the zone of negative values: in the first female to (-)0.7 ($p < 0.01$, $t = 3.9$, $df = 8$, Paired t test), and in the second to (-)0.56 ($p < 0.001$, $t = 21.5$, $df = 9$, Paired t test), indicating arrhythmic HR and activation of the SNS. An interesting fact was that in the anxious female “K” acquired negative values when performing a familiar task in a normal situation, while in the calm female only when a stressor was introduced.

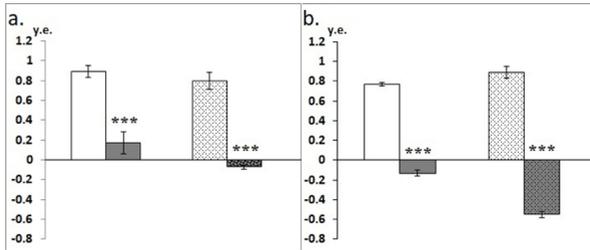


Figure 1. Comparison of tension coefficient (“K” in units): a - calm female in normal situation (first group of bars), when stress factor was introduced (second group of bars); b - anxious female in normal situation (first group of bars), when stress factor was introduced (second group of bars). Data are presented for the whole period of the experiment as arithmetic mean \pm standard error of the mean.

Designations: white and grey bars - “K” initial state before the beginning of the study, dark bars - “K” when performing cognitive tasks in the usual situation and when a stress factor was introduced. On the ordinate axis - “K” value in conventional units

Discussion

Comparison of “K” values in siblings in the background revealed no differences, which spoke about satisfactory adaptation to the experimental situation.

Changes in the functional state were manifested when performing the task in the normal mode, which is associated with the beginning of activity and activation of the concentration system, but if in the first female the tension of the regulatory mechanisms corresponded to satisfactory adaptation, the anxious one showed a tendency to its decrease. Unexpected introduction of a stress factor was accompanied by an increase in arrhythmicity of HR - “K” increased 8 times in comparison with the previous state, which, according to a number of researchers [Baevsky, Berseneva, 1997; Mikhailov 2002; Kiroi, Aslanyan, 2006] indicates unsatisfactory adaptation.

It is known that in the norm compensatory deviations in the work of the cardiovascular system are carried out at the expense of the respiratory component. When stress is increased, a non-respiratory component is included in the regulation of HR, providing interaction of the organism with the external environment and systems within it with the connection of hippocampus and corpus amygdaloideum [Guseva, 2005; Kiroi, Aslanyan, 2006] and cortex praefrontalis [Birn et al., 2017]. In this case, according to V.N. Mukhin et al. [2011], the functional system begins to work “ahead of schedule”, preparing the organism for the subsequent activity. At the same time, there is an opinion that stress impairs cognitive performance [Otten et al., 2019; Smith, Pollak, 2022]. Probably, in this case, the success of problem solving was not affected due to the inclusion of compensatory self-regulation strategies and mobilisation of the organism’s resources in a potentially dangerous situation, which increased the arbitrary control of attention [Astapov, Gasilina, 2023; Weger, Sandi, 2018], leading to an increase in the “physiological price” of adaptation.

In addition, it turned out that the inherited character traits of the mother were manifested only in one of the sisters. The question arose - why?

It is known that behaviour in primates is driven by the functional system of the corpus amygdaloideum and stria terminalis [Fox et al., 2018; Berry et al., 2021; Frick et al, 2022], but in GAD, the function of structures such as the hippocampus, corpus amygdaloideum and corpus praefrontalis undergo structural remodelling, altering behavioural and physiological responses, which according to [Birn, et al., 2017; Shi et al., 2020; McKeon, et al., 2022], may be heritable. In humans, heritable manifestations of psychosomatic abnormalities may be compensated for by the environment. In the younger female, the manifestation of hereditary anxiety

can be explained by early stress, which is consistent with the view of M.N. Ahun and his co-authors [Ahun, et al., 2022].

Thus, the conducted work has shown that in chimpanzees early stress leads to a violation of adaptation mechanisms at both behavioural and vegetative levels. The forms of anxiety manifestation in chimpanzees, as well as in humans, are individualised and can be inherited. The anatomo-physiological similarity of monkeys to humans makes them an optimal biological model for the study of norm and pathology of MND, and the studies conducted on monkeys will allow transferring the obtained results to children without major correction, opening new opportunities for fundamental and applied sociobiological and medical studies of adaptive behaviour of both monkeys and humans.

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在中风患者的医疗康复中使用虚拟现实与双重和三重认知运动任务
**USING VIRTUAL REALITY WITH DOUBLE AND
TRIPLE COGNITIVE-MOTOR TASKS IN THE MEDICAL
REHABILITATION OF PATIENTS AFTER STROKE**

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抽象的。利用虚拟现实 (VR) 技术对患者进行再训练在脑卒中 (CS) 患者的综合康复中具有广阔的前景。

本研究的目的是评估 VR 在多任务处理功能条件下对中风后运动和认知障碍进行多模式矫正的有效性和安全性。

方法。该研究是一项随机对照试验。它涉及 106 名接受医疗康复 (MR) 的 CS 患者, 其中 56 人接受了 VR 培训。MR 的主要任务是上肢 (UL) 功能、平衡。我们开发了专门的程序, 让患者沉浸在熟悉的环境 (厨房) 中, 并完成可理解的日常生活烹饪任务。主要结果是 Fugl-Meyer (FMA-UL) 和行动研究手臂测试 (ARAT)、伯格平衡量表 (BBS) 的分数变化。次要结果是医学研究委员会量表 (MRCS)、蒙特利尔认知评估 (MoCA)、医院焦虑和抑郁量表 (HADS)、功能独立性 (巴塞尔指数) 的变化。结果在治疗前、MR 结束时 (15 个疗程, 每周 3 次) 和 MR 后 1 个月进行评估。

结果。VR MR 后, FMA-UL (从 30.1 ± 1.0 到 35.7 ± 0.9 , $p < 0.05$)、ARAT 评分 (33.6 ± 3.8 到 43.8 ± 3.9 , $p < 0.05$) 以及 MoCA 认知和情感功能评分均有所改

善（主要组中 82% 的患者增加至正常 - $\chi^2=6.4$, $p=0.016$ ）和 HADS（基线时为 9.9 ± 2.7 ，研究结束时为 5.1 ± 3.3 ），以及日常生活独立性（BI 增加）（从 62.4 ± 6.6 到 82.3 ± 5.7 ）。

结论：在多任务条件下对视觉、听觉、前庭和动觉分析仪进行多感官训练对 CS 患者的认知和运动训练以及神经心理状态有有益的影响。

关键词：中风、康复、生物反馈、虚拟现实、上肢、平衡、多任务功能。

Abstract. *The retraining of patients using virtual reality (VR) technology is a promising in the comprehensive rehabilitation of patients with cerebral stroke (CS).*

The purpose of this study was to evaluate the efficacy and safety of VR in multimodal correction of post-stroke motor and cognitive disturbances in conditions of multitasking functioning.

Methods. *The study was a randomized control trial. It involved 106 CS patients who received medical rehabilitation (MR), 56 of them - with VR-training. The main tasks for MR were the upper limb (UL) function, balance. We developed specialized programs for immersing the patient in a familiar environment (Kitchen) with understandable everyday-life tasks for cooking. The primary outcomes were changes in scores on the Fugl-Meyer (FMA-UL) and Action Research Arm Test (ARAT), Berg balance scale (BBS). The secondary outcomes were changes on the Medical Research Council Scale (MRCS), Montreal Cognitive Assessment (MoCA), Hospital Anxiety and Depression Scale (HADS), functional independence (Barthel Index). The results were assessed before the therapy, at the end of MR (15 sessions, 3 times a week) and 1 month after the MR.*

Results. *After the MR with VR, improvements in FMA-UL (from 30.1 ± 1.0 to 35.7 ± 0.9 , $p<0.05$), ARAT scores (33.6 ± 3.8 to 43.8 ± 3.9 , $p<0.05$) and in cognitive and emotional function scores on MoCA (increased to normal in 82% patients of main group - $\chi^2=6.4$, $p=0.016$) and HADS (9.9 ± 2.7 at baseline, 5.1 ± 3.3 at the end of study), as well as in independence of daily living (BI increased from 62.4 ± 6.6 to 82.3 ± 5.7) were noted.*

Conclusions. *Training with multisensory effects on visual, auditory, vestibular, and kinesthetic analyzers in multitasking conditions have beneficial effects on cognitive and motor training, neuropsychological status of the patient with CS.*

Keywords: *stroke, rehabilitation, biofeedback, virtual reality, upper limb, balance, multitasking functioning.*

Introduction

Cerebral stroke (CS) remains the most important medical and social problem because of its high share in the morbidity and mortality of the population, significant indicators of temporary and primary disability [1]. Due to long-term physical and psychological impairments the quality of life after CS is significantly reduced

[2]. There are limitations of every-day functioning in 33-42% of patients with three to six months after CS. So 36% of patients are disabled five years after CS [3].

Motor disorders combine with cognitive impairment (CI) in more than 40% of CS survivors; two thirds of patients have moderate CI [4].

Sensory, speech, gait, vision disturbances, fatigue, depression, loss of balance are the symptoms of CS, that cause the restriction of physical and mental activity of the patients [5].

Most of the research on the medical rehabilitation (MR) of patients after CS focus on motor deficiency [6]. Recent studies in patients with CS show the effectiveness of dedicated and repetitive interventions relevant to real life activity that stimulate the cortical reorganization and neuroplasticity processes. In this context, the classic MR techniques can be combined with physiotherapy [7-10], pharmaceuticals [11-13], neuromodulation [14-15], trainings in a virtual environment and using video games [17-22].

Virtual reality (VR) technology allows patient to interact with the simulated environment and receive continuous biofeedback (BFB) with a certain purposeful activity. VR creates an enriched environment where CS-patients can perform everyday activity and learn new skills. VR has the potential of the basic concepts of neurorehabilitation of patients with CS, such as intensive, repetitive and task-oriented training, which is crucial for increasing neuroplasticity and than restoring motor activity according to the theory of motor learning [25].

The purpose of this study was to evaluate the efficacy and safety of VR in multimodal correction of post-stroke motor and cognitive disturbances in conditions of multitasking functioning in patients with ischemic stroke (IS).

Materials and methods

The study was a randomised control trial. Potential participants were assigned to rehabilitation by local hospitals of Moscow and were selected by the research group according to the inclusion/exclusion criteria of the study. All patients signed voluntary informed consent to participate in the study. The study was approved by the local Ethics Committee of the Moscow Centre for Research and Practice in Medical Rehabilitation, Restorative and Sports Medicine of Moscow Healthcare Department (Centre; Protocol No. 2 of 04/19/2023).

The following trial inclusion criteria were identified for patients: men or women aged 45 to 75 years, late recovery period (6-12 months) of primary IS; supratentorial location of ischemic focus according to MRI of the brain; absence of speech disorders, understanding of tasks and instructions; a score of 4 to 3 according to the Medical Research Council Scale (MRCS) for UL paresis [26]; spasticity of 2 points or less by the Modified Ashworth Scale (MAS) [27]; 20 points and more by the Montreal Cognitive Assessment (MoCA) [28]; a score less than 11 on the

Hospital Anxiety and Depression Scale (HADS) [29]; the patient’s ability and willingness to comply with the requirements of this protocol.

The study included 106 patients, mean age $58,8 \pm 4,3$ years, mean duration of IS $7,8 \pm 2,1$ months. By the method of block randomization, the patients were divided into 2 groups – the main (MG) and the control (CG); the groups didn’t differ from each other in demographic and clinical indicators. The basic therapy was carried out in accordance with the Standards of Medical Care in patients of both groups.

Specialized programs for cognitive-motor game trainings of large motor skills of the UL and balance with double and triple tasks in a virtual environment were developed in the Centre. The programs immerse the patient in a familiar environment (Kitchen) with understandable everyday-life tasks for cooking (figure 1-2). Certificate received №2022685352 (registration date 12/22/2022).



Figure 1. View of screen of the kitchen in the virtual reality program

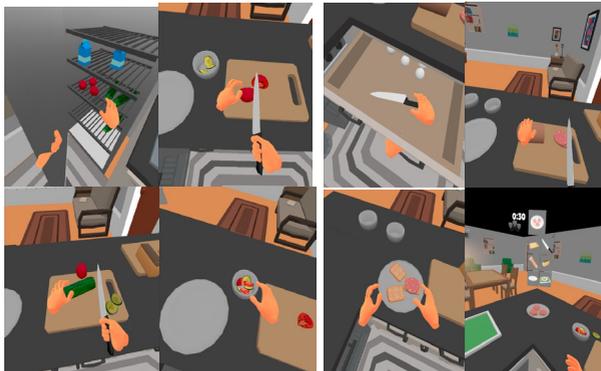


Figure 2. View of screen of cooking in the virtual reality program

The patients of MG received 15 VR-trainings (20-30 minutes, 3 times a week, 6 weeks).

Individual physical therapy sessions for the UL and balance were conducted in the CG. VR-trainings were not used in this group.

Efficacy and safety were assessed according to a set of scales and methods presented in Table 1. Adverse events were carried out at all patient visits.

Primary outcomes: Changes in the FMA-UL and ARAT scales, BBS used to assess the dynamics of locomotor activity.

Secondary outcomes: The following were used to evaluate the efficacy of therapy (Table 1): change in the paresis degree according to MRCS; spasticity severity according to MAS; level of impairment or dependence in daily life (Barthel Index changes ≥ 4 degrees), degree of cognitive impairment (MoCA), anxiety and depression degrees (HADS).

Assessment was performed before therapy (T1), after 15 sessions (T2), and a follow-up assessment was carried out 1 month after MR (T3).

Table 1.
Methods used in the study

Studied function	Examination method
<i>Primary outcomes</i>	
Motor function state of the upper limb	<ol style="list-style-type: none"> 1. Fugl-Meyer Upper Extremity Scale (FMA-UL) dynamics [30] 2. Action Research Arm Test (ARAT) Scale dynamics [31]
Balance	Berg balance scale (BBS) [32]
<i>Secondary outcomes</i>	
State of the locomotor system	<ol style="list-style-type: none"> 1. The 6-point Medical Research Council Scale for assessing muscle strength: MRCS [26] 2. Modified Ashworth Scale: MAS (0 to 4 points) [27]
Cognitive functions	Montreal Cognitive Assessment: MoCA [28]
Presence and severity of depression	The Hospital Anxiety and Depression Scale: HADS [29]
Functional independence	Barthel ADL Index: activities of daily living with analysis of total score and sections: Feeding; Bathing; Grooming; Dressing [33]

Statistical analysis

Statistical analysis of the data included a comparison of dependent and independent series of variables and methods of descriptive statistics. The type of data distribution was assessed using the Shapiro-Wilk test. Parametric quantitative data were represented by mean values and standard error of the mean ($M \pm m$). The validity of differences was determined by the Student’s t-test. The differences between qualitative binary traits were assessed using the χ^2 criterion. The statistical

significance level was accepted as $p=0.05$. Nonparametric Spearman correlation test was used to reveal the relationship between two features. The results obtained were processed using the licensed software Statistics 7.0 and Microsoft Excel.

Results

Primary outcomes

FMA-UL-prox и FMA-UL-total, ARAT, BBS.

By the end of the MR and one month after the MR, an improvement in UL-function was demonstrated in MG-patients according to the FMA-UL prox and total, $p<0,001$. In CG, there was a tendency to improve the FMA-UL score, the differences between MG and CG were statistically significant ($p=0.045$), Δ between MG and CG was - 2.75 (Table 2).

A clinically significant improvement in hand motor function on the FMA-UL was observed in 76.4% of MG patients, and on the ARAT-scale in 63.6% of patients. In CG patients, these results were 58% and 50%, respectively.

Besides, statistically significant changes in the BBS scale (balance) were observed in the MG (Table 2). The improvement of the BBS indicates a progress in statolocomotor control.

Table 2.
Primary and secondary outcomes

Scales and tests	Visits				
	T1	T2	p (T1-T2)	T3	p (T1-T3)
The Main group (n=56)					
FMA-UL-prox, score	30.1±1.0	35.5±0.9	0.05*	35.7± 0.9	0.049*
ARAT, score	33.6±3.8	43.4±4.0	0.048*	43.8± 3.9	0.047*
BBS, score	36.7±6.6	48.2±4.1	0.048*	46.0± 3.9	0.048*
HADS (Anxiety), score	9.9±2.7	7.9±3.5	0.65	5.1±3.3	0.25*
MoCA, score	23.8±2.3	26.2±2.5	0.62	26.6±2.2	0,041
Barthel index, points	62.4±6.6	77.8±5.8	0.017*	82.3±5.7	0.004*
The Control group (n=50)					
FMA-UL-prox, score	31.8±2.4	32.5±2.3	0.87	34.3 ± 2.2	0.64
ARAT, score	48.1±4.2	50.7±3.8	0.64	51.4 ± 3.7	0.56
BBS, score	35.7±6.3	42.3±4.6	0.16	40.9± 4.7	0.37
HADS (Anxiety), score	9.6±1.1	8.7±1.1	0.77	7.8±1.3	0.71
MoCA, score	23.8±2.3	24.6±2.5	0,84	25.6±2.1	0.077
Barthel index, points	66.8±4.4	73.4±4.8	0.32	81.5±4.70	0.03*

Secondary outcomes

Muscle strength. Strength assessed for each UL muscle group (shoulder flexion, elbow extension, wrist extension, forearm supination, forearm pronation)

demonstrated a 0.3-point improvement on the MRCS at follow-up compared to baseline both in patients of MG and CG (Table 2).

Cognitive functions. Initially, mild and moderate cognitive impairment and mild dementia were detected in 66.7% of MG and 65,3% of the CG-patients. Neurodynamic disturbances, fatigue while mental activity, difficulties in concentration of attention during tests were obtained. After the MR positive dynamics of neurodynamic and regulatory function scores were observed that increased to normal in 82% patients of MG ($\chi^2=6.4$, $p=0.016$). There was no significant dynamics in CG (Table 2).

Anxiety and Depression. Clinically significant positive dynamics ($\chi^2=24.2$; $p<0.01$) were observed according to HADS Anxiety in MG: before the study – 57.0%; at the MR – 87.5% without Anxiety. There was a tendency of improving these values in CG: 58.0% and 65%, respectively (Table 2). Changes in HADS Anxiety and Depression scores were associated with improvements in UL-function and balance. Correlation analysis showed a negative relationship between the mean ARAT score and the scores for anxiety on the HADS (Anxiety) ($r=-0.7$; $p<0.05$) and depression on the HADS (Anxiety) ($r=-0.67$; $p<0.05$); as well as relationship between the mean BBS and HADS Anxiety ($r=-0.62$; $p<0.05$)

Barthel Index (BI). Statistically significant improving of the BI was shown in MG at the end of MR and 1 month after the study. There was no significant dynamics in CG, ($p=0.066$; Table 2).

Safety. No worsening of the common state, changes in systemic hemodynamics (systolic and diastolic blood pressure, heart rate) were detected during the MR using VR. The most frequent adverse events were slight dizziness (47,6%) and fatigue (30,4%) in the first days of the training. None of the patients withdrew from the study. No serious adverse events have been reported.

Discussion

The aim of this study was to evaluate the effect of VR on the cognitive and motor functions in patients with paresis and balance disturbances in the late recovery period of the first IS.

The main specificity of MR with VR is the correction not only a single impaired movement, but restoring the everyday activity skills, as well as the cognitive and emotional state of the patient [33]. The present study shows that the use of VR was accompanied by an improvement in UL movements and balance, which persisted for 1 month after the end of MR [34].

After MR UL-movements became more effective when reaching and interacting with the goal by improved proximal stability, smoothness and efficiency of the path of UL movement to the goal, which could be due to the polymodal influence of BFB in MG [33, 35].

Another feature of the study was the estimation of the relationship between the restoration of UL-movements and cognitive status. According to meta-analysis [36], the use of VR after IS promotes improvement in cognitive functions and more active use of the UL. Our results indicated the improvement on the MoCA and HADS scores. This underlines the importance of further development of VR-method.

After the MR there was a significant improvement in functional independence in BI. These results are consistent with previous studies, which found an improvement in a number of BI sections when using VR compared with conventional rehabilitation [37].

The integration of innovative VR-technologies with the BFB in standardized rehabilitation programs for patients with CS may be considered.

Conclusion

Multimodal rehabilitation programs with VR expand the possibilities of the rehabilitation process of afterstroke patients, improve the adaptive neuroplastic changes in the brain due to the initiation of synergistic and additive processes.

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复杂病例中预剥离并保留后弹力层的内皮角膜移植术
**ENDOTHELIAL KERATOPLASTY WITH PRE-STRIPPED AND
PRESERVED DESCEMET MEMBRANE IN A COMPLICATED
CASE**

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抽象的。我们介绍了一名 69 岁患者接受后弹力层内皮角膜移植术 (DMEK) 的临床病例, 该患者患有大疱性角膜病变、人工晶状体、手术后唯一一只视力正常的眼睛患有开角 IIA 型青光眼。目前, DMEK 手术已成为针对角膜内皮功能障碍和解剖学的病理导向替代疗法金标准的一部分。选择性手术干预涉及用由后弹力层和功能性内皮细胞组成的供体材料替换无功能的内皮层。该临床病例描述了单视眼患者的成功手术策略和进一步治疗。研究了为期一年的随访期的临床和功能结果。

关键词: DMEK, 大疱性角膜病变, 内皮角膜移植术, 保存。

Abstract. *We present a clinical case of Descemet Membrane Endothelial Keratoplasty (DMEK) in a 69-year-old patient with bullous keratopathy, pseudophakia, operated open-angle IIA glaucoma in the only seeing eye. DMEK is currently an operation that has become part of the gold standard of pathogenetically oriented replacement therapy for corneal endothelial dysfunction and anatomy. Selective surgical intervention involves replacement of the non-functioning endothelial layer with descemet membrane with donor material consisting of descemet membrane and functioning endothelial cells. This clinical case describes the successful surgical tactics and further management of a patient*

with a single seeing eye. Clinical and functional results with a follow-up period of 1 year were studied.

Keywords: DMEK, bullous keratopathy, endothelial keratoplasty, preservation.

There is no conflict of interest; none of the authors has a financial interest in the materials and methods presented

Introduction

Decompensation of the corneal endothelial layer is a frequent complication of cataract surgery in the elderly. Today, this phenomenon is known as pseudophakic bullous keratopathy, leading to significant vision loss despite brilliantly performed lens replacement surgery. Descemet membrane transplantation (DMEK) is a keratoplasty technique that offers the opportunity to selectively replace the affected corneal layer [1,2]. Compared to end-to-end transplantation and other posterior keratoplasty, the advantages are less induced astigmatism, small incision, short rehabilitation period, high functional outcome, and many others, but there are many difficulties on the way to mastering this technique, such as high risk of rejection of donor material due to little experience, technical difficulties of dissection in the presence of deep anterior chamber, concomitant eye pathology. In this regard, there are now technologies for pre-preparation of material for transplantation [3,4]. For the first time, G. Melles et al. successfully transplanted a patient with grafts pre-prepared in an eye bank, which began to spread rapidly around the world due to the high demand for donor material. The material for DMEK is prepared just prior to surgical intervention. The surgeon takes the preserved graft to the operating room, which is implanted into the patient after some time and fixed in the anterior chamber with a gas-air bubble [5,6]. However, in this variant the surgeon cannot simulate the necessary diameter of the graft for the patient, therefore, we proposed to leave the descemet membrane preliminarily isolated by hydrodissection method on the corneoscleral flap, to preserve it in this variant, and to separate the descemet membrane intraoperatively with a pouch of the necessary size.

Purpose of the work: to present a clinical case of endothelial keratoplasty with pre-selected and preserved descemet membrane in a complicated case.

Patient and methods

Patient M., 69 years old, came to the clinic with complaints of progressive decrease in visual acuity, pronounced fog in the morning in front of the left eye. According to the patient, the above complaints have been bothering her for several months. From the anamnesis it is known that six months ago OS phacoemulsification for age-related nuclear cataract was performed at the place of residence. Glaucoma has been detected in both eyes for 10 years, the right eye became blind 2 years ago after antiglaucoma surgery, in both eyes the patient injects Sol. Timololi 0.5% 2 times a day. Visus OD 0 (zero), Visus OS = hand movement near the

face. IOP (iCare) is 20/14 mmHg. Biomicroscopy of the left eye: moderate mixed injection, filtration cushion at 12 o'clock is flat, conjunctiva is hyperemic, cornea is edematous, optic slice is thickened, multiple descemet membrane folds, single epithelial bullae. The anterior chamber is deep, the moisture is transparent. Diagnosis: OD - operated open-angle IVA glaucoma; OS - pseudophakia, operated open-angle IIA glaucoma, pseudophakic bullous keratopathy. It was decided to perform surgical treatment of OS with transplantation of the descemet membrane using DMEK technology, taking into account the severity of the disease and the possibility of using a donor with a large number of endothelial cells, in order to achieve maximum visual acuity in the postoperative period.

Preparation of donor material and surgical technique

The material for transplantation was made in an eye bank: donor age 54 years, day after death, endothelial cell density - 3143 kl/mm². The corneoscleral flap was placed endothelium upward on a plastic base. A 27G needle connected to a 5-mL syringe filled with fluid was inserted from the side of the scleral annulus under the descemet membrane. Using a fluid current, the descemet membrane was peeled away from the underlying stroma. A detachment bubble was formed, which was then drained by paracentesis. The detached descemet membrane was saved on the corneoscleral flap and thus preserved. On the next day intraoperatively, after performing descemetorexis, after selecting the required size of the patch, the descemet membrane was detached (7.5 mm patch). The obtained graft with a diameter of 7.5 mm was tucked into a cartridge for subsequent insertion into the anterior chamber of the eye. In the anterior chamber, the graft was easily spread (due to the lower torsional force) and centered by light blows with a cannula and spatula on the outer surface of the cornea. At the end of the operation, a gas-air mixture (15% SF₆) was injected to tightly adhere the stroma. A knotted suture (10/0 nylon) was placed over the main incision for complete sealing.

Results

On the first day after surgery, biomicroscopy showed mixed injection of the eyeball vessels, partial resorption of corneal edema, the graft was completely adherent throughout the air bubble in the anterior chamber. Vis OS = finger count at the face. IOP 11 mm Hg. Positive dynamics, subjective improvement of vision was noted 1 year after surgery. OS Vis = 0.6; IOP: 16 mm Hg on hypotensive mode; ECD: 2129 kl/mm². The eye is calm, the cornea is clear. OCT of the anterior segment: pachymetry - 571 μm, the graft is fully adherent. IOL in the correct position, pink reflex from the ocular fundus.

Discussion

In recent days, DMEK has become the operation of choice for many ophthalmic surgeons in the treatment of pseudophakic bullous keratopathy due to its high functional results. However, technical difficulties of graft excision, difficulty in

manipulation with thin descemet membrane, presence of concomitant pathology such as operated glaucoma, and avulsion, which are relative contraindications for DMEK, require high-class surgical skills, which prevents active performance of this type of keratoplasty [7]. Thus, today many, including novice surgeons, prefer to use a pre-prepared graft in an eye bank, which makes the task much easier. In the presented clinical case, complicated by concomitant operated glaucoma in the only seeing eye with deep chamber due to pseudophakia, which could provoke corneal decompensation and accelerate graft rejection, DMEK surgery was performed. Corneal transparency was restored by day 15. The chosen graft diameter turned out to be optimal. High density of endothelial cells was an important factor in the survival rate of the transplanted cornea. Despite associated pathologies, the cornea retained its transparency and endothelial cell loss was acceptable. At 1-year months after keratoplasty, visual acuity was restored to the maximum possible visual acuity taking into account the concomitant pathology.

Conclusions

Pseudophakic bullous keratopathy is quite common in the practice of corneal surgeons. In recent years, materials that are pre-prepared in eye banks have become more common. Modern methods of preservation allow to replace the damaged corneal layer, while obtaining high visual functions, including in complicated cases. Currently DMEK is the most popular method of treatment of corneal endothelial dysfunction. The presented clinical case indicates that even in complicated cases, the operation of choice may be transplantation of endothelial material pre-selected in an eye bank and preserved a day before surgery with delayed trepanning intraoperatively. The graft after preliminary separation is easier to spread in the anterior chamber than the materials obtained immediately before the operation, which makes this technology attractive in terms of reducing the operation time, reducing the risk of material rejection.

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有机轮作除草工作体安全装置
**SAFETY DEVICE OF THE WORKING BODY FOR THE
DESTRUCTION OF WEEDS IN ORGANIC CROP ROTATION**

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注解。 基于对有机产品生产中耕作和除草技术操作的分析,对土壤耕作单位的功能进行了研究,并对其工作有效性进行了评估,结果表明,目前使用的耕耘机并不能提供完全高质量切割多年生杂草的强大根系,工人的器官被杂草堵塞,田间保留大量未切割的杂草,同时由于现场有石头,效率低下。 为了提高除草效率和机器的可靠性,开发了一种带有安全装置的工作机构,其设计为月牙形单面爪子通过弹性元件安装在机架上,它的存在确保了自振荡的形成,以防止土壤和植物粘附在机翼上,并改善其切割过程。 该工作机构的使用将提高耕作质量和设计的可靠性

关键词: 有机农业, 耕作, 除草, 镰刀形工作体, 安全装置。

Annotation. *The study of the functioning of soil-cultivating units and the evaluation of the effectiveness of their work, based on the analysis of technological operations of tillage and destruction of weeds in the production of organic products, suggests that the currently used cultivators do not provide a completely high-quality cut of the powerful root system of perennial weeds, workers whose organs are clogged with weeds, keeping a large number of uncut weeds on the field, while having low efficiency due to the presence of stones on the site. In order to increase the efficiency of weed control and the reliability of the machines, a working body with a safety device has been developed, the design of which is a*

crescent-shaped one-sided paw mounted on a rack through an elastic element, the presence of which ensures the formation of self-oscillations to prevent soil and plants from sticking to the wing, and improve the process their cutting. The use of the working body will improve the quality of tillage and the reliability of the design

Keywords: *organic farming, tillage, weed cutting, sickle-shaped working body, safety device.*

Introduction. The process of destruction of weeds is subject to strict agrotechnical requirements, among which it is necessary to loosen the soil without bringing wet layers to the surface, without compacting and spraying; cutting working bodies must destroy at least 95% of weeds, while it is necessary to maintain a constant processing depth [1].

However, the existing types of tillage units, which provide the possibility of carrying out various technological works, including cutting weeds and loosening the soil, in many ways do not meet the agrotechnical requirements set by agronomists for a number of indicators for surface and fine tillage, and specifically for cutting the powerful tap root system of Sosnovsky's hogweed - an invasive culture that has spread over decades on the farmlands of Eastern Europe, Belarus, and Northwest Russia [2, 3, 4].

In studies [4], we carried out a comparative analysis of the destruction of weeds by various working bodies of tillage tools for surface tillage. It has been established that the effective technological method of weed destruction is its cutting by working bodies with a variable width of capture, standard lancet cultivator paws do not provide full cutting efficiency, stubble paws also do not provide a complete cut of the powerful root system of perennial weeds (Sosnovsky's cow parsnip), are periodically clogged with weeds, leave a large number of uncut weeds on the surface of the cultivated area.

On the basis of previous studies [4], the design and technological parameters of the working body for tillage to a depth of 10 to 15 cm and the destruction of weeds with a powerful root system were substantiated [5], the process of their change was modeled when cutting the rhizomes of weeds [6] and developed and patented [7] its experimental sample for use in organic crop rotation.

As a result of field experiments, to evaluate the effectiveness of undercutting and traction resistance, a working body with three different forms of undercutting paws (crescent, swept, sickle-shaped with a double radius) was studied [8]. The average depth of cutting the root system of weeds was 10-12 cm. The total cutting of weeds was 100%. The best quality of cutting was shown by the working body, which has a crescent shape. Traction resistance was in the range from 1.06 to 1.9 kN at travel speeds from 5 to 12 km/h. In addition, studies have shown that the

lack of protection when hitting obstacles in the form of stones led to the deformation of the knife of the experimental working body or breakage and, accordingly, to a decrease in the reliability (increase in the failure rate) of the entire structure, so the agrobckground of the site had a high stoniness. In this regard, the task of research is to develop a safety device that improves the reliability of the proposed working body.

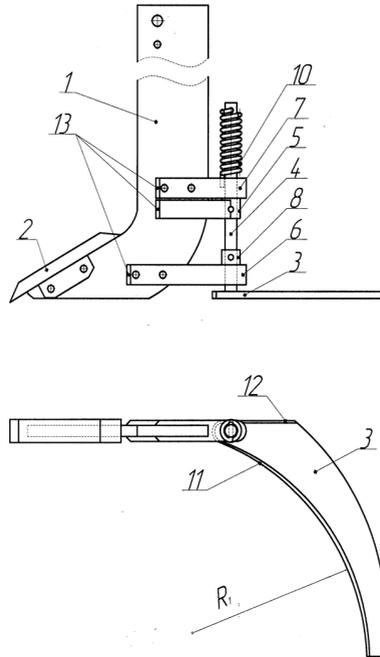
Materials and methods. When conducting research, well-known algorithms and methods for determining the design parameters of soil-cultivating working bodies of their fuses were used. Sketches and drawings of the working body were created using the computer program Compass-3D.

Results and its discussion. The main design parameters of the working body with a safety device are presented in table 1.

Table 1.
Design parameters of the working body for the destruction of weeds

Name of the parameter of the working body	Unit	Meaning
Tillage depth	sm	10-15
Width of capture of working body	mm	540
Stand Height	mm	880
Rack thickness	mm	25
Crushing angle (mortise chisel)	grad	30
Knife grip width	mm	480
Blade thickness	mm	14
Opening angle at the beginning of the knife	grad	30
Radius of curvature of the cutting edge of the knife (R _c)	grad	500
Width at the beginning and end of the knife	mm	210/50

The design of the working body with a fuse consists of a rack 1 with a chisel 2 (Fig. 1). A horizontal knife 3 is mounted on the rack using a vertical hinge, and a vertical plate 5 is rigidly fixed on the axis 4 of the hinge. limiter of vertical-horizontal movement, made in the form of a vertical plate, at the end of which a ring is rigidly fixed with the possibility of its interaction with the rack 1. The width of the vertical plate is less than the height of the ring. Holes 9 are made on the upper mounting plate 7 of the vertical hinge with the possibility of installing the lower hook of the torsion spring 10 in them. The upper hook of the spring is installed in the hole of the upper end of the axis 4 of the vertical hinge. The cutting edge 11 of the horizontal knife 3 is made along an arc of a circle of radius R₁, which is conjugated with the side surface 12 of the horizontal knife. Chamfers 13 are made at the ends of the mounting plates 6-7 of the vertical hinge and the vertical plate 5.



Rice 1. Scheme of the working body with a safety device for tillage and weed control:

1 - stand, 2 - chisel, 3 - knife, 4 - hinge axis, 5 - vertical plate, 6, 7 - mounting plates, 8 - limiter, 9 - holes, 10 - spring, 11 - cutting edge of the knife, 12 - side knife surface, 13 - chamfers, R_1 - knife radius.

The process of operation of the developed working body with the fuse installed is as follows. With the steady high-speed mode of operation at a given depth, the soil is loosened by the working body, while the horizontal knife 3, fixed on the lower part of the axis 4 of the vertical hinge, cuts the rhizomes of weeds with a powerful root system. When the working body moves, sliding cutting occurs along the entire length of the knife, due to the changing cutting angle, the value of which increases at its end. With the cutting edge of the knife 11, the roots of weeds are pressed into the soil layer due to the minimum cutting angle at its beginning and are cut. Part of the uncut weed roots slides along the cutting edge of the knife, made in the form of an arc of a circle of radius R_1 , while the remaining weeds are cut. The minimum required knife thickness increases the cutting effect. The cut parts of weeds and crop residues come off the knife and remain on the soil surface.

When hitting an obstacle (for example, a stone), the horizontal knife 3 deviates in the opposite direction, transferring the force created by the obstacle to the axis 4 of the vertical hinge, which, turning, twists the torsion spring 10. When the torsion spring 10 is twisted, a torque is created in the opposite direction, proportional to the angle twisting, in which the accumulation of mechanical energy occurs. After bypassing the obstacle, under the action of the accumulated energy, the torsion spring 10 returns to its original state, turning the axis 4 of the vertical hinge and, accordingly, deflecting (returning) the horizontal knife 3 fixed on it to its original position (at the initial angle), limited by the vertical plate 5 due to the interaction her with a stand. The magnitude of the tension force of the torsion spring is changed by rearranging its lower hook in the holes 9 of the upper mounting plate 7 of the vertical hinge.

In addition, the presence of a spring fuse installed on the working body provides the creation of self-oscillations, which prevents the roots of weeds and soil from sticking to the knife, and thereby improves the processes of loosening and cutting it.

Conclusions. The analysis of literary sources on technologies and operations of various tillage and destruction of weeds with a powerful root system led to the conclusion that the existing designs of the working bodies of machines often do not provide the required quality of the process for a number of important indicators. In this regard, a specific assessment of the effectiveness of various environmentally friendly methods in organic farming is required in order to destroy weeds on agricultural lands littered with stones and, on this basis, the creation of new working bodies and specialized tillage machines.

Based on the results of the analytical studies, a working body was designed with a safety device for the destruction of weeds with a powerful root system.

The peculiarity of its design lies in the use of a single-sided sickle-shaped wing, fixed on the rack with the help of an elastic element, the presence of which, when hitting an obstacle, helps prevent the deformation of the knife and, accordingly, its breakage, in addition, the self-oscillations of the fuse prevent soil and plants from sticking to the knife and improve their processes. cutting and loosening. As a result, the proposed design makes it possible to increase the reliability of the working body and the efficiency of weed control.

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电离层结构探测
IONOSPHERIC STRUCTURE SOUNDING

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注解。 考虑使用将探测频率转换成电离层电物理参数的装置来检测电离层结构的系统。

关键词： 电离层结构、探测信号、天线阵列、转换装置。

Annotation. *A system for detecting the ionospheric structure using a device that converts the probing frequency into electrophysical parameters of ionospheric layers is considered.*

Keywords: *Ionosphere structure, probing signal, antenna array, converting device.*

Known methods for probing the plasma layers of the ionosphere and troposphere are divided into the following groups of technologies:

1. Inclined ionospheric sounding (IIS);
2. Ground-based and satellite-based radiosounding of the ionosphere;
3. Sounding based on navigation space vehicles signals (NSV);
4. Ionospheric tomography;
5. Multi-frequency sounding from geostationary space vehicles (GSV).

The first group of sensing technologies in the Russian Federation uses a rare network of ground-based NZI stations. The second group requires a system of ground-based ionosondes and ionosondes on domestic space vehicles (SV). A foreign analogue of this direction is the development of the American network of modern digital ionosondes (e.g., Dynasonde 21) [1]. In the third, fourth and fifth groups, ionospheric sounding uses ionospheric penetration by NSV and GSV signals [2] and requires a sufficiently dense network of receiving stations to diagnose the morphology of atmospheric disturbances.

The physical basis of ionospheric sounding is the delay and refraction of propagation of spacecraft signals in the ionosphere and troposphere due to distortion of the radio receiver trajectory (see Fig. 1). On the basis of diagnostics of these effects during propagation of signals, for example, NSV and GSV, the electron content in the atmosphere is estimated, on the basis of which the characteristics of the radio signal propagation path are determined. The phase overlap in NSV signal propagation in a non-ideal medium is determined by the length of the signal propagation path between the receiver, transmitter and the refractive index of the medium [3].

Taking into account refractive indices of radio waves in the ionosphere and troposphere, estimates of delays of received signals and coordinates of the receiver and transmitter, the characteristics of the medium to be penetrated are estimated. It should be borne in mind that a number of characteristics of the medium being probed remain inaccessible for measurement and that, given the complexity of the radio monitoring process and the equipment used, the characteristics of the radio signal path are determined with a large error.

For sounding of ionosphere and troposphere with calculation of geomotion are used received through antenna devices signals of geostationary SV. Antennas are connected with navigation signal receivers and with corresponding power supplies. The control of the complex operation, planning of reception and signal processing is performed with the help of the processor, in which the programmes of switching of antenna devices through the station of data reception-transmission, solution of the direct and inverse problem of radio sounding of the atmosphere and restoration of altitude profiles, sections and fields, concentration of charged particles, characteristics of tropospheric refraction using the information and verification of the obtained results of sounding, creation of regional models of the ionosphere are flashed.

Consider the essence of the proposed solution to the problem of determining the height of the reflective layer of the ionosphere on the basis of the following calculation model.

In the first approximation of the radio signal propagation path can be represented as a waveguide, the lower wall of which is the Earth's surface, and the upper wall - the reflective layer of the ionosphere. Figure 1 shows a schematic of the waveguide, where the level $z = 0$ means the Earth's surface and the level $z = h$ - means the ionospheric reflecting layer. In this figure a cylindrical system is used, the coordinates of which are denoted by z , r and θ . A cylinder is assumed to be formed between the Earth's surface and the reflecting layer, with the antenna at its centre. The diameter of this cylinder is $2a$, and the height - h . Hereinafter we will call the boundary radius a the boundary radius.

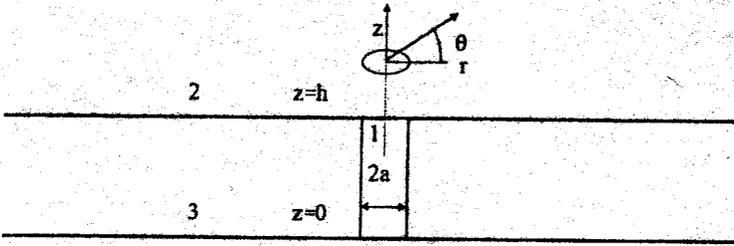


Figure 1. Antenna 1 is excited by a pulse generator in the form of delta functions $V_0 \delta(z)$ [2]. Due to axial symmetry, only the components of the electromagnetic field E_z, E_r and H [2]. Since E_r becomes equal to zero on both planes 2 and 3, the vector potential component A_z satisfies the boundary conditions

$$\frac{\partial A_z}{\partial z} \Big|_{z=0} = 0 \text{ и } \frac{\partial A_z}{\partial z} \Big|_{z=h} = 0. \tag{1}$$

The equation satisfying the vector potential A_z at all points outside the conductor has the form

$$(\nabla^2 + k_0^2) A_z = 0, \tag{2}$$

where $k_0 = 2\pi / \lambda$ – wave number (λ – wavelength)

A suitable Green's function can be obtained using the reflection principle. At reflection on two conducting planes 2 and 3 (Fig.1) an infinite sequence of reflected sources is obtained. They are located at the points $(2mh - z')$, where $m = 0, \pm 1, \pm 2, \dots$, and at the point $(2mh + z')$, where $m = 0, \pm 1, \pm 2, \dots$. Proceeding from this, we obtain the Green's function of the form

$$G = \sum_{m=-\infty}^{m=\infty} \frac{\exp(jk_0 R_m)}{4\pi R_m}, \tag{3}$$

which satisfies the inhomogeneous wave equation with periodically distributed sources

$$(\nabla^2 + k_0^2) G = -\sum_m \delta(r - r'_m) \tag{4}$$

and Neumann boundary conditions $\partial G / \partial z = 0$ at $z = 0$ и $z = h$, and radiation conditions at $r \rightarrow \infty$ (r and r' – coordinates of field and source vectors, respectively). $\delta(r - r'_m)$ – is the spatial Dirac delta function. $R_m = |r - r'_m|$ – distance between the points of the field and sources, which are defined as

$$R_m = \left[(z \mp z' - 2mh)^2 + \{2a \sin(\varphi / 2)\}^2 \right], \tag{5}$$

where $\varphi = \theta' - \theta$.

Так как, а метод возбуждения такой, что только z-компонента тока присутствует в вибраторе, то должен удовлетворять следующим граничным условиям на поверхности антенны:

Since $A_r - A_\theta = \partial A / \partial \theta = 0$ and the excitation method is such that only the z-component of the current I_z is present in the vibrator, so A_z must satisfy the following boundary conditions on the antenna surface:

$$\frac{\partial A_z}{\partial r} \Big|_{r=0} = \frac{\mu_0 I_z}{2\pi a}, \quad (6)$$

where $\mu_0 = 4\pi \cdot 10^{-7}$ (Gn/m) is the magnetic permeability of free space. Using formulas (1) - (6), we find

$$A_z(r) = \frac{1}{8\pi^2 \nu} \int_0^h I_z(z') dz' \int_0^{2\pi} \left\{ \sum_{m=-\infty}^{\infty} \frac{\exp\left\{-jk_0 \sqrt{(z-z'-2mh)^2 + [2a \sin(\varphi/2)]^2}\right\}}{\sqrt{(z-z'-2mh)^2 + [2a \sin(\varphi/2)]^2}} + \sum_{m=-\infty}^{\infty} \frac{\exp\left\{-jk_0 \sqrt{(z+z'-2mh)^2 + [2a \sin(\varphi/2)]^2}\right\}}{\sqrt{(z+z'-2mh)^2 + [2a \sin(\varphi/2)]^2}} \right\} d\varphi, \quad (7)$$

where ν is the order of interference (for integers = maxima, for semi-integers - minima).

The sums given in formula (7) can be transformed using the Poisson summation formula [3]

$$\sum_{m=-\infty}^{\infty} f(\alpha m) = \frac{1}{\alpha} \sum_{m=-\infty}^{\infty} F(2\pi m / \alpha), \quad (8)$$

where $F(\omega)$ is the Fourier transform of the function, defined by the formula [2]:

$$F(\omega) = \int_{-\infty}^{\infty} f(t) \exp(-j\omega t) dt. \quad (9)$$

We use the following formula for the Fourier cosine transform [4]:

$$\int_{-\infty}^{\infty} \frac{\exp(-jk_0 \sqrt{c^2 + (\beta t)^2})}{\sqrt{c^2 + (\beta t)^2}} \cos(\omega t) dt = 2K_0 [c(\omega^2 - k_0^2)]^{1/2} \cos(\beta\omega), \quad (10)$$

where $K_0(\bullet)$ is the modified Bessel function of the second kind. Substituting expressions (8) and (10) into equation (7), we obtain

$$A_z(r) = \frac{1}{8\pi^2 \nu} \int_0^h I_z(z') dz' \frac{1}{h} \sum_{m=-\infty}^{\infty} \cos(\pi m z / h) \cos(\pi m z') \int_0^\pi K_0 [2k_0 \gamma_m \sin(\varphi/2)] d\varphi, \quad (11)$$

where

$$\gamma_m = \sqrt{\frac{\pi^2 m^2}{k_0^2 h^2} - 1}.$$

The electric field strength on the surface of the vibrator 1 (Fig. 1) will be

$$E_z(a) = Z_i I(z) - V_0 \delta(z), \tag{12}$$

where Z_i - input impedance of the vibrator, $V_0 \delta(z)$ - signal voltage at the antenna connection point. For a relatively short antenna we assume $Z_i = 0$, then $E_z(a) = -V_0 \delta(z)$.

Through the vector potential A_z we define the tangential component of the electric field strength on the surface of the vibrator

$$E_z(a) = -\frac{j\omega}{k_0^2} \left[\frac{\partial A_z}{\partial z^2} + k_0^2 A_z \right]. \tag{13}$$

Proceeding from expressions (11) - (13), we find

$$V_0 \delta(z) = j\zeta_0 \int_0^h \left[a_0 + 2 \sum_{m=1}^{\infty} a_m \cos(\pi m z / h) \cdot \cos(\pi m z' / h) \right] I(z') dz', \tag{14}$$

where $\zeta_0 = 120 \pi$ - wave impedance of free space, Ohm; $a_i, i \in 0, 1, 2, \dots$ - coefficients of Fourier-Bessel series.

The current in antenna 1 (Fig. 1) is represented by the cosine Fourier series

$$I(z) = I_0 + 2 \sum_{m=1}^{\infty} I_m \cos\left(\frac{\pi m z}{h}\right), \tag{15}$$

where $I_m = V_0 / (j\zeta_0 h^2 a_m)$.

Denoting by $I_a(z)$ and $I_p(z)$ the active and reactive components of the vibrator current, we obtain

$$\begin{aligned} I(z) = I_a(z) + jI_p(z) &= \frac{V_0}{j\zeta_0 h^2} \left[\frac{1}{a_0} + 2 \sum_{m=1}^{\infty} \frac{\cos\left(\frac{\pi m z}{h}\right)}{a_m} \right] = \\ &= \frac{jV_0}{60k_0 h} \left[\frac{1}{(j\pi/2) \cdot H_0^{(2)}(k_0 a)} + 2 \sum_{m=1}^{\infty} \frac{\cos\left(\frac{\pi m z}{h}\right)}{\gamma_m^2 I_0(k_0 a \gamma_m) K_0(k_0 a \gamma_m)} \right], \end{aligned} \tag{16}$$

where $I_0(\bullet)$ and $J_0(\bullet)$ - modified and ordinary Bessel function of the first kind of zero order, respectively; $H_0^{(2)}(\bullet)$ - Hankel function of zero order.

For sufficiently large m , we use the following formulae:

$$\gamma_m = \sqrt{\left(\frac{\pi m}{k_0 h}\right)^2 - 1} \cong \frac{\pi m}{k_0 h}; \quad k_0 a \gamma_m \cong \frac{\pi m a}{h}; \quad \sum_{m=1}^{\infty} \frac{\cos\left(\frac{\pi m z}{h}\right)}{m} = -\ln \left[2 \sin\left(\frac{\pi z}{2h}\right) \right]; \tag{17}$$

$$I_0(z) \cong \exp(x) / \sqrt{2\pi x} ; K_0(x) \cong \exp(-x) \cdot \sqrt{\frac{\pi}{2x}} \text{ для } x \gg 1.$$

В результате проделанных математических операций получено выражение для комплексной входной проводимости антенны (рис. 1), возбуждающей напряжённость

As a result of the mathematical operations performed, an expression for the complex input conductance of the antenna Y_0 (Fig. 1) excitation voltage is derived $V_0 \delta(z)$

$$\text{Im}(Y_0) = \frac{1}{60k_0 h} \text{Re} \left\{ \left[\frac{j\pi}{2 \cdot J_0(k_0 a) H_0^{(2)}(k_0 a)} \right] + 2 \sum_{m=1}^M \left[\frac{1}{\gamma_m^2 I_0(k_0 a \gamma_m) \cdot K_0(k_0 a \gamma_m)} - \frac{2(k_0 a)(k_0 h)}{\pi m} \right] \right\}, \quad (18)$$

Where Y_0 – is the input conductivity of the antenna, h – the height of the reflecting layer of the ionosphere.

In formula (18) there are Bessel functions of both real and imaginary arguments. In formula (12), the expression under the radical changes sign at $k_0 h = \pi m$. In this case, there is a bifurcation of the solution of equation (14). The bifurcation refers to the imaginary component of the input conductance of the antenna. This condition is fulfilled when the radiation wavelength is $\lambda = 2h$. In this case, the active and reactive components of the input conductivity of the antenna Y_0 change abruptly (jump), which is a condition for accurate measurement of the distance between conducting surfaces. The dependence of the parameter a on the radius r_0 of the copper conductor for wavelength $\lambda = 20$ m is shown in Fig. 2.

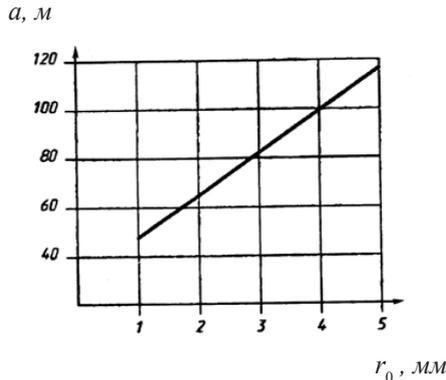


Figure 2.

The dependence of the input conductivity of the antenna on the height of the reflecting layer for a wavelength of $\lambda = 20$ m is shown in Fig. 3. 3, from where we can see that the active component of the input conductivity is small, and the modulus of the input conductivity is determined by the imaginary component.

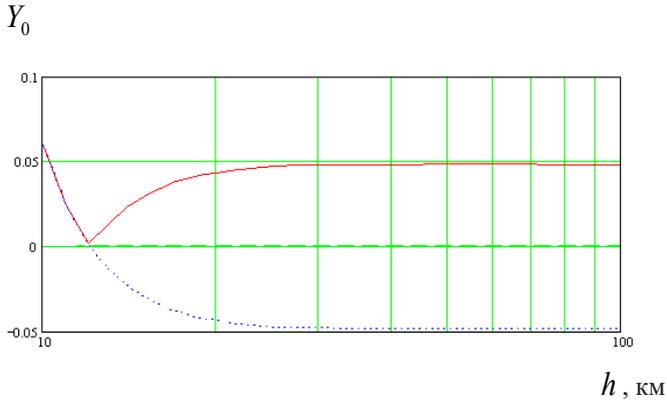


Figure 3.

Therefore, the question of the relationship between the height of the reflecting layer and the imaginary component of the input conductivity is important. For the frequency range 50...200 kHz in Fig. 4 shows the dependence of the imaginary component of the input conductivity on the height of the reflecting layer and the frequency of the signal, from where we can see that with increasing frequency and height of the reflecting layer the modulus of the imaginary component of the input conductivity decreases, which allows us to determine the average height of the reflecting layer on the radio signal trace.

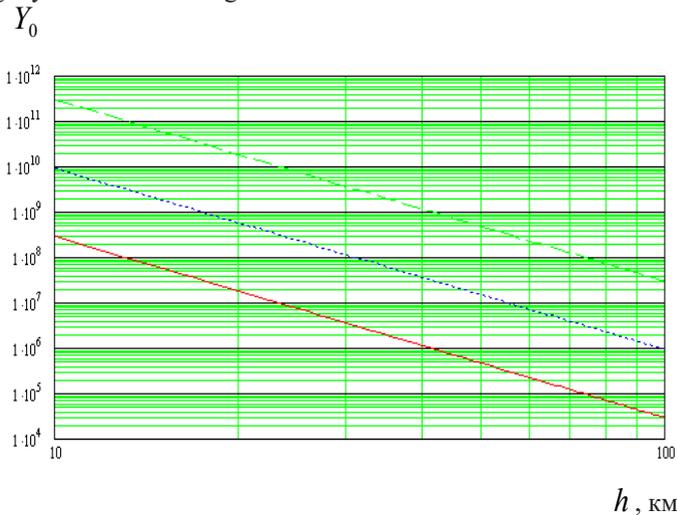


Figure 4.

As a meter of the imaginary component of the input conductivity it is possible to use the device, the structural scheme of which is shown in Fig. 5.

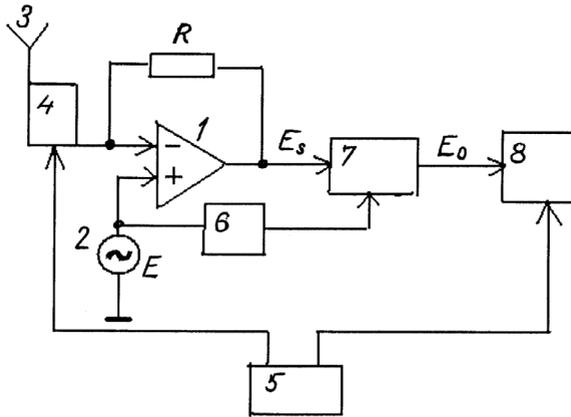


Figure 5.

The device for realising the method of ionosphere sounding (Fig. 5), consists of an operational amplifier 1, to the non-inverse input of which is fed test signal from the harmonic signal generator 2, and to the inverse input of which is connected to the antenna 3, control of the pattern of which is carried out by block 4, connected to the first output of the processor 5, the non-inverse input of the operational amplifier is connected to the input of the phase-shifting circuit 6, the output of which is connected to the second input of the phase-sensitive detector 7, and the first input of which is connected to the output of the operational amplifier, and the output of the phase-sensitive detector 7 is connected to the first input of the block of registration of measurement results 8, and the second input of the block 8 is connected to the second output of the processor 5.

The operation of the device for realising the method of ionosphere sounding (Fig. 5) consists of the following.

The complex input conductance of the antenna Y_0 (antenna 3) is defined as $Y_0 = g + jb\omega$, where g - the real part of the input conductance of the antenna, $b\omega$ - the imaginary part of the input conductance of the antenna, ω - the signal frequency of the harmonic signal generator 2.

Then the voltage at the output of the operational amplifier E_s is defined as

$$E_s = E(1 + Rg + j\omega Rb), \quad (19)$$

where E - test signal voltage of the harmonic signal generator 2, R - nominal value of the feedback resistor of the operational amplifier 1 (Fig. 5).

Since only the imaginary part of the antenna input conductance is measured, it is necessary to extract only the quadrature part of this voltage from the voltage at the output of the operational amplifier E_S . With the phase-sensitive detector 7, this is achieved by using a phase-shifting circuit 6 connected to its second input. The phase-shifting circuit 6 performs a phase shift of the oscillator test signal E by an angle of $\phi = \pi / 2$. As a result, the signal appears at the output of the phase-sensitive detector 7

$$E_0 = A|E|\omega Rb, \tag{20}$$

where A - characteristic of phase-sensitive detector 7.

The voltage E_0 is directly proportional to the imaginary part of the input conductivity of antenna 1. Block registration of measurement results 8 is connected with the second output of the processor 5, with the help of which the actual height of the reflective layer of the ionosphere h is calculated with the subsequent visual registration and memory of the calculation results. The processor 5 also provides commands to block 4 for controlling the antenna pattern 1. Methods and hardware used to control the antenna pattern can be found in [4].

The proposed model for calculating the height of the reflective layer is necessary in emergency conditions, when this height may vary according to Fig. 6.

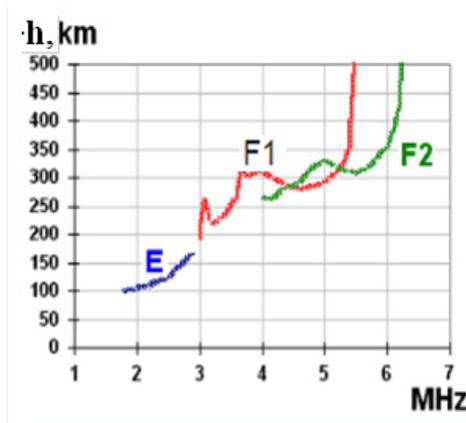


Figure 6.

To ensure reliable radio communication it is necessary that the frequency of the signal reflected from the ionospheric layer does not exceed the values indicated in Fig. 6. In this case, the proposed device allows you to select a range of frequencies of message transmission and determine the desired direction of signal emission.

In addition to ensuring reliable communication, the proposed device allows you to detect the presence of various objects from which there is a reflection of the sounding signal

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动态系统软件设计基础

FUNDAMENTALS OF DYNAMIC SYSTEMS SOFTWARE DESIGN

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抽象的。这项工作致力于管理动态系统元信息资源的软件设计基础知识。给出了服务器端和客户端的主要功能、系统的控制元件和机制、子系统的图数据结构、系统中软件模块的互连方案。

关键词：服务器端和客户端功能、软件模块互连方案、图数据结构、控制元素、执行控制器。

Abstract. *The work is devoted to the basics of software design for managing meta-information resources of dynamic systems. The main functions on the server side and on the client side, control elements and mechanisms of the system, graph data structures of subsystems, the scheme of interconnections of software modules in the system are presented*

Keywords: *functions on the server side and on the client side, the scheme of interconnections of software modules, graph data structures, control elements, implementation controllers.*

The digital evolution of intellectual developments allows us to improve scientific developments and remain competitive in the IT technology market. Modern trends in the development of enterprises are based on digital platforms, new tools. The state of economic development is characterized by hyper-automation of socio-economic clusters, the creation of digital twins of enterprises, the digital transformation of import substitution platforms, which is an integral factor of progress. Tools focused on the interaction of digital resources make it possible to qualitatively improve business processes based on the needs and wishes of individual enterprises, create an intelligent digital workspace, and commercialize the activities of an enterprise.

Experience in the development and implementation of intelligent systems for automated access to scientific and technical information [1] is based on knowledge of technologies for operating the main functions on the server side (libdatabase.js; serverDissAuto.js;

serverManuals.js serverPub.js server6NK.js), as well as basic client-side functions (addArticleCtrl.js; addcityCtrl.js; addManualCtrl.js; addmbookCtrl.js; addPeriodicCtrl.js; adminCtrl.js; changeCtrl.js; Doc1Ctrl.js; exloginCtrl.js; ListCtrl.js; ListKatCommCtrl.js; ListKatCtrl.js; ListNIICtrl.js; ListPubCtrl.js; mainCtrl.js; manualListCtrl2.js; mbookclassesCtrl.js; mbookfindCtrl.js; mbooksCtrl.js; mclassesCtrl.js; perioExCtrl.js; personalCtrl.js ; phonesController.js; ReportCtrl.js).

Flexible intelligent platforms have been developed and implemented in various sectors of the economy [2, p. 124], a fundamentally new approach to solving the problems of the socio-economic development process. The studies presented in the project provide a new solution to the problem of developing the management of a meta-information process based on distributed heterogeneous super-computer systems. An intelligent control algorithm for the mechanism of optimal interaction establishes an unambiguous relationship between the information system, the object and the controlled environment to obtain stable and unambiguous characteristics of the system. The proposed approach provides accurate tracking of the digital content profile, mutual adaptation of the object, environment and measurement system is ensured.

The main conceptual idea is to create conditions for the development of an interactive high-tech efficient information system for the industry serving the enterprises of the republic. The object of the study is the process of interaction of meta-information resources available for search interaction over the network, such as documentary databases, digital libraries, catalogs, search engines, as well as the characteristics of these resources in terms of organizing automated access to them.

The tools of the monitoring information-analytical system for industrial use have been developed: the automated workplace of the user - the intelligent assistant of information diagnostics [2, p. 205]. The structural-logical model of the system implementation is implemented using the process-system approach, event-oriented architecture; semantic hints of the user interface. The control elements of the system are: user authentication algorithms in the system; algorithms for controlling user-entered information before sending it to the server; algorithms for recording / updating information in the database; search algorithms in the database for information requested by the user; algorithms for generating output documents in PDF and DOCX formats; backup and data recovery algorithms.

The mechanisms of the system are: Node.js open source server platform; DBMS PostgreSQL; express library (web framework for Node.js applications);

sequelize ORM library (a tool for interaction between the Node.js platform and relational databases); officegen library (creating documents in MS Office formats); node-schedule library (task scheduler); dotenv library (working with environment variables); crypto library (secure cryptographic algorithms); read-excel-file library (reading data from MS Excel files); pdfkit library (generation of documents in PDF format); AngularJS (Open source JavaScript framework).

The information-analytical process is formalized, a model for determining compliance with the functional requirements of the system is formulated. The graph data structure of the database (DB) administration subsystems, work with the reference database, accounting and user registration is shown in Fig. 1; the graph data structure for the subsystems for displaying information from registers, the personal account of the enterprise, preparing input and output information is shown in Fig. 2; the scheme of interrelations of software modules in the system is shown in Fig.3. The formation of the exchange between the pages and the database and the display of data on the pages are provided by implementation controllers - modules for managing the html page: addIndustryCtrl.js - adding an entry to the directory of industries; addSubdivCtrl.js - adding an entry about the MPT subdivision; adm_addStreetCtrl.js - adding a street entry to the directory; adm_addUserCtrl.js – registration of an MPT employee user by an administrator; adm_baseController.js - system administrator page; adm_cityDistrictListCtrl.js - list of administrative districts of the city; adm_cityListCtrl.js - list of cities and administrative regions; adm_cityPlusListCtrl.js - list of cities with subordinate settlements; adm_countryListCtrl.js - view the list of countries; adm_kvedListCtrl.js - viewing the list of foreign economic activity codes (FEAC); adm_nppListCtrl.js - view the directory of codes for the nomenclature of industrial products (NIP); adm_streetListCtrl.js - view the street directory; adm_tnvedListCtrl.js – viewing the reference book of codes of the commodity nomenclature of foreign economic activity (CN FEA); adm_usersCtrl.js - list of users - MPT employees; changeCtrl.js - user password change; eo_scanConcCtrl.js - page for attaching a scanned copy of the conclusion; o_viewConclusionsCtrl.js - view the list of ready-made conclusions; eo_viewRequestsCtrl.js - view submitted applications; exitCtrl.js - confirmation of exit from the account; indListCtrl.js - a directory of industries; inpAddressCtrl.js - page for entering data about the address; lk_addProductCtrl.js - page for entering / editing data on the type of product; lk_addRequestCtrl.js - preparation of an application for the issuance of an opinion / exclusion of products from the register; lk_addRequestExpCtrl.js - preparation of an application for inclusion in the register of exporters; lk_companyCtrl.js - enter / edit company data.

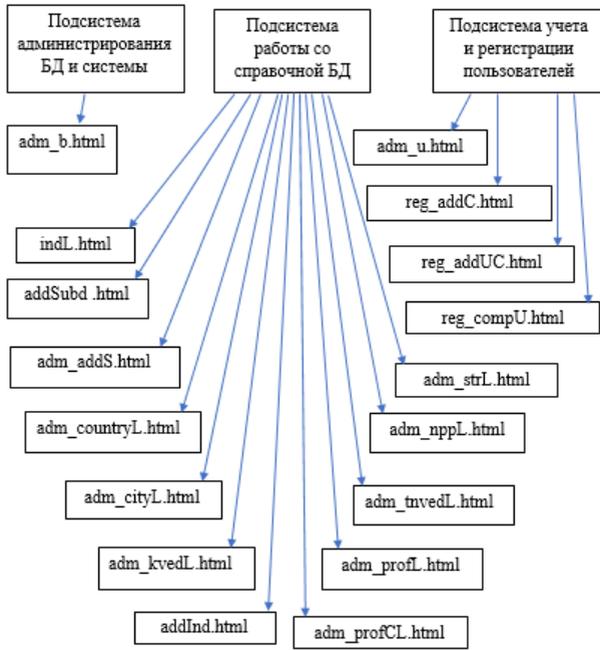


Figure 1. Graph data structure of database (DB) administration subsystems, work with a reference DB, accounting and user registration

The practical value of the work lies in the prospective significance of the project, solving the problem of commercialization of information industrial resources of the republic, including automated user workstations, logistics, statistics, monitoring, the main functional purpose of which is an interactive high-tech effective system of automated interaction of digital resources of near and far abroad; organizing the possibility of accumulating and processing additional information about industrial enterprises (data on the installed technological equipment, its characteristics and condition, on suppliers of raw materials and components).

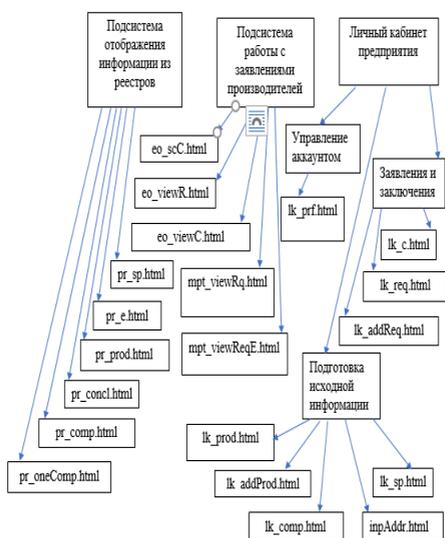


Figure 2. Graph data structure for subsystems for displaying information from registers, personal account of the enterprise, preparation of input and output information

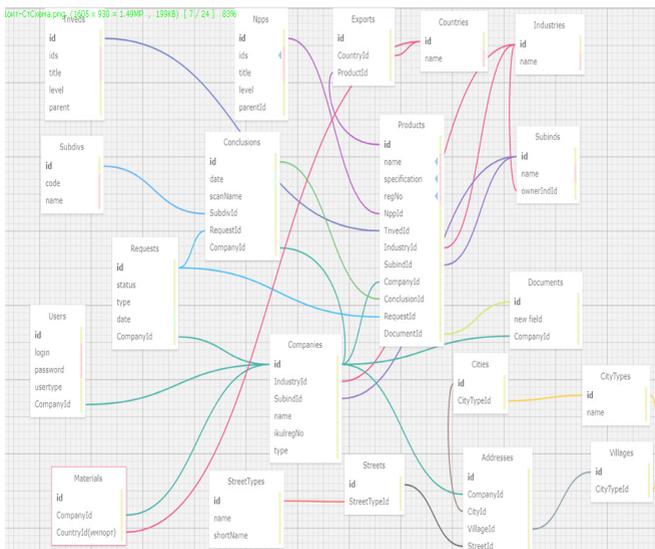


Figure 3. Scheme of interrelations of software modules in the system.

The new scientific approach will allow integrating databases of near and far abroad countries, which will contribute to the socio-economic mutually beneficial cooperation of all participants in the process.

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参数化泄漏检测系统运行的数学模型
**MATHEMATICAL MODEL OF PARAMETRIC LEAK DETECTION
SYSTEM OPERATION**

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抽象的。本文研究了基于压力、流量等工艺参数变化的参数化泄漏检测系统的数学模型。模拟了三种泵送模式：正常模式（无泄漏）；发生突然泄漏；发生平滑泄漏。该模型对主要管道实际事件所获得的数据的认可显示出良好的收敛性（5% 以内）。

关键词：管道泄漏、未经授权的窃听、参数化泄漏检测系统、泄漏识别。

Abstract. *The article deals with the mathematical model of parametric leak detection system based on the change of such technological parameters as pressure and flow rate. Three pumping modes are modeled: normal mode (no leakage); occurrence of sudden leakage; occurrence of smooth leakage. Approbation of the model on the data obtained as a result of real incidents on main pipelines has shown good convergence (within 5%).*

Keywords: *pipeline leakage, unauthorized tapping, parametric leakage detection system, leakage identification.*

Introduction

Pipeline transportation has been the classical way of long-distance transportation of liquid hydrocarbons for many years. In Russia more than 90% of the produced oil is transported through trunk pipelines with the total length of more than 217 thousand km.

Pipelines are designed and operated taking into account the probable effects of the environment and transportation conditions on their design. Nevertheless,

accidents occur, resulting in significant losses of energy, natural and human resources. One of the main causes of these incidents is pipeline leaks, the problem of eliminating them has not been fully solved yet.

The causes of oil leaks on trunk pipelines are different [1]. They can be defects in pipeline structures, technological violations during construction and welding works, insufficient protection of pipeline structure from corrosion, violation of pumping technology and pipeline operation rules, natural phenomena such as floods, landslides, earthquakes, unauthorized taps with criminal purposes, etc.

Fig. 1 shows the approximate share of the main causes of emergency leaks in 2017-2018 [2]. Before making a decision on actions in case of leak detection in pipelines, as a rule, it is necessary to have sufficiently reliable information on the location and size of leaks. For this purpose, leak detection systems (LDS) are widely used, which can be external and internal diagnostics [3].

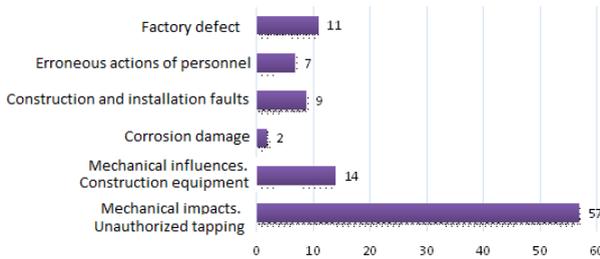


Figure 1. Causes of emergency leaks

When using external detection systems, parameters outside the pipeline structure are monitored. This is done with instrumentation designed for external monitoring, such as thermal imaging, acoustic microphone, vapor detector, infrared radiometer, fiber optic cable, etc. External systems show excellent results, but in many cases cannot be used permanently. The need for specialized equipment makes the investment and operating costs extremely high. For this reason, external systems are only used in critical applications, e.g. when a pipeline passes through a protected natural area.

With the help of internal diagnostics systems, the values of technological parameters of the transported medium are monitored in the pipeline. For this purpose, transducers such as pressure sensors, flow meters, temperature sensors, etc. are installed. Leak detection is based on the analysis of telemetry data of technological parameters and application of a mathematical model to make a decision on the presence of a leak. Therefore, the systems are called parametric (PIU). These systems do not have high sensitivity, however, due to low operating costs, it is more profitable for companies to use them.

Relevance of the study

Various methods are used in SIU, e.g. pressure monitoring method with fixed or sliding set point, hydraulic location method, linear or material balance methods, flow rate comparison method. The process parameters used are pressure and flow rate or their gradient of change. The most significant parameter in determining the presence of a leak is pressure. Since the same pressure transducers are practically used in pressure sensors of different companies, modernization of systems is carried out mainly by improving algorithms of processing of measuring information received from sensors. Therefore, the task of analyzing and identifying signals in pressure transmitters is of great practical importance.

Statement of the research task

Process data from measuring instruments are processed on the upper level with the help of appropriate software. Among the main technologies, on which the principle of parametric systems operation is based, it is necessary to note the technology of dynamic modeling in real time Real Time Trade Matching (RTTM). Parametric systems based on this technology are actively used in pipeline transportation diagnostics. Dynamic modeling of the technological process in time is performed, the resulting mathematical model compares measurements made during the actual operation of the pipeline in real time with the results of computer modeling of the pipeline, and makes a conclusion about the flow of the technological process. If the RTTM detects a flow mismatch, leak signature analysis algorithms determine whether it was caused by transducer error, gradual leakage or sudden leakage. Statistical classification algorithms determine the signature by assigning it to a class:

- step signature for sudden leaks;
- drift signature for smooth leaks and drifting sensor readings;
- all other types of signatures.

The mathematical apparatus of signature analysis algorithms used in Pipe Patrol systems is not given in open information sources, which makes it difficult to adapt these algorithms for a particular pipeline. It is also practically unrealistic to conduct full-scale experiments on operating pipelines. Therefore, the purpose of this study is to develop a simple mathematical model that allows obtaining statistical reference data for further signal analysis and selection of the signature processing method most suitable for leak detection and identification.

Research results and their practical significance

In order to conduct research it is necessary to build a mathematical model of the pipeline section with controlled leakage in MATLAB, which can be used to obtain approximate to real values data of the hydraulic profile of the pipeline. The modeling is performed using blocks from two libraries: Simulink and Simscape [4].

The hydraulic model consists of a hydraulic station block, a pipeline and a hydraulic motor. It also has pressure transducers and flow meters to take process parameters of the model.

The hydraulic station is a block of pumps and a block of fluid parameters. The ideal flow source unit (Hydraulic Pressure Source) is used as pumps. The parameters of the pressure setting unit can be adjusted, thus changing the maximal pressure at the outlet of each pump. The piping is also realized using two blocks, one of which is taken as a reference. The second piping block is the block after the variable restrictor valve, which is used to artificially create a leak of a certain size.

Technological parameters of the hydraulic system are calculated by means of the installed pressure and flow sensor units. The measuring instruments are installed in both pipeline blocks. In order to make the measured technological parameters close to the real values, blocks of proportional error coefficients for all sensors are introduced. The principle of operation of these blocks is that they generate a random number, which is further multiplied by the calculated absolute error limit of the measurement. The obtained values are summarized with the ideal values from the sensors, thus simulating noise. Technological parameters of the operation mode of the first block of the pipeline are taken as reference ones, and the dynamics of change of technological parameters at violations of the pipeline operation mode is monitored relative to these data. Measuring information from the second block is taken as actual, in this block the leakage is artificially created by means of a throttle.

The obtained mathematical model of the hydraulic system in MATLAB is presented in Fig. 2.

According to this model, three modes of pipeline operation were investigated: without leakage, with sudden leakage and with smooth leakage.

In the mode without leakage, when the technological process of pumping runs normally, the change of parameters is not observed, the area of the leakage hole is equal to zero and does not change in time (Fig. 3). The operation of the SIU is based on the comparison of readings of two pressure (or flow) sensors installed at the boundaries of the controlled area. In the absence of leaks, they do not change significantly, and the difference between the readings (Delta pressure sensors) fluctuates around some average value (Fig. 4). The graphs of flow rate values change look similar.

As a result of a sudden leak in the pipeline, for example, due to damage to the pipeline by an excavator, there is a sharp pressure drop, which also leads to a sharp change in their difference (Fig. 5). In the model under consideration, this mode was simulated by a sharp opening of the throttle at the 5th second. The leakage area also increased sharply (Fig. 6).

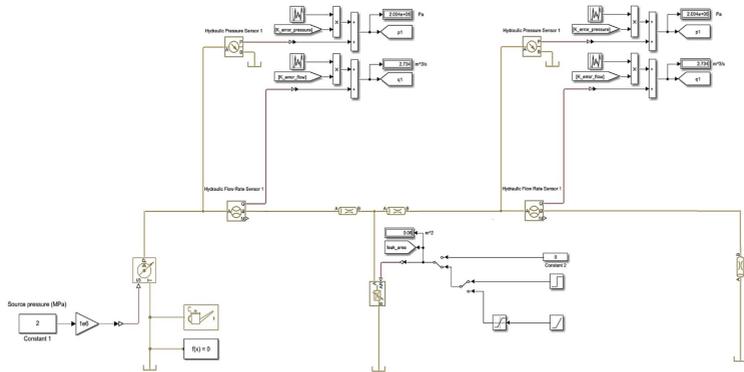


Figure 2. Mathematical model of hydraulic system in MATLAB

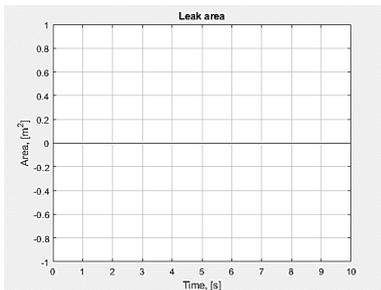


Figure 3. Leakage area in normal operation

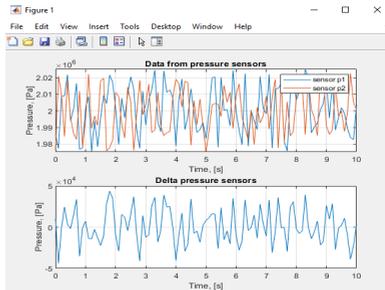


Figure 4. Values of pressures in the pipelines and their difference in the absence of leakage

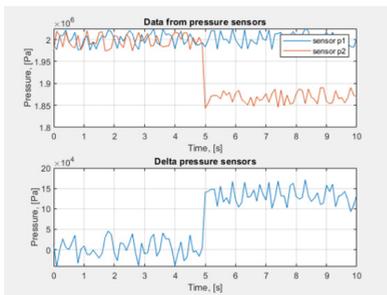


Figure 5. Change of pressures in pipelines and their differential at sudden leakage

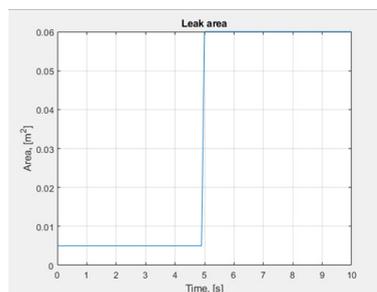


Figure 6. Area of sudden leakage at its occurrence

When the pressure drops, the pump increases its head, so that the flow rate in the pipeline increases sharply (Fig. 7).

Smooth leaks caused, for example, by corrosion, have two important characteristics: the leak volume is often extremely small and it develops slowly. In the model, the occurrence of a smooth leak is simulated by changing the opening angle of the throttle valve (Fig. 8). The pressure drop and the corresponding increase in flow rate are also smooth (Fig. 9, 10).

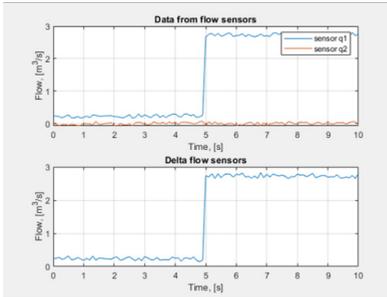


Figure 7. Flow rate variation in the pipeline during a sudden leak

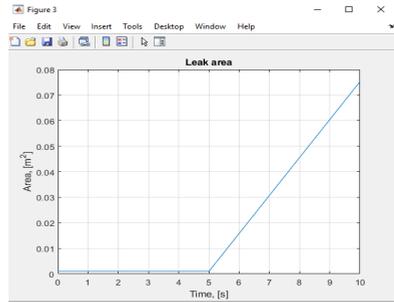


Figure 8. Variation of area during a smooth leakage

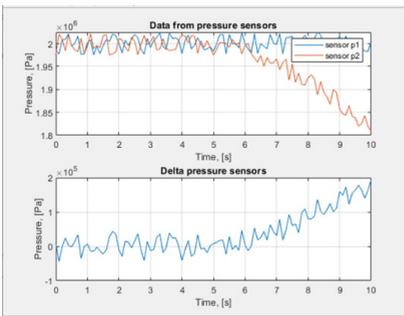


Figure 9. Variation of pressure in the pipelines and their differential at smooth leakage

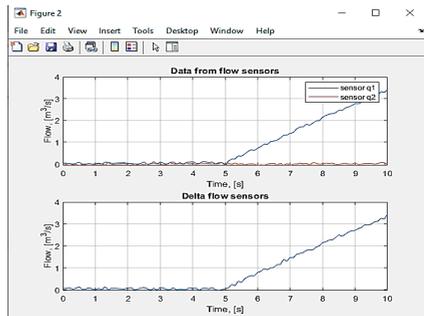


Figure 10. Variation of flow rate in the pipeline at smooth leakage

Conclusions

The analysis of leak detection systems from technological and main pipelines has shown that the most common are parametric systems, in which the occurrence of leakage is identified by the dynamics of change of any technological parameter, as a rule, pressure or flow. Since it is practically impossible to carry out full-scale

experiments, the study of SIU is carried out using mathematical models. The proposed mathematical model has been tested for operating conditions corresponding to the operating pipelines, on several leak diameters, also approximately corresponding to those arising in real incidents. Virtual experiments were conducted for a sudden leak with a sharp increase in diameter from 0.08 to 0.28 m and a smooth leak with an increase in area from 0.08 to 0.15 meters. The smoothed pressure and flow rate changes showed good convergence with real values (within 5 %).

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金属带材变形自动控制系统
AUTOMATIC CONTROL SYSTEM FOR METAL STRIP
DEFORMATION

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B. N. Yeltsin.

注解。这项工作引起了生产板材产品（包括有色金属、箔材）的企业的兴趣。连续金属带材变形过程的自动控制系统（ACS）允许在考虑允许负公差的边界的情况下生产板材产品，从而降低金属轧制产品的成本。激光测厚仪用于带材变形控制系统，可测量 3 毫米以上的厚度。至 15 毫米。同时以高达 60 m/min 的速度移动。在 ACS 的输入端和输出端的金属变形后计算拉伸系数。

关键词：厚度测量、三角测量、激光测厚仪、弯曲、弯曲和拉紧装置。

Annotation. *The work is of interest for enterprises producing sheet products, including non-ferrous metals, foil. The automatic control system (ACS) of the process of deformation of continuous metal strip allows, to produce sheet products, taking into account the boundary of the allowed minus tolerance and, consequently, to reduce the costs of metal rolled products. Laser thickness gauges are used in the strip deformation control system to measure thicknesses from 3 mm. to 15 mm. while moving at a speed of up to 60 m/min. at the input to the ACS and after metal deformation at the output to calculate the drawing coefficient.*

Keywords: *Thickness measurement, triangulation measurements, laser thickness gauge, bending, bending and tentoning devices.*

Laser thickness gauges [1,2] are used to measure the thickness of rolled products in the ACS process of metal deformation. The current rolling thickness at the input to the ACS is measured by the first thickness gauge . At the output of the ACS, after deformation, the current thickness is measured by a second thickness gauge Laser thickness gauge consists of a measuring bracket and a personal computer. The structural diagram of the measuring bracket is shown in Fig.1. It consists of two laser distance measurers located above and below the rolled product.

The laser distance meter consists of a transmitting channel with a semiconductor emitter with a power of 40 mw and a receiving channel with a linear receiver,

the number of elements 3648, size 8x200 microns, length 33 mm. Transmitting channels form light marks on the upper and lower surface of the rolled product. Lambertian component of diffuse reflection is registered by receiving channel with linear receiver located at the angle $\mu_{mp} = 45^{\circ}$. Some technical characteristics of the thickness gauge are given in Table 1.

Table 1
Characteristics of the laser thickness gauge

Parameters	Characteristics
Measured thickness range, mm	2-15
Measuring frequency, hz	100
Measurement error, μm	20
Emitter wavelength, nm	658
Supply voltage, V	220
Interface	RS-485 RS-232
Distance to rolled metal, mm	90
Dynamic measuring range, mm	50
Size of the light mark in the middle of the dynamic range on the metal surface, mm.	1.5

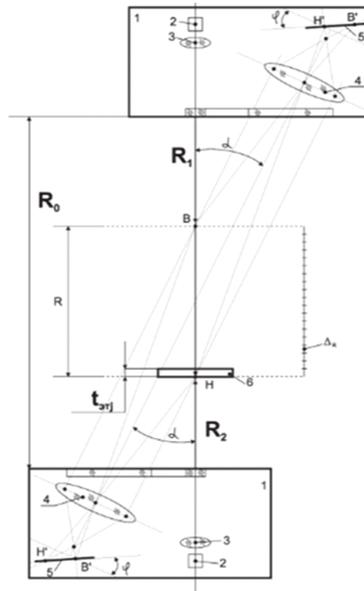


Figure 1. Structural scheme of the measuring bracket of the laser thickness gauge: 1 - laser distance gauges; 2 - semiconductor emitters; 3 - forming optics of the emitter; 4 - receiving lens; 5 - linear receiver; 6 - thickness standard; R1 -

distance from the upper laser distance gauge to the rolling surface; R_2 - distance from the lower laser distance meter to the rolling surface; R_0 - distance between the upper and lower laser distance meters; α - angle of signal reception reflected from the rolling surface; R - measuring zone; H - lower limit of the measuring zone ; B - upper limit of the measuring zone; ΔR – step of moving the reference sample in the measurement area ; φ - Sheimpflug angle

The peculiarity of the application of laser thickness gauges in the production of rolled metal products is the mechanical impact of the mill on the position of the metal strip in the measuring zone and round-the-clock operation. The measuring zone is dusty, there is dirt. These destabilising factors require periodic control of the measurement error and, if necessary, calibration of the thickness gauge [2].

The thickness gauge has an automatic check of the measurement error at the operator's command after every 8 hours of operation. To clean the optical hatches of the lower laser distance meter located under the moving rolled stock from dirt and scale, the thickness gauge is connected to a pipeline of compressed air with a pressure of 3-5 Atm, the blowing period is 5 minutes. The hatches of the lower distance meter can be cleaned with water. The appearance of the thickness gauge is shown in Fig.2.

To stabilise the rolling position in the measuring zone, the thickness gauge works together with auxiliary equipment [3] The measurement error was checked on metals with different roughness values. Surface roughness of rolled metal surfaces R_a , R_q , R_z were measured by profilometer Taylor-Hobson PGI-1240 and are given in Table 2.



Figure 2. Laser thickness gauge TL-3. Dimensions $W \times H \times L$, 185 x 596 x 760, mm, weight 75 kg.

Table 2
Surface roughness parameters of rolled metal products

Metal rolling	Roughness		
	R_a	R_z	R_q
Rolled steel	1,413	1,847	1,815
Copper	0,192	1,141	0,259
Brass	0,134	0,858	0,182

The automated control system of the machine for metal bending and tensioning (GNU) is shown in Fig.3. The input data for the operation of the GNU are:

- current thickness of rolled products, read from the laser thickness gauge TL1
- the minimum permissible thickness of the manufactured product is entered by the operator.

When operating the metal deformation control system, two thickness gauges TL1 and TL1.2 (TL1.2 is not shown in Fig. 3) are used to measure the thickness of rolled products. Calculation of metal drawing is performed by the lesser thickness of the left or right edges measured by TL1 and TL1.2, installed on opposite sides.

The data on the diameters of the support 3 and pressure 2 rollers and the height of their position in the GNU are entered into the GNU controller. These data are periodically corrected during the adjustment work with the GNU

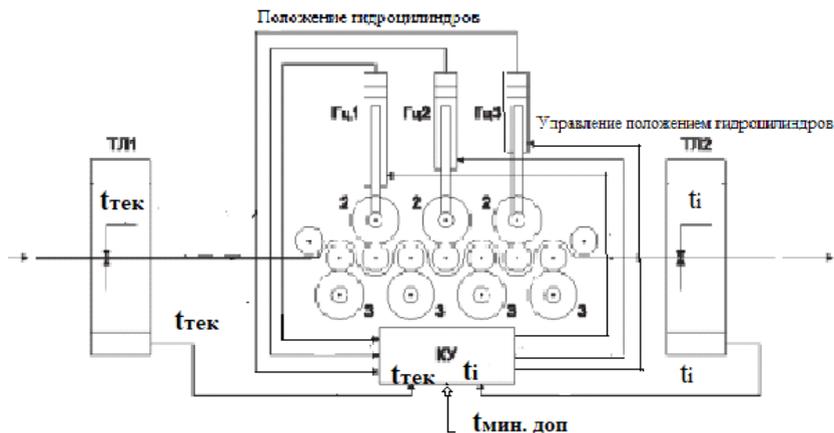


Figure 3. Gibon tensioning device (GTD) for metal strip drawing: TL1 and TL2 - laser thickness gauges , Hz1, Hz2, Hz3 - hydraulic cylinders, 2 - pressure rollers, 3 - support rollers, , - strip thickness, before GNU, after GNU. KV- control unit, minimum permissible drawing thickness entered by the operator

The law of distribution of the draws of the individual pressure rollers 2 see Fig.3 can be adjusted in relation to the central pressure roller 2. The operator can change the “slope” of the straight draws. Total extraction in the GNU where: current thickness from the thickness gauge, - minimum permissible thickness of manufactured products.

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含氧气氛中多晶 PbTe 和 PbS 薄膜光敏度的变化

**CHANGES IN THE PHOTSENSITIVITY OF POLYCRYSTALLINE
PBTE AND PBS FILMS IN AN OXYGEN-CONTAINING
ATMOSPHERE**

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注解。在这项工作中,考虑在不同基底上获得的 PbTe 和 PbS 薄膜。已经确定, PbS 薄膜的长期热处理会导致 $h\nu = 0.55$ eV 处的光电压符号发生变化,并且在 $h\nu = 0.3$ eV 的光谱长波长带中,光电导率有很小的变化。最大值,这是由于碰撞电离或深能级电荷载流子的产生所致。

关键词: 薄膜、PbTe、PbS、多晶、热处理、载流子浓度、电导率。

Annotation. *In this work considere PbTe and PbS films obtained on different substrates. It has been established that long-term heat treatment of PbS films leads to a change in the sign of the photovoltage at $h\nu = 0.55$ eV, and in the long-wavelength band of the spectrum at $h\nu = 0.3$ eV, the photoconductivity has a small maximum, which is due either to impact ionization or the generation of charge carriers from deep energetic level.*

Keywords: *films, PbTe, PbS, polycrystal, heat treatment, charge carrier concentrations, electrical conductivity.*

Introduction. Despite a large number of experimental and theoretical works, the physical processes responsible for photoelectric phenomena occurring in polycrystalline A_4B_6 films still remain unexplored, since this is due to the apparent inconsistency of the experimental data obtained by various authors [1-4]. The structures and properties of intercrystalline barriers in A_4B_6 materials are even more uncertain. It is reported in [5-7] that oxygen is concentrated on the surface of lead sulfide films and in intercrystalline interlayers, but does not penetrate into the

volume of crystallites. Oxygen in such films can form chemical compounds such as PbSO_4 and PbO , PbSO_4 , PbO on their surface and in intercrystalline interlayers. Heat-treated films of lead chalcogenides are very similar in their properties, which is probably why they have a non-uniform distribution of impurities both over the layer thickness and in the intergranular barrier.

Methodology. In this regard, let us consider the possibilities of using the technique [8,11] for measuring the spectral dependence of photoconductivity and photo-EMF as applied to PbS and PbTe films. Films obtained by deposition in a vacuum followed by their activation in an oxygen-containing atmosphere were studied [9,11].

Experimental results and their discussion. Figure 1 shows the dependence of photoconductivity (curve line 1) and photo-EMF (curve line 2) on the energy of the incident light quantum for PbTe films obtained on glass-ceramic substrate. In these films, the photo-EMF is more sensitive to the state of the surface (curve line 2) than the photoconductivity (curve line 1). This indicates a large asymmetry of the barriers near the surface, which is formed during processing. The asymmetry of barriers has a different relationship with the state of the surface in PbTe films deposited on an oxidized silicon surface. In such films, an inversion of the photo-EMF sign is observed in the region at $h\nu = 0,4$ eV (Fig. 2, curve line 2).

Next, the effects of the substrate and heat treatment conditions on the photoelectric properties of PbS films were studied. On fig. 3 and 4, shown the photo-EMF and PC spectra for these films deposited on polycor. The films were thermally treated for 10 and 20 min in an oxygen-containing atmosphere. As can be seen from the figure, long-term heat treatment of PbS films leads to a change in the photo-EMF sign to the opposite at $h\nu = 0,5$ eV (Fig. 3, curve line 3). The shape of the curves of the PT spectra does not change significantly with increasing heat treatment time (Fig. 4, curves 1, 2). In the long-wavelength region of the spectrum at $h\nu = 0,3$ eV, the phase transition has a small maximum, and some decrease is observed with increasing photon energy. Starting from $h\nu = 0,75$ eV, as the energy of a light quantum increases, the FP increases. Such an increase in photoconductivity can be due either to impact ionization or generation of charge carriers from deep bands [9] or from heterojunctions between crystallites and other compounds that form on the film surface and in intercrystalline interlayers during heat treatment. Then the film surface was removed by plasma etching, and the PC and photo-EMF spectra were again measured. Etching leads to the disappearance of the sign inversion and an increase in the photo-emf (Fig. 3, curve 2). This can be explained by the fact that before etching on the film surface, the barriers had opposite polarities. During plasma etching, a thin layer of the film surface is removed, and thereby the contribution of barriers that give photo-EMF of opposite polarity is reduced. The remaining barriers generate photo-EMF predominantly of one po-

larity, which contributes to its increase. This situation is apparently close to that in the case of CdTe after treatment with chlorine [3,7,9].

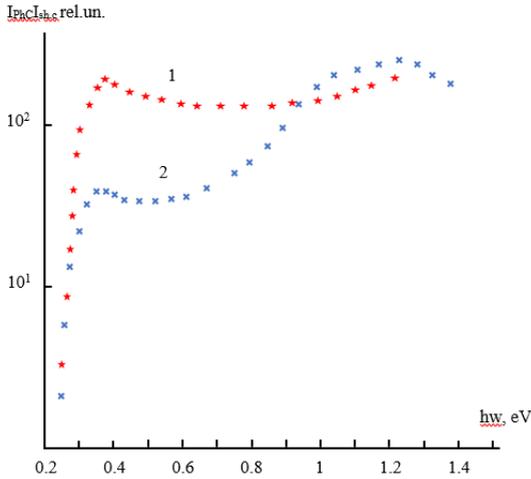


Figure 1. Spectra of phase transition (1) and Ics (2) for PbTe films obtained on glass-ceramic substrate. $T=300K$

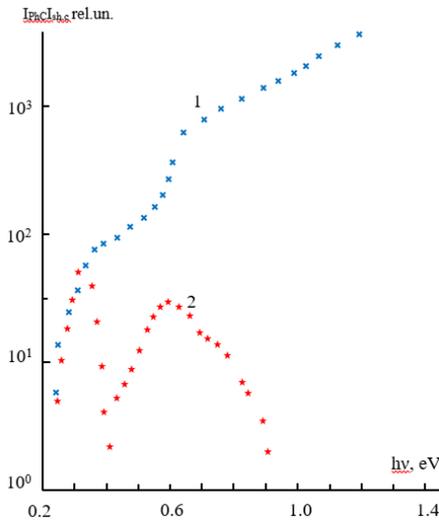


Figure 2. FP spectra(1) and Ic(2) for PbTe films obtained on a SiO₂-Si substrate. $T=300K$

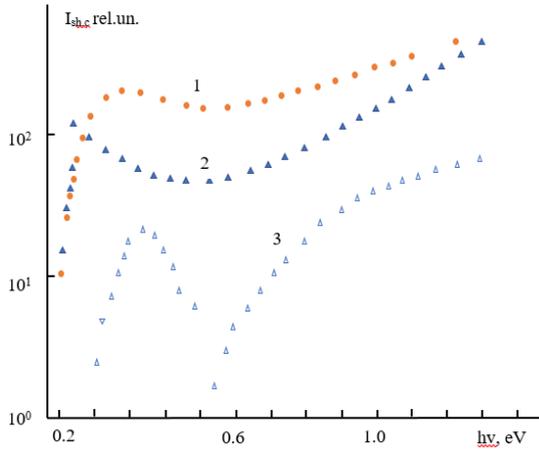


Figure 3. Photo-EMF spectra for PbS films obtained on polycor. 1 - after heat treatment for 10 min in an oxygen-containing atmosphere, 2 - after heat treatment for 20 min and plasma etching, 3 - after heat treatment for 20 min.

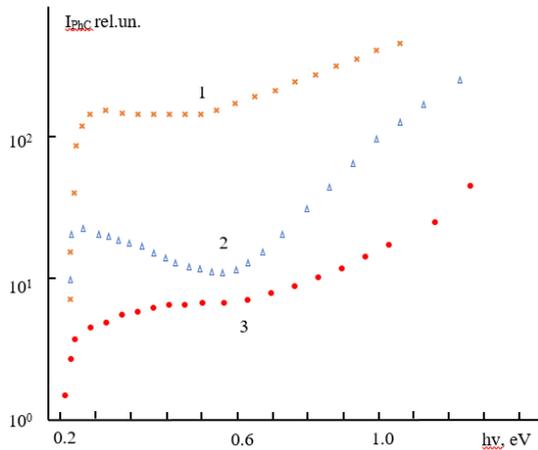


Figure 4. FP spectra for PbS films obtained on polycor ; 1 - after heat treatment for 10 min in an oxygen-containing atmosphere; 2 - after heat treatment for 20 min; 3 - after heat treatment for 20 min and plasma etching.

In films deposited on $\text{SiO}_2 - \text{Si}$, more asymmetric barriers are obtained, which change the polarity of the photo-EMF under back illumination at $h\nu = 0,8 \text{ eV}$ (Fig. 5, curve 3).

Conclusions. Thus, the complex technique used by us has shown sensitivity to the technology of fabrication and processing of layers, which makes it possible to use it to study the properties of films of A4 B6 semiconductor compounds.

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日粮中使用氧化褐煤对动物血液形态和生化参数的影响
**MORPHOLOGICAL AND BIOCHEMICAL PARAMETERS OF
ANIMAL BLOOD WITH THE USE OF OXIDIZED BROWN COAL
IN DIETS**

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注解。 该研究的目的是研究在克拉斯诺亚尔斯克地区的条件下,当泌乳牛饲喂氧化褐煤饲料混合物时,动物血液的形态和生化参数。 该研究的目的是确定氧化褐煤作为吸附剂和生物活性添加剂在泌乳牛日粮中的用途,及其对形态生化血液参数的影响。 已证实,在主粮中添加 5% 氧化褐煤可使血红蛋白含量增加 2.6%,红细胞含量增加 7.7%。 总蛋白、白蛋白、 α -球蛋白、 γ -球蛋白指标升高也超过对照组。

关键词: 吸附剂、氧化褐煤、饲喂、生物学参数、动物、形态参数、血红蛋白、红细胞、总蛋白。

Annotation. *The aim of the study was to study the morphological and biochemical parameters of the blood of animals in the conditions of the Krasnoyarsk Territory when fed in diets of oxidized brown coal in the feed mixture of lactating cows. The objectives of the research were to establish the use of oxidized brown coal as an adsorbent and a biologically active additive in the diets of lactating cows, and its effect on morphobiochemical blood parameters. It has been established that the introduction of 5% oxidized brown coal into the diet to the main diet made it possible to increase the amount of hemoglobin by 2.6%, erythrocytes by 7.7%. Increased indicators of total protein, albumin, α - globulins, γ - globulins also exceeded the control group.*

Keywords: *adsorbent, oxidized brown coal, feeding, biological parameters, animals, morphological parameters, hemoglobin, erythrocytes, total protein.*

Blood plays a vital role in the physiological processes of animals. It is responsible for transporting oxygen and nutrients to various parts of the body to sustain life. The circulatory system also helps remove metabolic products and carbon dioxide from body tissues.

In addition, blood plays a critical role in regulating body temperature. Blood vessels near the surface of the body can either expand or constrict, regulating the transfer of heat to the external environment. Blood also helps fight disease by transporting white blood cells to sites of infection or inflammation in the body [2].

Morphological and biochemical blood tests are carried out to detect metabolic disorders and deficiency of nutrients in the animal's body. These tests allow timely detection of leukemia and infections, and other changes that allow timely preventive measures to be taken.

The blood carries all the useful substances, vitamins and minerals throughout the body. How much, accurately and quickly the blood flows depends not only on the general condition of the animal, but also on the amount of milk.

If the analysis shows a lack of nutrients, certain measures can be taken, such as changing the diet, adding vitamin mixtures, or administering medications. To analyze and confirm the impact of the use of oxidized brown coal in the diet of lactating cows, a research experiment was conducted [1].

For the experiment, red-and-white breed cows of 3 lactations were taken. For 305 days, oxidized brown coal was added to the diet in an amount of 5% in addition to the main diet.

The diet used was adopted on the farm according to the physiological state of the animals.

After that, biological material was taken from animals and analyzes were carried out to determine the morphobiochemical parameters of blood [1].

The results of morphological parameters of the blood of experimental animals are presented in Table 1.

Table 1
Morphological parameters of blood of experimental animals (n=3)

Group	Hemoglobin, g/L	Erythrocytes, 10¹²/L	Leukocytes, 10⁹/L
Control	102,8±0,15	6,26±0,04	6,78±0,45
Experimental	105,5±0,92**	6,74±0,04***	6,80±0,43***

Hereinafter: *P>0,95, **P>0,99, ***P>0,999

From the data obtained, it can be concluded that in the blood of animals of the experimental group, the amount of hemoglobin and erythrocytes was higher by 2.6% and 7.7% (P> 0.99, P> 0.999), respectively, compared with the animals of the control group.

Consequently, oxidized brown coal, as a feed additive, did not have a significant effect on the number of leukocytes in the blood of animals in the experimental group and was within the physiological norm.

The health state of cows is assessed depending on the hematological and biochemical blood profile. Nutrition is the main technological factor that can cause profound changes in the metabolic profile in animals. Analysis of blood parameters can lead to the detection of errors in the nutrition of lactating cows.

The results of the biochemical blood composition of the cows of the experimental groups are presented in Table 2.

Table 2
Biochemical composition of the blood of cows of experimental groups

Indicator	Norm	Group	
		Control	Experimental
Reserve alkalinity	44,0-66,0	46,75±0,74	47,07±0,15
Urea, mmol/L	3,3-5,0	0,93±0,18	1,27±0,14
Glucose, mmol/L	2,22-3,88	3,27±0,07	3,43±0,09
ALT, IU/L	25,5-50,0	35,60±0,41	30,30±2,90
AST, IU/L	30,0-90,0	95,70±7,28	87,30±8,12
AST/ALT (RITIS coefficient)		2,69	2,88
Calcium, mmol/L	2,5-3,13	2,60±0,05	2,68±0,03
Sodium, mmol/L	141,3-145,7	144,70±2,96	148,70±0,88
Potassium, mmol/L	3,84-5,88	3,88±0,08	4,02±0,06
Chlorides, mmol/L		106,20 ± 5,11	106,30 ± 3,17
Inorganic phosphorus, mmol/L	1,45-1,94	1,55±0,05	1,73±0,05

As it can be seen from the data obtained in the blood of animals of the experimental group, the content of urea exceeds by 0.34 mmol/L, compared with the control group, which does not exceed the physiological norm.

Glucose is a sugar required for energy production and the proper functioning of many organs in the body, and it is the main and most important source of energy for animals. In the blood of experimental animals, the glucose content was within the normal range, a higher glucose content is observed in animals of the experimental group by 0.16 mmol/L.

To assess the direction and intensity of metabolism in the body of lactating cows, it is necessary to measure the functional state of the liver. The analyzes included ALT and AST, according to the data obtained, we observe a decrease in indicators in the experimental group by 5.3 and 8.4 IU/L, respectively, compared with the control group.

Minerals play a vital role in maintaining various bodily functions. They are essential for the proper functioning of enzymes, hormones and other biochemical reactions in the body. Minerals such as sodium, potassium, and chloride are electrolytes that help regulate fluid balance in the body. Analyzing the data obtained, the content of calcium and fluorine, hematological indicators of sodium, potassium and chlorides were within the normal range and did not exceed the physiological normative values [3, 4].

The content of protein and protein fractions in the blood serum of experimental animals is presented in Table 3.

Table 3
The content of protein and protein fractions in the blood serum of experimental animals (n=3)

Group	Total protein, g/l	Albumin, %	Globulins, %			A/T
			α - globulins	β - globulins	γ - globulins	
Control	73,08±0,85	34,26±0,69	12,06±0,35	11,26±1,77	27,29±2,16	0,68
Experimental	77,00±0,55**	36,62±0,31***	12,54±0,71	10,87±1,81	28,01±2,39	0,71

From the obtained data it can be seen that the animals of the experimental group, which received oxidized brown coal in addition to the main diet, improved the indicators of total protein, albumin, α , γ - globulins compared to the animals of the control group by 3.92 g/l, 2.36%, 0.48% and 0.72% respectively. With a simultaneous decrease in β - globulins by 0.39%. These indicators show an increase in the protective properties of the organism of animals in the experimental group.

Thus, the use of oxidized brown coal in the diet of lactating cows did not have a significant effect on the morphobiological parameters of blood. And it allowed to increase oxidative processes, thereby the body improves milk production.

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俄罗斯西北部水资源生态监测
**ECOLOGICAL MONITORING OF WATER RESOURCES OF
NORTH-WEST OF RUSSIA**

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抽象的。该文章证实了对水体进行持续监测以进行环境预测和预防水上极端情况的必要性，并提出了通过基于高科技投入材料加工技术的数学方法来减少财政和人力资源的方法。这些方法之一是表观指示的开发方法。通过定量和定性特征对变异性的定义进行了分析，并根据 C 系数对总体状况进行了评估。通过对列宁格勒省东部池塘考察数据的处理来说明方法。对小龙虾 *Astacus astacus* 的形态多样性进行了分析，并对无齿 *Anodonta piscinalis* 不同龄期的形态特征进行了分析。在表型发生方法的基础上，考虑了接触监测和卫星图像的方法。

关键词：种群多态性，种群变化规律，双侧性状不对称，形态多样性，种群状态评估。

Abstract. *The article substantiates the need for constant monitoring of water bodies for environmental forecasting and prevention of extreme situations on the water, and also suggests ways to reduce financial and human resources by mathematical methods based on high-tech input material processing technologies. One of these methods is the developing method of phenogenetic indication. An analysis of the definition of variability by quantitative and qualitative characteristics was made, an assessment of the state of the population based on the C coefficient was made. Methods are illustrated by processing of expedition data on ponds of East of Leningrad province. An analysis of the morphological diversity of crayfish *Astacus astacus* and an analysis of the morphometric characteristics of different age stages of the toothless *Anodonta piscinalis* were carried out. On the basis of the phenogenetic approach, the method of contact monitoring and satellite images is considered.*

Keywords: *population polymorphism, law of population change, asymmetry in bilateral traits, morphological diversity, assessment of the state of the population.*

Environmental monitoring is understood as a system of regular recurring observations and assessments of the biotic components of the natural environment. Like any scientific study, monitoring has two main goals: 1. Возможность predictions of the development of ecological processes, 2. More importantly, the ability to manage environmental processes. Nowadays, the importance of regular monitoring for science and the national economy has increased due to two circumstances: 1. Global increase in anthropogenic pressure, 2. The growth of climate instability and the increase in the number of natural disasters due to reasons that are not fully understood. Monitoring of water bodies is of particular importance for our country, as one of the richest water resources in the world, among all forms of monitoring. Monitoring of water resources allows us to create a database based on which you can build predictive models. The latter can be divided into dynamic and static. Dynamic is based on the analysis of dynamics, a time series of observations with the identification of the direction of further development of the process. Static ones are based on a one-time assessment of the state of the object and a forecast of the further development of the system. Static ones are less accurate and require more knowledge-intensive processing methods. But the lack of data on the dynamics of systems in some cases and the serious groundwork achieved in the field of fundamental ecology leads to the need and possibility of active use of static models. This is especially relevant today due to insufficient funding for monitoring work. This paper provides an analysis of contact methods of phenogenetic monitoring.

Methods. Phenogenetic indication

The method of phenogenetic indication has been developing since the last century and is used in the study of water bodies [2, 7, 8]. The practical application of most mathematical models of natural populations requires knowledge of many variables that can only be measured through long and expensive research in nature. Such observations are not always possible and have not been made for most species and ecosystems. Compensation for the lack of initial data can be carried out on the basis of a knowledge-intensive approach, taking into account the achievements of environmental science. Table 1 presents a hypothetical scheme of the dependence of the direction of population change on ecological processes. Is it possible, on the basis of a short-term or even one-time analysis of the state of populations, to determine which of the possible categories it belongs to, what its future fate is, and what is the minimum information required to predict the fate of the population and the ecological system? The ecological system includes interacting populations and their environment. The population is characterized by the

following features: Number of species population. It is difficult to draw conclusions based on its absolute value. A more significant characteristic is the law of change in numbers (N_t) by time (t). Unlimited population growth is described by the equation:

$$N_t = N_0 \cdot e^{kt}$$

Table 1.

Possible changes in the population depending on environmental conditions

population	genetic composition	
	stable	unstable
stable or cyclically changing	stable, favorable conditions	slow environmental changes leading to changes in genetic composition
exponentially decreasing	sharply unfavorable conditions to which it is impossible to adapt	relatively unfavorable conditions leading to a reduction in population
exponentially increasing	improvement of living conditions and expansion of the possible range of the population	qualitative restructuring of the ecological environment for the better

Where N_0 – is initial population, k – a coefficient reflecting the reproductive potency of the population. Periodic fluctuations in the number are possible, described by the dependence:

$$N_t = k \cdot \sin t$$

In this case, the population can be considered relatively stable. Variability by quantitative characteristics is usually estimated using the standard deviation, the coefficient of variation. The issue of a comprehensive assessment of variability for a number of quantitative characteristics has already been considered in the literature [4]. We offer the following simple algorithm. For each trait, all organisms are divided into three groups. In the first, the quantitative measure of the trait (denote x) is less than 0.9μ . The second group includes organisms in which the trait is within μ (1 ± 0.1), in the third x more 1.1μ . Then the quantitative variability of the complex of features is described by the formula:

$$W_{qn} = \frac{(\sum_{i=1}^n (\sqrt{p_{i1}} + \sqrt{p_{i2}} + \sqrt{p_{i3}}))^2}{n}, \tag{1}$$

where

$$p_{i1} = p(x < 0.9\mu), p_{i2} = p(0.9\mu \leq x \leq 1.1\mu), p_{i3} = p(x > 1.1\mu).$$

The error of this value of formula (1) should be evaluated:

$$m_{W_{Qn}} = \sqrt{\frac{W_{Qn}(3n - \mu)}{3n}},$$

where n is the number of features.

Variability in qualitative traits can be estimated in two ways. If one wild type predominates and anomalous forms are found as an exception, it is possible to estimate the proportion of such forms in the population:

$$P_{af} = \frac{n_{af}}{N}, \quad (2)$$

where n_{af} – number of atypical forms. The error is determined by the traditional formula for the fraction error:

$$m_{P_{af}} = \sqrt{\frac{P_{af}(1 - P_{af})}{N}}.$$

If the wild type is not so clearly distinguished in the population and there is a polymorphism, then the intrapopulation diversity can be estimated by the formula:

$$W_{QL} = \left(\sum_{i=1}^m \sqrt{p_i} \right)^2, \quad (3)$$

where p_i – frequency i -th morph, m – morph number. The error is determined by:

$$S_{W_{QL}} = \sqrt{\frac{W_{QL}(m - W_{QL})}{N}}.$$

The next characteristic is asymmetry in bilateral characteristics. On its basis, the state of the population is traditionally assessed [8]. Asymmetry is characterized by the following indicator:

$$S_{d^2} = \frac{\sum_{i=1}^n (a_r - a_l)^2}{N - 1}, \quad (4)$$

where a_r and a_l – the values of the feature on, respectively, the right and left sides. The error is determined by:

$$m_{S_{d^2}} = \frac{S_{d^2}}{N}.$$

The question of the evolutionary role of sexual dimorphism is considered in detail by Geodakyan [1]. He found that the male-female line corresponds to the direction of the evolutionary process. The degree of sexual dimorphism can be estimated using the coefficient:

$$S_{sd} = \frac{x_{\sigma} - x_{\varphi}}{x_{\sigma}} \tag{5}$$

The error:

$$m_{S_{sd}} = \frac{S_{sd}}{\sqrt{N}}$$

A positive value of the coefficient indicates the tendency of the sign to increase, a negative value indicates a decrease in the trait.

The sex ratio is an easily measurable and informative indicator. It is estimated as the proportion of individuals of one, more often male:

$$P_{\sigma} = \frac{n_{\sigma}}{N} \tag{6}$$

The error:

$$m_{P_{\sigma}} = \sqrt{\frac{P_{\sigma}(1 - P_{\sigma})}{N}}$$

herewith $N = n_{\sigma} + n_{\varphi}$. Sexual dimorphism in terms of the degree of quantitative variability, which is important for adaptation at the population level (Geodakyan, 1983), is estimated by the formula:

$$S_{sd} = \frac{1}{KL} \sum_{j=1}^L \sum_{i=1}^K \frac{CV_{\sigma_{ij}}}{CV_{\varphi_{ij}}} \tag{7}$$

where $CV_{\sigma_{ij}}$ – coefficient of variation on the i -th trait in the j -th male. $CV_{\varphi_{ij}}$, accordingly, the same in females. With the help of all these parameters, it is possible to characterize the population and roughly assess its fate in the future. The most favorable case is in which there is at least a limited number of consistent observations. However, it is possible that there is only a single sample of animals. How can the results of the analysis of this sample be interpreted? Data on the absolute size of the population, if they can be obtained, are usually not very informative, but they also allow us to draw some conclusions. If for dioecious species the number is reduced by 150–200 individuals, it can be concluded that the population is “near death”. An essential characteristic is variability on quantitative grounds. Normally, for most morphological traits, the coefficient of variation is

in the range of 0.1 [5-8]. A significant excess of this value may indicate a genetic imbalance. If we are talking about a complex of features (formula 1), then for the threshold value we can take the figure 2.67 obtained on the basis of the previous one. Exceeding this value suggests that the population is destabilized. The proportion of abnormal forms is within 5% in most cases. It is no coincidence that biological statistics are based on an empirically found significance level of 0.95. 0.05 individuals are atypical. This proportion of anomalous forms is observed in many biological populations [2,3,7]. Based on this, we can say that the appearance in the population of atypical forms with frequencies of more than 5% indicates that the state of the population is unfavorable. When analyzing population polymorphism (formulas 2, 3), we assume that atypical forms are rare with recorded deviations from the wild type. As a threshold value for the indicator of intrapopulation diversity, we can take (formula 3) a value of 1.4. Morphological asymmetry and the degree of sexual dimorphism are important not only in comparison with the species norm. Sexual dimorphism in variability (formula 7) in a stable population is close to 1. At the initial stage of adaptation, it significantly increases [1].

As for the sex ratio, despite some deviations, it is usually close to 1: 1, i.e. the proportion of males is 0.5. The shift towards females indicates the ultimate stabilization and conservation of the gene pool, towards males - the adaptation of the population to adverse conditions. The excessive predominance of males indicates that adaptive potencies have been exhausted, and the population is on the verge of extinction. Those species where females are rare can be considered evolutionarily conserved. Such are aphids, stick insects. In progressive species, there is some predominance of males. This is the majority of mammals, including humans. The predominance of males several times indicates that the species is dying out. To make more obvious methods for assessing the state of the population, based on a small number of quantitative and qualitative estimates, they are summarized in Table 2. It is clear that it is difficult to draw conclusions about the state of the population on the basis of one parameter. A comprehensive study of as many of the listed parameters as possible is required. But in practice, sometimes you have to limit yourself to only a small number of them.

All the mentioned characteristics are correlated with each other. However, the degree of correlation can vary greatly depending on what specific features are being studied, on the biology of the object, and environmental conditions. The degree of connection between all characteristics is also a sign subject to individual variability. Therefore, the algorithm-formula should describe the parameters in total, based on the following considerations. 1. The formula should take into account all 6 characteristics, but at the same time, work even in the case when there is only a part of the characteristics. 2. The proportion of functions reflecting each of their variables should be approximately the same.

Table 2.

Possible explanations for the results of the population assessment

Population parameter	Parameter value	Possible explanation
1. Variability by Quantitative Featured	$W_{Qn} < 2.67$	Population in stable Environmental conditions
	$W_{Qn} > 2.67$	The population is genetically unbalanced
2. The nature of the distribution of quantitative characteristics	symmetric	The population is stable or stressed
	asymmetric	Adaptation to new conditions is underway
	Highly asymmetrical	Adaptive potencies in the population have been exhausted
	Bimodal	In the population, there is normal dimorphism, or there is disruptive selection
3. Variability by qualitative characteristics	$W_{QL} < 1.4$	The population is stable
	$W_{QL} > 1.4$	The population is destabilized
4. Proportion of males	$P_{\sigma} = 0.5$	The population is stable
	$P_{\sigma} < 0.5$	The population is highly stable
	$P_{\sigma} > 0.5$	Adaptation to new conditions is underway
	$P_{\sigma} \gg 0.5$	Adaptive possibilities have been exhausted, extinction is possible
5. The proportion of atypical forms	$P_{af} < 0.05$	The population is stable
	$P_{af} \gg 0.05$	The population is destabilized

As noted above, [1,4, etc.], in populations in unfavorable conditions, variability increases, primarily in males, and the proportion of males increases. For most species, the degree of change in these characteristics turns out to be close in order of magnitude. Here are the threshold values, the excess of which indicates an unfavorable condition:

$W_{Qn} = 2.67, V_{QL} = 1.4, S_d = \frac{P_{af\sigma}}{P_{af\theta}} = 1, S_r = 0.5, P_{af} = 0.05$, (see above for the argumentation).

Correction factors allow you to equalize the proportion of all characteristics and reduce them to a single formula that gives the value *C* - the coefficient of the state of the population, generalizing the formulas (1-7):

$$C = \frac{6}{n} ((W_{Qn} + 1) + 1.53(W_{Ql} + 1) + 1.84 \left(S_d + \frac{P_{af}}{P_{af}} + 2 \right) + 2.45(S_r + 1) + 3.5(P_{af} + 1)). \quad (8)$$

The error of the magnitude is determined by the formula:

$$m_c = \frac{2C}{\sqrt{N \cdot n}} \quad (9)$$

where *n* is the number of parameters listed in the formula (8), *N* is the sample size. The final value of the *C* coefficient, reflecting a particular state of the population, obtained based on own and literature data, is given in Table 3.

Table 3.
Assessment of the state of the population based on the C coefficient

The value of the coefficient	The state of the population
$22.02 \pm m_c$	Indefinite
$22.02 - m_c$	Stable
$22.02 + m_c$	Adverse

The algorithm works even if there is data on only a few of the parameters. For example, if a species normally has representatives of only one sex (hermaphrodites or parthenogenetic females), then data on sex ratio and sexual dimorphism are not entered. This has practically no effect on the accuracy of the results. It may be necessary to increase the sample size, which exactly will show the magnitude of the error - formula (9).

Results and discussions. Based on field research of the Boksitogorsk district of the Leningrad region

This area is of interest due to the following considerations.

1. It is relatively typical in terms of environmental characteristics for the North-West of Russia.
2. Of great importance for the development of the economy and environmental processes is the Alumina plant located here, the impact of which on the environment is not fully understood.
3. The authors of this communication have been involved in environmental studies of the area and have a significant database that contains important environmental and social information.

As an example of the use of phenogenetic indication, we can consider the situation with the introduction of noble cancer *Astacus astacus* to lake Eglino of the Boksitogorsk district of the Leningrad region. This experiment, which began in 1997, continues to this day (Fedotov, 2020). During the first 3 years of the experiment, about 600 crayfish were studied. The morphological analysis of this sample is presented in Table 1. The average values of body length, standard deviation (σ), error (M) and coefficient of variation – CV – are given as a highly informative parameter for phenogenetic indication.

Table 4.
Morphological diversity of crayfish Astacus astacus.

Parameters	2000	2008	2016
Males - average length, mm.	112	102	105
Σ	13.7	22.0	9.9
M	1.02	2.9	1.2
CV	0.12	0.21	0.09
Females - average length, mm.	103	101	98
Σ	9.46	9.80	7.0
M	1.35	1.2	1.0
CV	0.09	0.097	0.07
% of males	48.0	58.5	59.3

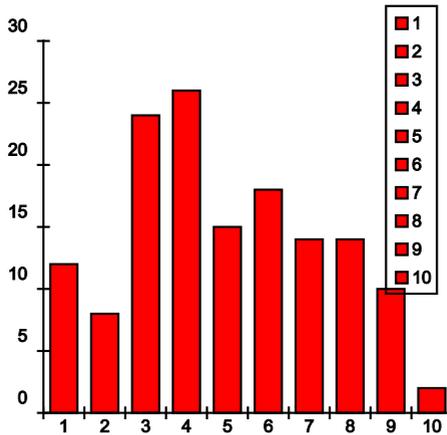
Data on sex ratio and phenotypic variability complement each other. A coefficient of variation of less than 0.1 for terrestrial animals and less than 0.15 for aquatic animals indicates population instability [4,7,8]. This is also evidenced by the predominance of males. The increase in the proportion of males in the 2000 captures coincided with an increase in phenotypic variability. Males are the first to respond to changes in the ecological situation. Apparently, in 2000 there was a change in the physicochemical characteristics of the ecological niche of crayfish in the lake. It is known that in 2000 the water level fell by 2-2.5 m during the summer due to extreme heat. After 2000, there was a stabilization of the ecological situation and the state of the population. But the excess of the proportion of males compared to females suggests that stabilization has not passed to the end. Thus, the coefficient of variation and the sex ratio turn out to be informative indicators of the state of the population. Indicators of variability can also vary by different age stages. Among the indicators of variability, the most important, as already noted, is the coefficient of variation, which reflects the degree of diversity on quantitative grounds. Of this variety, data were obtained, for example, on toothless shells (*Anodonta piscinalis*) of different ages – (see Table 5 and Fig. 1). The data were

obtained during the expedition to the Tikhvin water system [2], conducted under the scientific supervision of the first co-author.

Table 5.
Morphometric characteristics of different age stages of toothless Anodonta piscinalis

Stage (year)	Length, cm.	Coefficient. Variations
1	0.8	0.125
2	5.1	0.08
3	5.4	0.24
4	5.7	0.26
5	7.3	0.15
6	7.3	0.18
7	8.5	0.14
8	9.4	0.14
9	9.9	0.095
10	11.1	0.02

The results show the following. The most intensive growth occurs between the first and second stages (the first and second year), as is typical of many animals. Up to two years, the variability is relatively small. Then it increases rapidly.



Rice 1. Dynamics of variability of *Anodonta piscinalis* mollusks along length over time. Along the abscissa axis - age (years), along the ordinate axis - the coefficient of variation in percentages.

This is due to the implementation of the diversity of genetic programs in different individuals. Further, from stage to stage, stabilizing selection operates, which leads to the fact that at mature ages variability becomes moderate. For clarity, this process is shown in Figure 1. Thus, the regulation of the level of variability by population genetic mechanisms is an important factor in adaptation at the population level.

The conclusion

Continuous monitoring of water bodies is a necessary component of environmental forecasting and prevention of extreme situations on the water. Its implementation requires certain costs and regular work of specialists. At the same time, the level of development of fundamental sciences - ecology, mathematics - makes it possible to somewhat reduce the necessary financial and human resources based on the development of high-tech technologies for processing material. Especially relevant is the gradual transition to increasingly high-tech technologies in our days and in our country, when continuous series of observations of the state of water bodies that have existed for many decades in the 90s of the last century were interrupted due to negative social processes of that period. Synthesis of contact monitoring data based on the phenogenetic approach is the way to improve methods for assessing the state of water bodies, forecasting and management.

The authors confirm that legal norms were observed when working with living organisms.

The authors confirm the absence of conflicts of interest.

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关于久姆里市境内天坑的出现和激活问题
**TO THE PROBLEM OF THE EMERGENCE AND ACTIVATION OF
FAILURE PHENOMENA IN THE TERRITORY OF GYUMRI**

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注解。 本文介绍了该地区的主要地质生态问题。 久姆里。 考虑各种自然和人为因素（坎儿井、岩溶充盈空洞等）对城市境内沉降现象发生和激活过程的影响。 分析了生态地球物理学方法的可能性，这些方法能够提供高密度和频率的空间和时间观测，这对于评估人为对地质环境影响的动态（生态地球物理监测）至关重要。

关键词：地质生态条件、坎儿井、地面沉降、塌陷、生态地球物理方法。

Annotation. *The article presents the main geo-ecological problems of the territory of the z. Gyumri. The influence of various natural and anthropogenic factors (qanats, karst-suffosion voids, etc.) on the process of occurrence and activation of subsidence phenomena on the territory of the city is considered. The possibilities of methods of ecological geophysics, which are able to provide a high degree of density and frequency of spatial and temporal observations, which is essential in assessing the dynamics of anthropogenic impact on the geological environment (ecogeophysical monitoring), are analysed.*

Keywords: *geo-ecological conditions, qanat, ground subsidence, collapse, eco-geophysical methods.*

Various impacts of natural and anthropogenic origin lead to pollution of air and water basins, degradation of soil cover, displacement of rocks, disturbance of geological environment of urbanised areas in the epicentral zone of the Spitak earthquake. At present, such massive anthropogenic impacts are experienced by floodplains of Akhuryan, Pambak, Debed, Aghstev rivers, where the main industrial centres of the disaster zone (Gyumri, Spitak, Vanadzor, Dilijan, etc.) are located [1].

Modern urban planning practice has a great need in forecasting of anthropogenic geological processes and phenomena, at the same time, the problem of fore-

casting today remains the least developed section of anthropogenic engineering geology and geoecology.

Scientific substantiation and selection of appropriate specific measures necessary for improvement of ecological conditions of life of the population are possible at the analysis of problem situations in the Republic from the system-wide positions and understanding of restoration of the disaster zone as a natural-social-ecological-economic integrity.

The object of research geo-ecological studies, some results of which we present, was the territory of Gyumri city, the geo-ecological condition of which deserves special attention... is experiencing a lot of different impacts of both natural and man-made character.

Since 1997. The United Nations Environment Programme (UNEP) started to prepare and publish the report "Global Environmental Outlook" (GEO), or "Global Environmental Outlook", designed to summarise scientifically based information on the environmental situation on the planet, to analyse its long-term dynamics and current trends, to develop possible forecast scenarios, as well as proposals and recommendations to harmonise environmental, social and economic components of society in the interests of sustainable development. The GEO-Cities Programme in the Republic of Armenia is supported and financed by the Environment and Security Initiative established by UNEP, the United Nations Development Programme (UNDP) and the Organisation for Security and Cooperation in Europe (OSCE). The national coordinator of the "GEO-cities" project is K. Danielyan, Doctor of Geographical Sciences.

In accordance with the above mentioned, the report "GEO-Gyumri" was prepared, the main role of which is to support local municipal authorities in carrying out a comprehensive assessment of the state of the environment, contributing to the definition of environmental priorities of the city and the development of measures for more sustainable development of Gyumri city [2].

The circle of the main geo-ecological problems occurring within the territories of Gyumri is reduced to the following: pollution of air and water basins, degradation of soil layer; the presence of numerous gravitational phenomena; activation of subterral processes in densely built-up areas of the city, the presence of heterogeneous underground voids of different genesis (qanats, karst-suffosion sink-holes and voids, tunnels, etc.); the presence of active high-permeability, highly permeable, and highly corrosive processes in the densely built-up areas of the city.); presence of active highly permeable geodynamic zones creating favourable conditions for exhalation and accumulation of radioactive emanation in dwellings (Fig.1).).

The solution of the above problems requires an integrated approach of research with the involvement of various specialists - geotechnical engineer, seismologist, geochemist, ecologist, geophysicist and others. A special role is assigned to geo-

physical methods of research, which are able to provide a high degree of density and frequency of spatial and temporal observations, which is essential in assessing the dynamics of anthropogenic impact on the geological environment (ecogeophysical monitoring).

Conducting geophysical surveys in conditions of increased urbanisation is associated with a number of complications that limit and sometimes even exclude the use of standard field survey techniques and interpretation methods (presence of heterogeneous interferences, limited free space, etc.). Minimisation or exclusion of interfering factors was achieved by applying such research methods, which are characterised by significant resistance to anthropogenic interferences (radiometry, gasometry, geothermia, gravity survey, spectral seismic profiling).

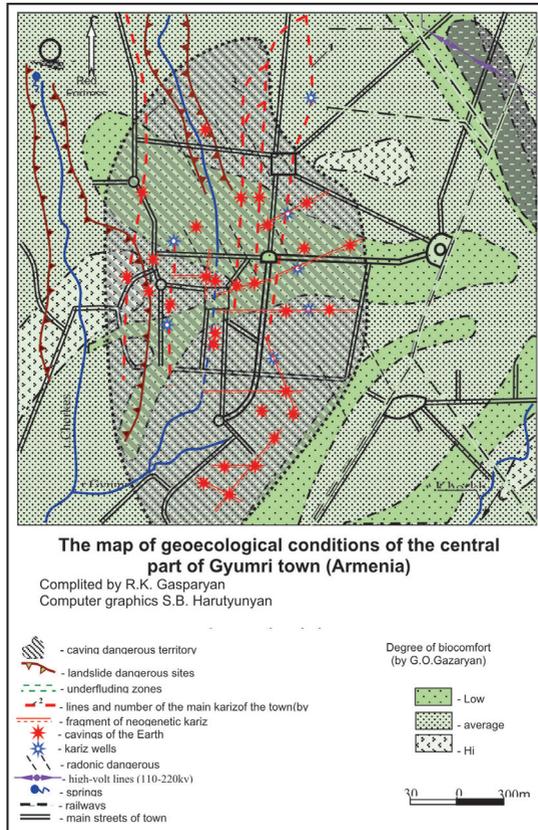


Figure 1. The map of geocological conditions of the central part of Gyumri town (Armenia).

The peculiarities of ecogeophysical studies for solving the above mentioned problems are illustrated by the results of research works carried out in the areas of development of heterogeneous exo- and anthropogenic processes: landslides, karst-suffosion phenomena, radon pollution, etc..

By its natural, socio-economic, ecological and other parameters Gyumri differs significantly from other cities in that it is located at the bottom of a vast intermountain basin at an altitude of 1530-1560 m above sea level, has a sharply continental climate and has been repeatedly destroyed by strong earthquakes throughout its history.

Intensive construction and various engineering activities have primarily affected the underground environment of the city. As a result, the stress-strain state of the soil, its physical-mechanical and filtration properties have changed. Today, in the central, southern and south-western districts of Gyumri, activation of underground processes is observed due to the presence of natural and anthropogenic voids (tunnels, karst-suffosion voids, etc.). These underground heterogeneities periodically make themselves known by deformation, subsidence and destruction of buildings in some parts of the city.

The analysis of regularities of location of modern subterranean processes occurring on the territory of Gyumri city after the Spitak earthquake allowed to establish a preliminary list of the main conditions and factors of development of these processes: 1) presence of underground excavations (qanats, tunnels, etc.); 2) distribution of fine and easily dissolved soils; 3) presence of weakening zones; 4) suffosion processes; 5) natural and artificial change of groundwater levels; 6) seismicity and other geodynamic processes.

The geo-ecological environment of Gyumri is a multi-component system, which includes underground mine workings as a specific system-forming element [2]: qanats (ancient underground hydraulic structures) (Fig.2); underground workings formed as a result of excavation of construction material; bomb shelters; underground ways and premises of military and unknown purpose; karst-suffosion voids. Deformations of the loose cover layer and destruction of structures actively occurring in different parts of the city are “provoked” by underground mine workings and voids of both anthropogenic and natural origin. In recent years, there has been a noticeable activation of soil collapse processes in the central and south-eastern parts of the city, which are characterised by the most dense network of qanats.



Figure 2. A functioning karez discovered in the central part of Gyumri

It is important to note that the presence of underground mine workings is a necessary, but not yet sufficient condition for rock shear. Violation of stability of rocks above the excavation space occurs under the influence of a certain set of natural and anthropogenic factors, which are mostly random in nature.

In this regard, the development of methods to combat the processes of rock shear in urbanised areas, in particular Gyumri, based on the knowledge of the regularities of their occurrence, as well as the development of methods for early detection of foci of nucleation is an urgent scientific and applied problem. It should be noted that this task should be solved in addition to the established normative documents on construction and environmental protection.

It is obvious that the specific engineering-hydrogeological and seismotectonic conditions of Gyumri territory, as well as the presence of a very complex and intricate network of underground structures within the city requires the development of special multi-purpose complexes and technology of geo-environmental research (in the format of GPS and GIS technologies), contributing to the most effective solution of the problem of identifying underground voids and assessing the impact of factors that stimulate the emergence and activation of rock shear processes. The above mentioned is a determining stage of systematic research of underground space of Gyumri city with the purpose of revealing and mapping of various subterral processes and phenomena, which will allow to implement scientifically-based measures on engineering protection of the city territory from dangerous natural and anthropogenic processes.

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