International University Science Forum

SCIENCE EDUCATION PRACTICE

Toronto 2020

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The collection includes scientific articles of participants of the International University Science Forum, the purpose of which is to present significant results of scientific research in the field of humanities, natural and technical sciences; the formation of a modern level of scientific knowledge, experience in transformation of theoretical science into the sphere of practical application of innovations; generalization of research and practical experience. The forum is a tool for establishing sustainable ties, as well as the exchange of experience between teachers and researchers of universities and research organizations.

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

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SOCIO-ECONOMIC CONSEQUENCES OF DIGITAL DEVELOPMENT OF THE ECONOMY AND SOCIETY

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In the article, based on the analysis of cause-and-effect relationships in the changing socio-economic system, the economic consequences of digital development, the general organizational and technological basis of the transition from the post-industrial era to the informational one is revealed and the infocommunication nature of digital development is established.

Keywords: digital economy; infocommunications; transformation; methodology, conceptual apparatus.

The systemic process of creating a "digital economy" in the Russian Federation based on the digitalization of socio-economic processes is aimed at the formation of an information society as a new technological paradigm [1; 2].

The theoretical substantiation of the new technological paradigm includes not only the conceptual apparatus of the digital economy, but also new ways of cooperation and coordination of economic agents in the ecosystem of machines and people, identifying the reasons for erasing the boundaries of service markets and business unification, factors of changing the value-added model [3; 4; 5]. To do this, it is necessary to reveal the nature of the transformation of socio-economic relations on the basis of identifying the general organizational and technological basis for the transition from the post-industrial era to the information society.

To reveal the reasons and sources of transformation of the economy and society, we identified the main socio-economic consequences of digital development, presented in fig. 1.

The digitalization of the economy, the industrial Internet, digital competencies of employees have a significant impact on the structure of production and production resources, the nature of food consumption and the quality of life of Russian citizens. Electronization of trade, procurement, logistics and financial operations leads to virtualization and integration of business, the formation of business models on a common electronic platform for the functioning of economic market entities.

With the massive application of information and communication technologies (ICT) and the strengthening of the digital development of the economy and society, the theoretical concepts reflecting these events are being rethought, their contradictory nature and ambiguous socio-economic consequences are revealed.



On the one hand, progress is expressed in an increase in labor productivity and intelligence, an increase in the demand for knowledge and ICT, the development of "human" capital, a decrease in industrial risks and technological disasters. On the other hand, digital development is fundamentally transforming the modern economy and social life based on remote electronic public services, education, medicine, etc., causing "information inequality" and fundamentally new information and cybernetic risks [3; 6; 7].

An analysis of modern interpretations of the ongoing transformations in society and the names of a new stage in the development of civilization: a society of knowledge, science, ICT, mega-society, techno-society, electronic-digital society, etc., indicates the global nature of the ongoing processes, in which infocommunication technologies are of primary importance [3; 5; 8; 9].

To explain the reasons for the transformation of the economy and society, its impact on all aspects of human life, it is necessary not only to analyze the cause-and-effect relationships in the changing socio-economic system, but also to establish a common basis for the transition from the post-industrial era to the information society, which is an important methodological technique in development of new principles of the economy of infocommunications.

In the new society, the economic activity of enterprises and national states ceases to be limited in space and time, global corporate and international communication networks provide information transfer in real time, the productive function is assigned to science, knowledge, technology [5]. The scale of the introduction of digital technologies in the production of goods and services, the management system, education, medicine, finance, banks, trade, everyday life of people and the established reasons and factors indicate the transfer of this activity to the infocommunication industry (fig. 2).

The infocommunication nature of production and economic relations of the digital economy is manifested, firstly, in the features of production resources and the dominance of information resources in them; secondly, in the form of production organization (fig. 3). Information and knowledge are a specific resource that has the property of penetrating all boundaries and barriers, and therefore serve as a conduit for the processes of globalization and digitalization. The boundaries between individual industries are increasingly blurred, unified interbranch production and service systems and complex industries integrated in terms of final consumption are formed, ultimately the structure of the economy acquires a network character [1; 2; 4].



Fig. 2. Reasons and factors of the transition from post-industrial production to the digital economy of the information society

The technological peculiarity of the development of the digital economy is that infocommunication elements develop in traditional industries and become quasi-information production within non-information industries, which determines the priority of ICT over its resources. At the same time, the share of labor resources engaged in the direct production of goods and services will decrease, and the share of employees using ICT will increase [5; 8; 9].

Due to the development of the infocommunication infrastructure of the digital economy, the introduction of digital platforms and services, the transformation of economic relations and forms of doing business is taking place. ICT is being transformed from a business process automation tool into a business development environment and increasing the value of companies' shares. On the basis of ICT, a single financial and economic space is being created, global markets for goods, services, labor resources and capital are developing. With the help of an interactive electronic communications system, virtual companies and network communities, business networks are formed, an economic space without borders is formed, contributing to new forms of obtaining added value and "digital dividends".

The "big data" formed as a result of the modernization of the economy, along with the technologies of their analysis, are becoming one of the leading assets of the state, business and civil society. At the same time, the absence of physical boundaries in the digital space provides access to a significant amount of data for numerous participants in the global economic space.



Fig. 3. Signs of the infocommunication industry of the digital economy

Thus, the digital economy is the socio-economic basis of the information society, and ICT, communication networks, digital systems and platforms are its organizational and technological basis or industry.

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ARBITRATION AGREEMENTS AND THE COMPETENCE OF INTERNATIONAL COMMERCIAL ARBITRATION

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The article is devoted to the study of the specifics of an arbitration agreement concluded within the framework of international commercial arbitration, which predetermines the emergence of a conflict problem requiring a special solution.

Keywords: arbitration agreement, international commercial arbitration, international arbitration court, arbitration proceedings.

A written agreement of the parties on the transfer of a dispute that has arisen or may arise from civil law relations for consideration in an arbitration court or arbitration will be called an arbitral or arbitration clause or agreement.

The arbitration agreement, according to the majority of civil law experts, is the basis of arbitration and is important for the parties to the transaction, from the conclusion of the contract to the most undesirable moment - the emergence of a dispute between the parties.

As a rule, the arbitration clause is placed in the final sections of the agreement next to addresses, bank details and other conditions, and in this regard, the parties to the agreement often do not pay due attention and significance to these few lines. As a result, one of the important conditions of the contract is concluded with omissions and inaccuracies, which in the end, in the event of a dispute, can lead to losses that exceed the benefits obtained from the conclusion of the transaction¹.

¹See: R. Roncalya, Some Reflections on the Future of International Commercial Arbitration // International Commercial Arbitration: Contemporary Problems and Solutions: Collection of Articles on the 75th Anniversary of the ICAC at the RF CCI / Ed. A.S. Komarov. – Moscow: Publishing House Statute, 2007. – P. 353 - 370. As a rule, a reservation containing inaccuracies is usually called "pathological".

An incorrect indication of the applicable law, the subject and essence of disputes submitted to arbitration, a reference to a non-existent arbitration institution to which the dispute is submitted, etc. can lead to the pathology of a clause. The consequence of this will be the impossibility of arbitration due to the fact that the arbitral or arbitration institution may not recognize its competence to consider the claimed claim in connection with an unclear, unclear arbitration clause.

All this entails certain difficulties for persons who have entered into a pathological arbitral agreement. At a minimum, you should try to negotiate with the debtor on amending the clause - conclude an additional agreement on the definition of permanent arbitration or agree on ad hoc arbitration, or you will have to invalidate the clause in a competent court. As you know, in this situation, debtors are not very willing to meet their counterparties halfway. In a word, the plaintiff will have to invest a lot of effort, and most importantly, time, to secure the protection of his rights.

In the Russian Federation, on September 1, 2016, the Federal Law of 29.12.2015 № 382-FZ "On Arbitration (arbitral proceedings) in the Russian Federation" came into force².

According to Art. 1 of the said federal law, its purpose is to regulate the procedure for the formation and activities of arbitration courts and permanent arbitration institutions on the territory of the Russian Federation, as well as arbitration (arbitral proceedings). Disputes between the parties to civil law relations may be referred to arbitration (arbitral proceedings) by agreement of the parties, unless otherwise provided by federal law.

Federal law may establish restrictions on the transfer of certain categories of disputes to arbitration (arbitral proceedings).

Unless otherwise provided by law, it applies to both arbitral proceedings administered by a permanent arbitral institution and arbitral proceedings carried out by an arbitral tribunal established by the parties to resolve a specific dispute. The procedure for considering disputes in the field of professional sports and elite sports is established by federal law.

Article 7 of the above law defines the concept, form and interpretation of the arbitration agreement^{3.} So, in accordance with paragraph 1 of

²See: On Arbitration (Arbitral Proceedings) in the Russian Federation, Federal Law № 382-FZ dated 29.12.2015 (as amended on 27.12.2018). [Electronic resource]. SPS "ConsultantPlus". URL: http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=3148 50&fld=134&dst=1000000001,0&rnd=0.7803442303839019#009786212479748424 (appeal date: 29.09.2020).

³See: Ibid.

Art. 7, an arbitration agreement is an agreement of the parties to refer to arbitration all or certain disputes that have arisen or may arise between them in connection with any particular legal relationship, regardless of whether such a relationship was of a contractual nature or not⁴. An arbitration agreement can be entered into as an arbitration clause in a contract or as a separate agreement. The arbitration agreement is concluded in writing. This provision is deemed to be complied with if the arbitration agreement is concluded, inter alia, by the exchange of letters, telegrams, telexes, telefaxes and other documents, including electronic documents transmitted through communication channels that allow it to be reliably established that the document comes from the other party.

An arbitration agreement is also considered to be concluded in writing if it is concluded through the exchange of procedural documents (including a statement of claim and a response to a statement of claim), in which one of the parties declares the existence of an agreement, and the other does not object to this. A reference in a contract to a document containing an arbitration clause constitutes an arbitration agreement in writing, provided that such reference allows such clause to be considered part of the contract.

Clause 6 of Article 7 emphasizes that an arbitration agreement can be concluded by including it in the rules of organized trading or clearing rules, which are registered in accordance with the legislation of the Russian Federation. Such an arbitration agreement is an arbitration agreement between participants in organized trading, parties to an agreement concluded in organized trading in accordance with the rules of organized trading, or clearing participants⁵.

An arbitration agreement on the transfer to arbitration of all or part of the disputes between the participants of a legal entity created in the Russian Federation and the legal entity itself, for which the rules of arbitration of corporate disputes are applied, may be concluded by including it in the charter of the legal entity. The charter containing such an arbitration agreement, as well as amendments to the charter providing for such an arbitration agreement, and changes made to such an arbitration agreement, shall be approved by a decision of the supreme governing body (meeting of participants) of the legal entity, which is adopted unanimously

⁴See: On Arbitration (Arbitral Proceedings) in the Russian Federation, Federal Law № 382-FZ dated 29.12.2015 (as amended on 27.12.2018). [Electronic resource]. SPS "ConsultantPlus". URL: http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=3148 50&fld=134&dst=1000000001,0&rnd=0.7803442303839019#009786212479748424 (appeal date: 29.09.2020).

⁵See: Ibid.

by all participants in this legal entity. An arbitration agreement concluded in accordance with the procedure established by this part applies to disputes between participants of a legal entity and disputes of the legal entity itself, in which another person participates, only if this other person has expressly manifested his will to be bound by such an arbitration agreement. An arbitration agreement cannot be concluded by including it in the charter of a joint stock company with the number of shareholders - owners of voting shares of one thousand or more, as well as in the charter of a public joint stock company. The place of arbitration when considering these disputes shall be the Russian Federation.

When interpreting the arbitration agreement, any doubts must be interpreted in favor of its validity and enforceability. Unless the parties have agreed otherwise, the arbitration agreement in respect of a dispute arising out of or in connection with it applies to any transactions between the parties to the arbitration agreement aimed at the execution, modification or termination of the specified agreement. In the event of a change in the person in the obligation in respect of which the arbitration agreement is concluded, the arbitration agreement applies to both the original and the new creditor, as well as both the original and the new debtor.

The arbitration agreement contained in the contract also applies to any disputes related to the conclusion of the contract, its entry into force, change, termination, validity, including the return by the parties of everything performed under the contract, recognized as invalid or not concluded, unless otherwise follows from the arbitration agreement itself.

The arbitration rules referenced in the arbitration agreement are considered to be an integral part of the arbitration agreement. Conditions that, in accordance with the said federal law, can be agreed only by direct agreement of the parties, cannot be included in the rules of a permanent arbitral institution.

The choice by the parties of the substantive and procedural law applicable to the contract is also an important point when concluding an arbitration agreement. This choice is of particular importance, its absence may complicate and delay the consideration of the dispute, as it will put before the arbitration an additional task of finding the applicable law.

In the case of participation in the proceedings of persons - residents of a foreign company, the norms provided for by law for arbitration courts are applied. In the event that a foreign non-resident element participates in a dispute, the parties have the right to elect and agree on substantive and procedural law to resolve a conflict that may arise. Of course, each of the parties will seek to use "their own" national legislation, and if agreement cannot be reached in this regard, then it is wiser to offer the parties such an option as "applicable law at the choice of the plaintiff". By the way, the plaintiff can also delegate the right to choose the institution of arbitration, but with the obligatory indication of a specific arbitration court.

For example, you can use the following construction: in the event of a dispute in which the plaintiff is firm A, the dispute will be considered in the permanent international arbitral court "IUS", and if the plaintiff is firm B, the dispute is resolved in the arbitration center (indicate arbitration). This version of the arbitration agreement will suit both parties.

With regard to the applicable procedural law, the most rational choice is the country where the decision is made by the arbitration tribunal.

And, perhaps, the most important thing in the content of the arbitration agreement is an indication of a specific arbitration court or arbitration, to which the parties can apply in case of disagreement. Particular attention should be paid to this part of the reservation.

Often, when drawing up a clause, the parties do not indicate which particular arbitration tribunal is competent to resolve their dispute, or they designate the name of the arbitration, which does not allow determining its location or even its existence, or the arbitration institution is not indicated, but only the place of arbitration is indicated.

Even in the case of inaccuracies or incompleteness of the content of the agreement on the composition of the arbitration, language, rules, etc., with reference to a specific arbitration, the dispute can be resolved and the rights of interested parties are protected. The legislation provides that when a dispute is referred to a permanent arbitration tribunal or arbitration, the rules of the permanent arbitration institution are an integral part of the arbitration agreement. As a rule, permanent arbitration courts and arbitration tribunals have their own rules, in accordance with which the proceedings are conducted in the case and where all the procedures necessary for the arbitration are prescribed.

From the practice of the permanent International Arbitration Court "IUS". The company filed a claim for debt collection to the permanent International Arbitration Court "IUS". When accepting the claim and processing the documents, the secretariat found that it was impossible to establish the competence of the arbitral tribunal competent to resolve the dispute. The reason for this was the content of the arbitration clause, which does not indicate the specific arbitration court chosen by the parties to resolve their disputes. The applicant's claim and the initiation of arbitration proceedings were denied. The legal doctrine expresses the opinion that the issue of the competence of the arbitral tribunal should be decided by the arbitral tribunal elected by the parties or appointed by the arbitral tribunal. In principle, the Secretariat is not obliged to check the existence of an arbitration agreement, but such a rule exists and without observing it, the claim cannot be accepted. In particular, one of the conditions for the acceptance of the claim by the International Arbitration Court "IUS" is the rule on the presentation by the applicant of the claim of proof that the parties have agreed to submit the dispute to the arbitration court, i.e. at the stage of filing a claim, the competence of the International Arbitration Court "IUS" to accept and consider the claim is checked.

And about the termination of the arbitration agreement.

From the practice of the permanent International Arbitration Court "IUS". In opposition to the claim, the defendants declare their disagreement with the arbitral proceedings and ask to leave the claim without consideration. The justification for the refusal to arbitrate, according to the defendants, is the fact of delusion when signing the supply agreement with the clause on the transfer of possible disputes for resolution to the International Arbitration Court "IUS" in the execution of the terms of the agreement.

In this case, the defendants choose a passive position of the participant in the proceedings: they do not appear at the sessions without good reason, they do not participate in the formation of the composition of the arbitral tribunal, considering their statement of disagreement to the arbitral proceedings to be sufficient grounds for this.

Meanwhile, the laws stipulate that the arbitration/arbitral agreement may be terminated by agreement of the parties in the same manner in which it was concluded.

The examples given are by no means all the cases when the incorrect preparation of the arbitration agreement can lead to negative consequences.

You should pay attention to one important point. Permanent arbitration tribunals and arbitration courts must post in the media, including Internet resources, information about themselves, including their legal address, and keep a register of their arbitrators.

In this regard, in order not to find themselves in a disadvantageous situation in the future in the event of a dispute and in the case of the parties' will to arbitrate, the parties to the arbitration agreement or proceedings should monitor the arbitration courts, familiarize themselves with the rules of the selected arbitration court and the list of its arbitrators, visit the official website, specify the address and other contact information of the arbitration institution. In the absence of information about any proposed in the agreement a permanent arbitration center or arbitral court, interested parties should be invited to consider the dispute in one of the really existing permanent arbitration or arbitral institutions.

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PSYCHOLOGICAL AND PEDAGOGICAL ASPECTS IN THE FORMATION OF MOTIVATION FOR THE PROFESSION OF A DESIGN ENGINEER IN OLDER PRESCHOOL CHILDREN

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The article examines the problem of the formation of motivation for the profession of design engineer in older children. The system of work on the formation of motivation for the profession of design engineer in older preschoolers is presented.

Keywords: profession of design engineer, career guidance, scientific and technological progress, senior preschoolers.

Wonderful country of Childhood! You can dream about your future, for example: who to be? Realize your dream in games; today - a doctor, tomorrow - a banker and even a president ...

Professional self-determination is interconnected with the development of personality at all age stages, therefore, preschool age is considered preparatory, in which the foundations for professional self-determination in the future are laid.

In order to instill in children a respectful attitude to work, it is important to enrich their ideas about different types of professions of adults, about the role of work in people's lives, about the results of work, about the motives that drive people in the labor process.

Preschool children are able to understand the essence of adult activities, the motives and goals of their work, ways to achieve results. In modern pedagogical science, the problem of familiarizing preschoolers with the work of adults has been studied by many scientists: V.I. Loginova, L.A. Misharina, A. Sh. Shakhmanova, M.V. Kruchlecht.

In the issue of familiarizing preschoolers with the professions of adults, there are various approaches. S.A. Kozlova and A.Sh. Shakhmanova propose to acquaint children with workers, with their attitude to work, to form the idea that professions appeared in response to the needs of people (you need to bring the load, prepare lunch).

M.V. Krulekht and V.I. Loginova emphasize the formation of ideas about the content of labor, about the products of the activities of people of various professions, and fostering respect for work.

Many teachers, such as N.E. Veraksa and T.S. Komarov have recommended to acquaint children with the types of labor that are most common in a particular area. To date, the main directions of the child's development have been identified, in which educational areas are defined, including the educational area "Social and communicative development".

Early career guidance is predominantly informational in nature (general acquaintance with the world of professions), and also does not exclude a joint discussion of the child's dreams and experience acquired in some types of work (in terms of self-service, when doing feasible work).

Currently, the need to improve and update the practice of "nurturing" from preschool age a person capable of becoming a professional in his field in the future has become evident on the basis of the formation of ideas that work is an honorable duty of every person living in our society.

At the same time, there is a deep contradiction between the growing importance of professions on the principle of "prestige" and the need for highly qualified specialists.

There is a problem of ignoring questions early information about professions of adults, have a minimum of knowledge in this area and a low vocabulary on this topic. In addition, the complexity of the work lay in the fact that this topic does not arouse such exciting interest among preschoolers as some others. And the child will be interested in only what attracts him.

Therefore, our work was to interest teachers in early career guidance of preschoolers and teach them how to interest the child in this problem.

So in 2017, the kindergarten's team of authors developed a program for personal and professional self-determination of a preschooler "On the way to a profession" and during 2017-2019 it was tested. The program covered 10 professions, five of which are known to children: teacher, librarian, doctor, postman, firefighter, welder and five little-known ones: computer designer, design engineer, graphic designer, laboratory assistant.

In the process of implementing the program, we found that children were very interested in technical professions, namely the profession of design engineer.

This profession at this stage is included in the category of prestigious professions, since with the advent of computer technology, we observe a technical rise in industry, production does not stand still, there is a rapid development of telecommunications, electronics, computer engineering and other industries. There is an improvement in existing, and the development of new scientific and technical areas and this leads to an increase in intellectual costs, where not the last place is occupied by the quality level of the performers of these developments, that is, an increase in people of technical professions.

The 2015 Address of the Governor of the Samara Region sets out the task of deepening work in the engineering and technical direction through additional activities.

But where can we find such people interested in technical professions?

Of course, kindergarten teachers come to the rescue, who know that preschool age is a very fertile ground for developing interest in various professions, including technical ones. Therefore, the kindergarten's team of authors decided to correct this program and deepen the direction of the profession of a design engineer.

We understand that a child's motivation arises precisely when problematic search and research methods are used in the work.

"The child is not a vessel that needs to be filled, but a lamp that needs to be lit!" This idea belongs to I.G. Pestalozzi is one of the most famous educators in human history.

Setting ourselves the problem of finding such forms, we have developed a system of work to study the profession of design engineer, where technologies, methods and measures have been thought out.

The purpose of this work was to form a positive emotional attitude towards the profession of design engineer in preschoolers and provide them with the opportunity to use their knowledge in accessible types of activities.

Tasks are developed:

- to form and enrich children's ideas about the professional activities of design engineers of the city of Otradny about the structure of this process, about the role of modern technology in human labor activity, to realize the importance, necessity and irreplaceability of this profession;

- to consolidate the ability of children to express their impressions in play and productive activity;

- to enrich vocabulary, develop coherent speech, teach children to give complete answers to questions, form the ability to express their thoughts coherently and consistently;

- to foster a respectful attitude towards the work of adults and its results;

The whole system of work is based on modern technologies, namely, on the technology of research activities (A.I.Savenkov, N.A. Korotkova), by which the teachers have chosen the types of research that are accessible and interesting to older preschool children:

- tests (experimentation) - the development of cause - effect connections and relationships;

- collecting - the development of generic relations.

Research methodology

For immersion in imaginary and real reality, for the development of creativity and initiative, teachers used the pedagogical technology of organizing role-playing games (D.B. Elkoninin, A.V. Zaporozhets, D.V. Mendzheritskaya, A.P. Usova, N. Ya.Mikhailenko, R.I. Zhukovskaya).

In direct educational activities, teachers used the technology of integrative learning (L.A. Venger, E.E. Kravtsova, O.A. Skorolupova), because Integration is a state of connectedness, interpenetration and interaction of individual educational areas of the content of preschool education, ensuring integrity.

The basis for the implementation of the complex-technical principle of building work is the system-activity approach. This provides social and personal orientation and motivation for all types of children's activities, maintains an emotionally positive attitude of the child.

The solution of tasks was carried out during direct educational activities, during regime moments, in the independent activities of children (conversations. Observations, readings, discussions, viewing pictures, conducting theatrical puppet shows, didactic, mobile, musical-dance games, classes on mastering certain skills, elements of labor activity).

Pupils also received information about the profession outside the kindergarten (excursions, meetings with interesting people of the city), where children not only watched the work of adults, but also participated in joint labor activities with adults, fulfilling work assignments and requests.

Thanks to such work, the preschooler will in the future be able to use the knowledge gained in independent activity (plot-role-playing), consolidate and expand the acquired knowledge. In the system of work, the independent activities of children are thought out: (plot-role-playing, didactic, theatrical games), productive types of children's activities (album design, making attributes for games, drawing, appliqué, designing, making collages and posters), performing labor actions (upon request or on behalf of an adult).

So, in the direct educational activity "Who is a design engineer?", The children learned that the name of the profession has ancient roots. The word "engineer" comes from the Latin "ingenium", which means capable of inventing. The teachers told the children that the first engineers were exclusively engaged in the construction and operation of military vehicles, and in the 16th century civil engineers appeared who were engaged in the construction of bridges. This is how civil engineering was born.

The pupils learned that the first engineers appeared in Russia thanks to Peter I, who sent talented young people to study abroad. With the help of logical links, the guys came to the conclusion that a modern engineer is a specialist with a high culture and knowledge of modern engineering and technology, economics and organization of production, who knows how to use engineering methods in solving engineering problems and at the same time has the ability to invent.

At another event, with the help of a teleconference, the guys got acquainted with the design engineers of the Volzhsky Automobile Plant, where the workers talked about their workplace at the plant, about their developments in the field of mechanical engineering and about their projects. The productive activity of preschoolers was very interesting. The pupils, on the instructions of adults, drew up schemes of various machines. I would like to note that after such a productive work, the schemes and drawings of the machines of the future have already been created by the pupils and are waiting for their implementation.

The direct educational activities "Design Bureau" were interesting, where children learned to distribute the duties of workers and solved the problem of restoring a destroyed bridge at the request of residents of the Paper Country. This way the children consolidated their paper modeling skills and got to know the profession of design engineer more deeply.

In joint and independent activities, teachers widely use "TIKO" and "LEGO" kits. Children, using them to play, help gnomes and residents of a small country to restore houses and shops, libraries and schools, think over the construction of protective structures, machines of the future using schemes and drawings for this, using their skills and knowledge.

Classes are held fascinatingly with the use of didactic games such as "Pythagoras", "Columbus Egg", "Tangram", "Kiusner's Sticks", "Nikitin's

Cubes", "Dienesh Blocks", waste material is actively used. Children very often organize exhibitions of creative artists, where exotic and unusual birds and animals, interesting buildings and cities of the future are depicted on canvases.

The work on creating films was very interesting. So, together with teachers and parents, the guys came up with fairy tales using various play kits, waste material in their characters.

To improve the competence of parents, parent meetings were held in groups, where teachers told about the work being done and how important it is to support the children in this direction.

To support gifted and talented children in the kindergarten, a competition "Generation NEXT" was held, where children, together with their parents, presented their author's projects of technical content.

In order to prove the effectiveness of the work carried out, at the beginning and at the end of the study, the pupils were examined. The research part used techniques; diagnostics of V.P. Kondrashova, survey of children on the topic "Professional activity of adults" L.V. Kutsakova (professional activity of a design engineer), author's diagnostics "Learn a profession by a picture". The sample consisted of 53 pupils. Time of the first measurement: 2018 Career guidance work was carried out during the academic year, therefore, repeated diagnostics was carried out in April-May 2019. To prove the hypothesis, the angular multifunctional Fisher test (ϕ *) was used for each variable.

Having considered the results of the diagnostics of gaming activity according to V.P. It was found out to Kondrashev that in the first dimension 60% of children use their knowledge of the profession of design engineer in play, 37% of children independently create games in the profession of design engineer. 32% of children know how to construct a plot creatively, discussing it with a partner. Thus, we can conclude that not a large number of children of the older and preparatory groups for school use knowledge about the profession of design engineer in the game. Only with the help of a teacher, the content of the upcoming game, the sequence of events, game actions are determined, they poorly reflect professional actions in the game, and the tools of design engineers are used.

According to the results of the second diagnosis, 80% of children began to apply knowledge about the profession of a design engineer in the game. 82% of children independently create games in the profession of a design engineer. 72% know how to construct a plot creatively, discussing it with a partner.

It can be concluded that the majority of children apply the acquired

knowledge in games. They combine several plots in one game, assign roles independently, coordinate the plot, game actions and characters.

Comparative analysis using Fisher's test showed that statistically significant changes occurred in the following competencies of the participants in the experiment.

1. Application in the game of knowledge about the profession of design engineer (ϕ^* - 4.154).

2. Independent creation of a game in the profession of a design engineer (ϕ^* - 7.943).

3. Ability to creatively combine the plot of the game, coordinating with a partner (ϕ^{\star} - 6.141).

According to the results of diagnostics of L.V. Kutsakova, when retesting, 85% of children know the basic work processes, 82% know about the materials of a design engineer. When calculating the angular multifunctional Fisher criterion, it was established:

1. Knowledge of basic work processes (what does he do?) (ϕ^* - 2.366).

2. Knowledge of materials, tools, apparatus and mechanisms required for work ($\phi^{\star}\text{-}$ 2.001).

According to the results of the survey on the pictures "What kind of profession?" before the vocational guidance program, 75% of children named the profession of a design engineer, when, as at the end of the work, 98% of children already knew about the profession of a design engineer and the value of the Fisher angular transformation criterion was (ϕ^* - 2.181).

As a result of the work carried out, positive results were obtained in solving the assigned tasks: ideas about the profession of a design engineer were formed, elementary labor skills were acquired, familiarized with the history of this profession, knowledge about the professional activity of adults was transferred into independent play activity.

These results indicate that this program is effective for older preschool age.

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FEATURES OF SPEECH DISORDERS IN PRESCHOOLERS WITH AUTISM SPECTRUM DISORDERS AND HYPERDYNAMIC DISORDER

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This work is based on the fact that 91 children of preschool age (from 3 to 7 years old) with severe speech impairments (SSI), of which 63 boys and 28 girls were consulted by a speech therapist in order to establish the factors of speech disorders, including the use of neuropsychological methods. Pathologies of conception, pregnancy, childbirth and early development were recorded in the overwhelming majority of cases: on average 0.93 biological burdens per child. Thus, the study is a generalization of the experience accumulated by a specific correctional care office in 2018-2019 and cannot claim statistical reliability in comparison with the entire population of children with SSI. The authors apologize in advance to colleagues whose practice is different and hope that their research will be useful.

It should be noted that medical complications were not limited to obstetric and gynecological anamnesis data; therefore, neuropsychiatric diseases were also taken into account.

When analyzing concomitant SSI (heading F80.x in ICD-10) mental disorders, the uneven distribution among groups with different neuropsychological syndromes is striking. In this work, on the basis of empirical criteria, seven syndromes were identified, named according to the predominantly deficient structures of the brain: 1) cerebellar, 2) midbrain, 3) diencephalic, 4) right hemispheric, 5) undifferentiated brainstem syndrome, 6) ascending syndrome, and 7) unformed interhemispheric interaction.

Thus, "autism spectrum disorders" (ASD, group F84.x according to ICD-10) were more often diagnosed in cerebellar (5 out of 15 who applied with it), midbrain (5 out of 26) and undifferentiated brainstem (4 out of 20)

syndromes. The four other symptomatic complexes of cognitive impairments identified in the present study accounted for only 2 cases of ASD per 30 children.

Attention deficit hyperactivity disorder (ADHD, ICD-10 group F90.x) is now diagnosed much less frequently. Possibly [2], a wide, up to 2-3 times, scatter of data on the incidence of ADHD indicates a loose adherence to diagnostic categories. Rarely enough, "pure" ADHD is found, more often it is comorbid with other developmental disorders, especially underdevelopment of general motor coordination and speech problems (expressive or both expressive and impressive). Two-thirds of the diagnostically significant symptoms in ADHD and ASD overlap to varying degrees in terms of external manifestations, which leads to the establishment of a "mixed" (both ASD and ADHD) diagnosis. Or the doctor's choice of the most emphasized at the moment in the medical press.

In the present study, out of 91 children, 8 were diagnosed with the F90.x group, which amounted to 8.8%. Of these, 3 children in the group with mesencephalic syndrome (the total number of the group is 26 children), and 3 - with undifferentiated stem syndrome (20 children).

It should be noted that these two groups "attracted" the official neurological and psychiatric diagnoses from all considered groups (epilepsy, cerebral palsy, ADHD, ASD). There have been cases when the same child had both ASD and ADHD diagnoses separated by commas. This is due to the low specificity of symptoms and the lack of unambiguous differential criteria in objective methods such as electroencephalography (EEG) and magnetic resonance imaging (MRI).

The basic, most commonly used symptoms in the cases under discussion include: stereotyped behavior, tendency to self-stimulation, sensoryemotional hypersensitivity (or distorted sensitivity), and affective lability. Often unconscious, not included in the official classifiers, but an essential criterion for a doctor is "social maladjustment". It is established on the basis of complaints such as aggression or indifference towards other children, refusal to study or eat in kindergarten, general negativism in behavior. At the same time, it is not taken into account that in a kindergarten group for 35 people, any child can demonstrate "asocial behavior" due to elementary emotional and sensory overload. In other words, maladjustment is an irrelevant criterion. But the signs of psychotic changes inherent in Canner's syndrome (F84.0) or normative intelligence, as in Asperger's syndrome (F84.5), are rarely found in SSI. Similarly, the deficit of not only attention, but also other components of voluntary regulation cannot but stem from the problems of communication and underdevelopment of sign systems. It is known that it is the possession of signs, especially speech, that is the basis for the development of voluntary behavior.

However, children with SSI, as can be seen from the above data, often receive psychiatric diagnoses. Whether in reality these children need supervision and treatment by a psychiatrist is an open question.

Another aspect of the qualifications of the condition of our wards may be of the greatest interest to colleagues. Only 10 out of 91 children (~ 11%) had their own speech therapy diagnoses at the time of contacting the correctional care room! And this despite the fact that about a third of cases were characterized by a complete absence of speech, it was replaced by vocalizations and babbling pseudowords. Another third of cases were characterized by a speech delay by two age periods. So, by the age of 7, a child could only enter into the use of a two-word protosentence, like "give me a drink." Which, generally speaking, are normative for the early, from one to three years, age. After which the junior preschool age has already passed and the senior preschool age ends.

And after all, only from a quarter to a third of cases, the consultation was the first diagnostic event attended by parents. Other children have already been repeatedly examined by doctors, neurologists and psychiatrists, and attended correctional groups in kindergartens.

There seems to be an interaction between the two trends. The first is the clear reluctance of parents to share significant medical and pedagogical information with a specialist at the start meeting.

The data provided in the process of further correctional assistance was not taken into account in the work in order to equalize children who applied only for a diagnostic examination and those who then took a course with a speech therapist. The second tendency is a misunderstanding by speech therapists of kindergartens, polyclinics and development centers of the very essence of severe speech disorders. A specialist sees a gross underdevelopment of speech, but cannot qualify it in accordance with generally accepted criteria. This allows us to consider the need to create a new classification of speech disorders in preschool children justified.

The qualification of speech symptoms within the framework of psychopathological disorders is of no less importance. It is likely that, following a broad scientific discussion involving both physicians and speech therapists, and neuropsychologists, the diagnostic criteria for ASD and ADHD can be refined.

Let us describe speech and neuropsychological symptoms in cerebellar, midbrain, and undifferentiated brainstem syndromes, which cover most of children with ASD and ADHD. The first of the syndromes in terms of frequency of occurrence is dysfunction or organic lesion of the midbrain level (26 children out of 91 examined). It should be noted that the name "midbrain" or mesencephalic is rather arbitrary. These are children with impaired movements, emotions, and general self-control, traditionally associated with changes in dopaminergic neurons [1]. Considering that 90% of dopamine in the central nervous system is produced by the so-called. "Substantia nigra" in the midbrain, and the described syndrome is obligatory associated with disturbances in the orienting reflex to the auditory and / or visual stimulus, the name we have adopted should be recognized as adequate.

So, dysfunctions of the midbrain level are characterized primarily by an uneven tone. Let's clarify that muscle tone and mental tone are different in work. The selective mental activation as opposed to the background one (usually designated as the level of wakefulness) also differs. It is also possible to accurately distinguish during observation and using simple neurological tests, the background muscle tone (how he walks, how he sits, etc.) and the tone when making targeted movements. Normally, in the absence of gross neurological disorders or overwork, different types of tone are relatively equal to each other. With midbrain syndrome, they are markedly different. Note that children who are defined by psychiatrists as having ASD are more often characterized by a deficit in background tone. These children are lethargic, emotionally flattened, long and difficult to adapt to the new environment. But after engaging in activities that can take up to 30-45 minutes, children with ASD are capable of productive work. The opposite is true for ADHD. It seems that in the background the child is active, examines the speech therapist's office, touches all the toys. Experiential tasks, such as drawing a person, can be performed while talking with the examiner. But it is worth asking the child to do some kind of neuropsychological test, for example, to give a certain position to the fingers of the hand (according to A.R. Luria), as a surge of negative emotions begins, aimlessly running around the room, behavior with a violation of social distance.

The uneven distribution of tone is noted not only between the "background" and "directed activity", but also over the muscle groups of the body. With midbrain syndrome, there is a "tyrannosaurus rex gait": the legs are bent at the knees, the calves and feet are tense (standing on tiptoe), the shoulders are bent forward and one above the other, the hands are relaxed on the arms bent at the elbows and brought to the body. Muscle tone is "mosaic" in the style of the Arlecchino costume, when the same muscle group on the right and left has different levels of tension, sluggish arms are accompanied by excessively tense legs. In the most severe cases, each limb and each major muscle group has differences in tone.

Orientation in space and objects with middle cerebral syndrome practically does not stop. The child goes through the same set of toys many times, makes dozens of circles around the room, staying on nothing for more than a few seconds. This symptom is aggravated by a variable response to visual, auditory, tactile stimuli. To the light of a flashlight in the eye, vivid reflexes are noted (blinking, indicative, pupil accommodation), then there is practically no reaction. An orienting reflex in the form of a head turn to a loud, sudden sound can be delayed up to 3-5 seconds relative to the norm. Or it may not be detected at all. This group of symptoms also includes problems of primary sensory integration. They are expressed in difficulties, up to the inability, to correlate a realistic toy and a color picture, a picture and object sound, a picture and a word-name. The latter is especially striking in those cases when the choice of a toy for the same word is lightning fast.

Distortions of the body image are frequent: with midbrain syndrome, sometimes instructions are perceived, and tasks are performed only when the child can see both himself and the speech therapist in the mirror.

At the same time, the understanding of speech strongly depends on the personality of the speaker, such a child understands a mother at least partially, strangers – not at all. Or he understands, but begins to follow the instructions only after stimulation from the mother, "well, do as the lady asks."

Lesions of the substance or functional weakness of the structures of the "cerebellar" level, which also includes the pons, were 15 people out of 91 examined with SSI. Among the main symptoms of this condition, purely neurological manifestations prevail, such as: tremor of the fingers during "targeted" movements; shaky, "uncertain" gait; inability to produce combined movements of the limbs (for example, such children "do not know how" to stand on one leg or jump on two); disturbancein movements requiring rapid alternation; nystagmus (oscillatory movements of the eyes of high frequency), especially in the extreme leads; general lethargy of the muscles; reduced sensitivity to touch. With a formed breathing cycle, including speech, the child has difficulty in voluntary breathing (inflate and deflate the balloon and similar tasks). Tentative activity, in particular, interest in toys, is reduced. In speech, bradilalia (slow speech) can be noted; pronouncing syllables "one by one", and not together; extreme poverty of the dictionary - no more than 20-30 words, some of which are grossly phonetically distorted (like dysarthria), and some are babbling
pseudowords, such as "meow". The grammatical presentation in cerebellar syndrome is most often absent.

Along the way, we note that the younger the brain structure is evolutionarily, the more speech and cognitive manifestations proper, the fewer motor and general behavioral manifestations. Here it is clearly seen in the volume and essence of the descriptions of the middle cerebral syndrome (structures "newer") and cerebellar (it is "older").

The most difficult thing is to characterize the undifferentiated stem syndrome, because it was not described in neuropsychological or neurological literature. With varying intensity, this condition combines symptoms from different structures of the brain stem, from the medulla to the diencephalon. It is impossible to say unequivocally which structures of the central nervous system or nervous processes are disturbed, with an undifferentiated syndrome. For example, among the most striking manifestations, cerebellar unsteadiness of gait, midbrain features of the orienting reflex and diencephalic disturbances of the sleep-wake cycle can be combined. In speech, disorders vary in a similar way. The phonation design in the form of blurring, symptoms of dysarthria suffers almost obligatory. Comprehension and especially the generation of speech are very dependent on the subject context: the "toy versus picture" described above, and interest in a particular subject, and emotional reinforcement from the speech therapist or parent also affect. Positive emotions visibly increase speech activity and the volume of phrases understood by a specialist. The mental and muscle tone of such children, as a rule, is characterized by a diffuse decrease. They are tired all the time, the time windows of clear consciousness and readiness to perform tests are 1-2 minutes and are fairly evenly distributed throughout the length of the consultation with large intervals.

Thus, speech development disorders in ASD and ADHD in preschoolers, having a number of features, can be described through a small set of frequency symptoms: decreased mental activity, distorted activity in orientation in the subject environment, dysarthria, lag in the formation of both lexical and grammatical design of speech at two age stages.

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AUTHENTICITÉ PERSONNELLE DES APPRENANTS DANS LE CADRE DES SCIENCES SOCIO-HUMANITAIRES

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l'article fait l'appel à la nécessité du développement et de la conservation de l'authenticité personnelle d'un individu, représente les particularités de ce phénomène dans différentes sciences socio-humanitaires et leur influence sur le système de la formation linguistique.

Mots-clés: authenticité personnelle, sciences socio-humanitaires, objet de l'authenticité, sujet de l'authenticité, la nature individuelle de l'authenticité, la nature sociale de l'authenticité.

L'experience de discussion du phénomène de l'authenticité au niveau des sciences philosophiques et psychologiques est empruntée par de différentes branches socio-humanitaires. Le problème de l'authenticité personnelle trouve son expression dans les domaines scientifiques qui étudient des côtés diverses de la nature humaine et font attention renforcée au phénomène de l'authenticité (p. ex., histoire, belles lettres, théologie, linguistique, études culturelles, histoire de l'art, ethnologie etc.)

Selon la philosophie l'individu et la société sont toujours en rapports serrés c'est pourquoi le domaine de l'étude de l'authenticité au point de vue socio-humanitaire comprend des éléments objectifs et subjectifs. Les racines objectives de l'authenticité sont envisagées comme des lois et des règles qui sont admis dans une société et qui déterminent la conduite d'une personne. Les sources subjectives de l'authenticité sont concentrées dans les intérêts, les motifs des actes, les intentions des individus qui réalisent leurs buts personnels dans une société. C'est-à-dire, l'objet des connaissances socio-humanitaires c'est le matériel significatif pour chaque individu et ses mesures personnelles du monde entouré.

L'objet des sciences socio-humanitaires constitue extensivement un spectre large des phénomènes exprimé par la notion «le monde d'une personne» y compris tout ce qui est actuellement et potenciellement survécu, souffert et important pour un individu. Ce sont des intentions, des sens, des valeurs, des acceptions, des relations introsubjectives et autocommunicatives déterminées par des niveaux sensoriels, topognostiques etc. de la conscience; … au sens commun c'est le continuum globale de la réalité qui fait contour de la richesse et de la fortune intérieures d'un individu (Ilyin, 2008, p. 128).

Par séquence, il existe toutes les raisons de conclure que la compréhension de l'authenticité personnelle peut être déterminée par l'aspect culturel. Cette approche est logique puisque la culture est une des branches de l'activité humaine liée à l'expression de soi, à la manifestation de la subjectivité d'un individu. Comme protecteur des valeurs sacrées, la culture existe en général sous forme des objets fabriqués authentiques de l'art (peinture, musique, architecture, cinéma etc.), de la littérature et de l'histoire.

On discute aussi souvent la notion de l'authenticité dans le cadre de l'antropologie de l'art. L'une des définitions employée par des critiques d'art et des antiquaires suppose l'identification évidente d'un fabricant aussi que le caractère unique d'un objet fabriqué ce qui monte à l'étimologie de la notion «authenticité» au sens «fait avec ses propres mains» (Benjamin, 1996; Davydov, 2007).

Une question essentielle consernant l'authenticité dans l'art, l'histoire et les belles lettres c'est la discussion du degrès de l'authenticité des objets. En histoire de l'art la compréension du phénomène de l'authenticité au sens indiqué a été développée assez tard. La signification initiale de la notion «authentique» a figuré au pratique de la copie et s'est rapporté, avant tout, aux instruments utilisés dans la peinture (Yai, Kasfir, 2004, pp. 192-194).

V. Benjamin dans son ouvrage «Oeuvre de l'art du siècle mécanique de la reproduction» a prouvé que la copie d'une oeuvre de l'art même très bien faite et parfaite manque un élément: sa présence dans le temps et dans l'espace, son existence unique dans l'endroit où elle a été. Cette existence unique d'une oeuvre de l'art a provoqué son histoire qu'elle avait survécu au cours de son existence qui comprend les changements physiques et les diversifications de son appartenance (Benjamin, 1996).

En effet, si on s'adresse, p. ex., à la toile de I.E. Répine «Ivan le Terrible et son fils Ivan», on voit l'évenement catastrophique et qui n'est pas déterminé par des raisons sociales. La conscience subjective du peintre se répend dans une scène qui fait appel à la perception et la sensibilisation aussi subjectives de l'évenement par des autres personnes. Au point de vue authentique la toile est unique, parfaite, distinctive, capable d'invoquer des réactions reflexives et d'activer une expérience individuelle (authentique) d'une personne. L'authenticité du peintre (du sujet) est transmise par la toile-objet à l'authenticité d'un individu ce qui fait naître une perception spécifique. L'authenticité d'une toile peut se perdre s'il s'agit d'une copie parce qu'il est parfois difficile et même impossible d'identifier l'intention et l'approche individuelle d'un peintre d'après la copie. De ce fait l'authenticité d'un «destinataire» n'est pas remarquée, l'authenticité d'un «destinateur» n'apparait pas et le soustexte d'une toile disparait. Ainsi, l'objet reproduit se loigne de la tradition culturelle, le caractère unique est remplacé par le caractère de masse.

Ce n'est pas par hasard que J.O. Yai propose de comparer le phénomène de l'authenticité aux notions de tradition, d'identité, de diaspora pour éviter toute interprétation fausse (2004, p. 192). De ce point de vue l'authenticité contient les connotations d'originalité, de caractère unique des actes, des impressions, des sensations. La réflexion habituelle et perpétuelle des sensations intérieures d'un individu crée un modèle unique de sensation authentique.

À la fois, dans l'art l'authenticité présente sa dualité ou l'ambivalence. Dans l'exemple donné ci-dessus le peintre essaie de changer la situation ainsi que les gens puissent percevoir sa toile (objet) d'une manière authentique. En ce cas l'être, d'après J.-P. Sartre et M. Heidegger, se crée lui-même.

Le statut social de l'authenticité peut être limité par des préscriptions et des jugements de la société. Cela veut dire que même si on voit une copie d'une toile, on la croit authentique puisque c'est pris pour règle dans la société qui crée des stéréotypes en conscience des gens. Une alternative pareille est critiquée par H. Arendt dans les termes de l'abcense de l'indépendance d'un individu dans sa vie subjective (1998, pp. 131-141). A.Ch. MacIntyre fait une observation juste à ce sujet: nous ne sommes plus (et parfois mois) que les co-auteurs de nos narratifs (2000, pp. 10-12).

En même temps le critère dualiste de l'authenticité est valable pour les oeuvres de la littérature où le sujet de la véridicité reçoit une très large distribution. Premièrement il faut mettre l'accent sur la direction existentielle dans l'art littéraire. Au plus haut point cela conserne les oeuvres de J.-P. Sartre, S. de Beauvoir, A. Camus, A. Rand, M. Kundera, L. N. Tolstoy, F. M. Dostoyevsky, N. G. Tchernychevski, D. S. Merezhkovsky, F. Sologoub et d'autres qui se posaient la question de la nature de l'existence humaine. Les oeuvres pareilles nous laissent réfléchir, laissent notre esprit «nager» librement et sont vraiment actuelles au point de vue de la manifestation de notre authenticité. D'autre part, il s'agit de notre perception authentique du sens du texte littéraire. Ainsi, les catégories «auteur-lecteur» peuvent s'opposer ou se corréler et interpénétrer. Chaque lecteur dévoile le contenu d'une oeuvre sous son point de vue individuel, lit un texte littéraire à sa manière, fait des conclusions subjectives.

Au contexte du problème de l'apprentissage de la culture étrangère il est préférable de prendre en considération encore un critère important de l'authenticité. Dans l'enseignement des langues étrangères on parle de l'authenticité de l'information d'un texte. En opposition du texte créé pour les besoins d'études, le texte authentique ne doit pas manquer la profondeur et la précision de l'information, ne doit être soumis aux changements ni au niveau du contenu, ni au niveau du sens. A condition de la réalisation de ces deux paramètres on peut parler de la possibilité de la manifestation de l'authenticité des apprenants. Dans ce cas il est tout à fait raisonnable de comprendre l'authenticité en enseignement des langues étrangères comme la manifestation trinitaire «sujet-objet-sujet».

Les textes comme artéfacts culturels sont aussi les objets de l'étude des sciences historiques et de l'histoire de la culture. Ce vecteur des recherches représente l'authenticité comme caractéristique estimée d'une information d'un texte, du sens de l'existence des hommes en étape concrète de l'évolution, d'un moyen de la communication (y compris pétroglyphes, géoglyphes, tableaux en argile, suscriptions sur des pierres, sur l'écorce de bouleau, traités philosophiques, documents juridiques et gerriers etc.). Tous les documents historiques et archéologiques du passé et du présent portent des traces de l'authenticité de leurs créateurs. Il n'est pas important s'il s'agit des oeuvres individuelles ou communes. Une telle interprétation permet de caractériser les textes authentiques concernant la possibilité de leur création par des auteurs qui sont en corrélation avec ces textes en conditions concrètes.

Les savants contemporains éprouvent des difficultés en déchiffrant des oeuvres d'art anciennes et sont obligés de mobiliser toutes les capacités de leur conscience, d'accumuler toutes les connaissances humaines, de prendre en considération les traits d'identité, de véridicité, d'authenticité des artéfacts culturels.

Le processus de la reconnaissance du contenu des textes et des documents historiques ne pourrait pas avoir du succès sans que les gens ne fassent mouvoir un mécanisme subjectif basé sur la compréhension de l'identité culturelle, nationale, ethnique. Aussi qu'en cas de la contemplation d'une toile ou de la perception d'une oeuvre littéraire, l'authenticité d'un objet se rencontre à l'authenticité d'un sujet donnant naissance à une nouvelle connaissance sur le sens authentique de la nature humaine par la cognition de ce qui est inconnu, obscure. C'est pourquoi le résultat des recherches historiques, d'après l'opinion de V.M. Kapytsin, c'est toujours un modèle spécifique de la compréhension du passé, un texte historique, un discours ou bien une image d'une étape historique créée par un savant (2008, p. 259).

Une déclaration pareille confirme la pensée de la manifestation inévitable de l'authenticité dans la description des événements écoulés en tous leurs rapports nombreux. L'interprétation du passé est plutôt une construction subjective de l'histoire.

Tout de même n'importe quelle reconstruction de l'authenticité d'un texte historique acquiert souvent une difficulté spécifique s'il s'agit des oeuvres antiques ou médiévales. En effet, les textes parviennent notre présent dans les modifications, les transformations et les adoptations plus modernes. La difficulté peut apparaître à condition de la détection des fragments nommés «non authentiques» à l'intérieur des oeuvres authentiques.

L'idée de l'authenticité dans les oeuvres historiques est liée à l'histoire de l'herméneutique – l'art de l'interprétation des textes. Dans sa première signification la définition «herméneutique» monte aux textes de la Bible. À présent ce terme est très répendu dans le domaine de la critique littéraire parce qu'il est important d'interpréter et d'analyser correctement chaque texte littéraire comme artéfact culturel. Les défenseurs de la doctrine herméneutique (W. Dilthey, H.-G. Gadamer, P. Ricœur, F.-D.-E. Schleiermacher) ont formulé la thèse suivante: il faut savoir comprendre l'écrivain mieux que celui-ci se comprend.

Cette affirmation se déroule en deux directions. D'une part, le vrai objet de l'interprétation ce n'est pas le texte réel mais le monde intérieur d'un écrivain, en d'autres termes, l'authenticité d'un auteur, dans laquelle la vie culturelle et morale d'une époque se reflète. D'autre part, la meilleure compréhension d'un texte peut être parvenue à travers l'auto-compréhension d'une oeuvre par un interprétateur (c'est l'allusion à l'authenticité d'un lecteur). L'authenticité personnelle nous aide à «nous approprier» une oeuvre malgré une grande distance historique.

Le point de vue des savants connus confirme l'idée de l'interdépendance entre un «destinataire» et un «destinateur» de chaque objet culturel au niveau de l'authenticité. Avec ceci il faut prendre en considération le fait que l'histoire existe dans différents hypostasis ce qui permet de présenter l'authenticité historique dans le cadre des diverses sens, en particulier, au point de vue du rôle d'un individu dans la société. P. ex., l'authenticité d'une personne historiquement importante influe sur la reconstruction des moments d'événements aux yeux des contemporains.

Puisque l'interprétation des événements historiques c'est la compréhension du passé, des actes importants des gens, des conceptions nationales et générales de la culture concrète, cette interprétation-ci est toujours conjuguée aux valeurs de la vision du monde et l'orientation sociale d'une culture ... (Ilyin, 2008, p. 129).

Le processus éducatif comme moyen d'interaction sociale fait heurter sans cesse deux types d'identité sociale. La corrélation interrompue des enseignants et des pédagogues, des parents et des pédagogues etc. provoque inévitablement la formation des avis à la base des marques identifiées des individus. Les individus possedants des particularités positives ou négatives attirent l'attention des autres. La perception laisse son empreinte à l'égard de ces enseignants du côté du milieu social. De ce fait le modèle des rapports réciproques sociales se réalise. Cela mène à ce que des élèves insolites et originaux sont obligés de cacher leur authenticité personnelle et se défendre instinctivement ce qui fait impossible la manifestation des capacités individuelle d'une personne.

La société fait la catégorisation définitive des gens et limite des qualités individuelles de chaque personne du point de vue de l'adaptation ou l'inadaptation aux stéréotypes de la culture. Dans la plupart des cas l'avis de la société dépend de l'interaction entre les gens (cela veut dire, de l'authenticité au niveau «sujet-sujet»). Autrement dit, la communication définie la mesure de l'identité sociale et de l'authenticité personnelle.

La communication donne la possibilité de sentir les intentions et de comprendre les principes d'une personne ce qui est impossible sans interaction. La langue et le discours assurent l'adaptation réciproque des types d'identité des individus différents. La manière de la manifestation de l'authenticité à l'aide de la langue devient, d'après G.H. Mead, une partie de la réaction d'un individu, provoquée par la communication interactive (2014, pp. 25-30).

Personne ne peut contester la conviction que le discours est capable d'interpréter les idées intrinsèques au genre humain. Tout de même, l'utilisation de la langue au diapason de n'importe quel prossesus social est toujours médiée par une perception et une compréhension individuelles du discours. L'individu ouvre des particularités de son identité par la langue et le discours, rend son authenticité aux autres individus, change une situation sociale concrète à l'aide de son individualité. En général, ces conclusions sont actuelles pour l'enseignement des langues. En considérant comme perspective le développement de l'authenticité personnelle au moyen des langues étrangères, il est préférable de toucher les sciences telles que sociolinguistique, psycholinguistique, ethnolinguistique.

Les recherches sociolinguistiques de V.R. Jyrmounsky, B.A. Larine, P.-J.-A. Meillet, M.V. Serguiévsky, V.V. Vynogradov, L.P. Yakoubinsky et d'autres justifient la conception de la détermination sociale des actes du discours. La sociolinguistique ne conserne pas directement les questions de l'authenticité personnelle, mais étudie la corrélation entre la langue et les conditions de son existence, ce qui a l'influence aux décisions des problèmes du maintien de l'identité sociale, économique et culturelle.

L'ethnolinguistique au niveau de la linguistique anthropologique et de l'antropologie linguistique indique aussi sur l'interdépendance des systèmes de la langue et de la culture sociale. Les recherches ethnolinguistiques de F. Boas, B. Havránek, S. Lem, V. Mathesius, E. Sapir, J. Vachek, B.L. Whorf représente un grand intérêt sous l'aspect de l'orientation sur les marqueurs culturels d'un milieu social concret. Le cercle des problèmes essentiels de l'ethnolinguistique est situé au domaine des interprétations des représentations des gens sur la société et sur la place de l'homme dans l'univers par des moyens et des formes de la langue. Les ethnolinguistes affirment que chaque groupe social et ethnique a ses moyens et ses formes spécifiques de la communication ce qui correspond aux raisons de la sociologie sur le rôle de la langue en manifestation de l'identité d'une personne.

La langue est une partie inaliénable de l'authenticité personnelle. Elle est localisée en conscience d'un individu et liée étroitement à la réflexion ce qui est étudié en détails par la science psycholinguistique (A.N. Chomsky, L.V. Chtcherba, N.I. Jynkine, A.A. Léontiev, L.S. Vygotsky). Les résultats des recherches psycholinguistiques sont très actuels pour l'enseignement des langues parce qu'ils consernent les questions de la création et de la compréhension du discours oral et écrit, les problèmes du fonctionnement de l'activité linguistique dans la société, l'analyse du développement linguistique d'un individu. La psycholinguistique considère la connexion entre les actes du discours et les caractéristiques des participants de la communication (la transformation des intentions en discours, l'interprétation des intentions par des interlocuteurs) ce qui est essentiellement le prossesus de la manifestation de l'authenticité d'un individu et la transmission de l'authenticité personnelle aux autres au moyen de la langue et du discours.

L'analyse retrospective de la représentation du phénomène de l'authenticité personnelle aux sciences socio-humanitaires paritaires as-

sure qu'une personne montre son individualité en interaction aux autres individus aux différents niveaux sociaux de la communication culturelle. En ce cas, l'authenticité joue le rôle d'une constante au point de vue de socialisation aussi que d'individualisation d'une personne dans la structure de l'éducation. Cela veut dire que l'authenticité peut se manifester justement au niveau du début individuel et social d'un individu.

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METHODOLOGICAL INTEGRATION IN THE IMPLEMENTATION OF PROFESSIONAL EDUCATION OF FUTURE TEACHERS¹

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The article presents the prognostic grounds for the methodological integration of approaches in the implementation of professional education of future teachers based on the SWOT analysis and benchmarking. The main and auxiliary methodological approaches, leading theoretical concepts, principles and functions of professional education in the context of higher pedagogical education have been determined.

Keywords: methodology, integration, professional education, future teacher, methodological approach

The issues of the implementation of the system of education of students in various types of educational organizations, including in secondary vocational and higher education in the last decade, have especially often become the subject of comprehensive discussions with the participation of not only representatives of state authorities, but also employers, the educational community in the context of development prospects, increasing social partnership, coordination of educational and upbringing programs based on the priorities of socio-cultural, economic, ecological development of regions, improvement of the educational infrastructure of educational organizations, etc. This is evidenced by a number of relevant regulatory documents that appeared during this period (for example, the draft Federal Law "On Amendments to the Federal Law" On Education in the Russian Federation "on the Education of Students", 2020, etc.). The purposeful consolidation of the efforts of various subjects and social institutions in our country contributes to the formation of a new image of the

¹The study was carried out within the framework of the State Assignment of the National Research University "BelSU" for 2020-2022. Nº 0624-2020-0012 "Substantiation of the integrative methodology of professional education at the university: dominants of the formation of universal competencies, pro-social attitudes and poly-subjectness of the future teacher".

professional education system, flexible in relation to the challenges of an innovative economy, attractive for young people working for the development of regions, cities, towns, and society as a whole.

Despite the scale and breadth of the tasks facing the system of professional education today, one of the most serious unresolved tasks is the upbringing of the future teacher, the development of his versatility, prosociality (social utility, welfare orientation), aimed at solving the problems of successful socialization and self-realization, their development. personality, becoming as active citizens of our society.

In this regard, the key concept itself - "professional education" - and its definition in relation to teacher education are of interest. By professional education of a future teacher, we mean "a purposeful process that contributes to the successful socialization, flexible adaptation of students and the correlation of the capabilities of their "I" with the requirements of modern society and professional pedagogical community; the formation of future teachers' readiness for effective self-knowledge, self-development, self-determination, self-education, self-realization, identification with the teaching profession, its activity forms, values, traditions, social and personal meanings" [5, p. 98].

The reference to this term was not accidental, it was necessary to emphasize, first, the professional content of the substance of educational work with future teachers in universities; and secondly, to draw the attention of representatives of higher pedagogical education to the fact that today the mechanism of education, socialization and professionalization of youth has changed. The pedagogical power of the word "must" ceases to work, but more and more often we answer the question "why?". Consequently, professional education today is, first of all, work with meanings, values, emotional-volitional, existential and reflexive spheres, taking into account the pro-social trends of teacher education. And only the pooling of all resources: human, environmental, managerial and others can lead to the desired results.

Conducting a SWOT analysis and benchmarking of the Concepts and programs of social and educational work presented on the websites of pedagogical universities in Russia made it possible to identify the strengths and weaknesses of professional education in universities, institutes, to identify a number of opportunities and threats associated with professional education (table 1).

Table 1 – Predictive justification	on of methodological integration
	(SWOT analysis, benchmarking)

Strengths (S)	Weaknesses (W)	Opportunities (O)		
 Stable teams of teaching staff with significant professional competencies and personal qualities. Formed assets of study groups, student government. Availability of developed infrastructure. Medical, psychological and pedagogical support of the educational process. 	 Low degree of social activity and independence of students. Lack of readiness to take initiative (among teachers and students). Low level of awareness of target, methodological, substantive, technological, effective benchmarks. Lack of diagnostic tools. An action-based approach to education. Insufficient individualization of educational work, the predominance of collective forms of education. 	 Targeted professional development of teaching staff in the field of professional education and project management of education. Expansion of relations with the public, social partners. Large-scale use of digital educational resources in educational work. Introduction of innovative educational technologies, forms and methods. Possibility of self-education and self-correction through the activation of the work of student self-government. Possibility of employment of students after the 3rd year, support of youth initiatives, startups with the possibility of financing them. Diagnostics of the professional education for the implementation of common tasks. 		
Threats (T)				

• Difficulties in overcoming the passivity of students as a result of the use of traditional forms, methods and technologies of professional education.

• Difficulties in transition to integrative methodology and project management of professional education.

The table shows that in order to solve the problems identified in the course of the study, to eliminate the shortcomings and threats, it is necessary to determine the methodology for organizing the professional education of future teachers in universities in order to increase its orderliness and efficiency.

In this regard, we will further consider the main and auxiliary, in our opinion, methodological approaches, leading theoretical concepts, principles and functions of professional education, which allow integrating leading ideas and determining the conceptual methodological core of professional education (table 2).

Parameter	Content		
Methodological	Basic methodology	Supporting methodology	
approaches	 Systemic Cultural Competent Personal and activity Environmental Synergistic Project 	 Prosocial Anthropological Valeological Socio-professional Axiological Existential Humanistic Polysubject 	
Leading theo- retical con- cepts	 The concept of a systematic construction of the upbringing process (V.A. Karakovsky, L.I. Novikova, N.L. Selivanova) The concept of education as a pedagogical component of the socialization of a child's personality (M.I. Rozhkov, L.V. Baiborodova) The concept of raising a child as a person of culture and morality (E.V. Bondarevskaya) The humanistic concept of education of student youth (A.A. Bodalev, Z.A. Malkova, L.I. Novikova) et al. [6]. 		
Integration principles of vocational edu- cation	 Integrity Communication Structurality Controllability and purposefulness Personal, professional, humanistic orientation Complexity Socialization of personality Reflexivity Democratization Unity of professional education and training Creativity, etc. 		
Functions of professional education	 Diagnostic Educational Cognitive Formative Social and professional Adaptive 		

 Table 2 – Methodological integration in the implementation of professional education of future teachers

To the main methodological approaches, in accordance with which the professional education of future teachers is implemented, we attributed: systemic, cultural, competence, personality-activity, environmental, synergetic and project approaches.

Systemic approach contributes to the construction of an integrative model of professional education of future teachers "on the principles of the necessary integrity and allows a systematic approach to the study of the best domestic practices and systems of education in higher pedagogical education" [7]. Using the ideas of a systematic approach, according to Yu.P. Sokolnikov and other researchers, suggests "the orientation of educational activities to ensure the optimal functioning of those systems in which pupils are included in order to obtain the necessary educational results" [4]. These are goals, and subjects, and content, and types of activity with their technologies, forms, methods and means, and the environment, and management, and, of course, criteria for the effectiveness of the system with the appropriate diagnostic tools.

Cultural approach "allows us to consider the process of professional education of future teachers in higher education institutions in a general cultural context, taking into account the manifestation of the integration of subjects of the educational process with the general, professional and personal culture" [2].

Competence approach allows to consider the results of professional training in higher pedagogical education "as the integration of its professionally and personally filled components: knowledge, skills, possessions, professionally and personally significant experience of activity" [7]; universal and professional competencies.

Personality-activity approach allows to organize the process of forming professionally significant qualities of future teachers in the integration of various types of creative, project, educational and research, professionally and health-oriented personally significant activities, which contributes to successful socialization, creative self-expression of the future teacher; the formation of his civic position, patriotism; familiarizing with spiritual and moral values; involvement in interpersonal, intercultural, interethnic, interfaith communication.

Environmental approach allows you to manage the process of professional education of future teachers through a specially formed environment. The environment influences the lifestyle, attitudes and thoughts of students, sets certain conditions, stereotypes, models, "corridors" of advancement in life and in the profession.

Synergistic approach makes it possible to "take a new approach to the

development of problems of the development of pedagogical systems, considering them from the position of "openness", co-creation and orientation towards self-development" [1, p. 50].

Project approach in modern conditions, it promotes the use of relevant competencies, tools, methods and means in order to obtain effective results, achieve indicators and goals of professional education based on the principles of systematicity (structuring stages, accurate performance of work, detailed prediction of the result); efficiency (improving the quality and efficiency of activities, the validity of management decisions, timely control); efficiency (saving resources: labor, financial, material and technical, etc.); transparency (openness and clarity of activities).

In this particular case, we consider pro-social, anthropological, valeological, socio-professional, axiological, existential, humanistic and polysubjective approaches to be a part of auxiliary methodology.

Let us consider only the role of the *prosocial approach*, which, on the one hand, contributes to the formation of future teachers of social responsibility, social justice, the need for volunteer, volunteer, helping activities, in selfdevelopment and lifelong education; promotes the formation of self-government skills and the choice of personal, professional, career paths, social activity, incl. innovative, social and pedagogical, entrepreneurial, etc. The prosocial approach to the professional education of future teachers allows the use of educational technologies based on benevolence, non-conflict, helping interaction, on the construction of creative, caring communities not only in a professionally oriented environment, but also in everyday life [3].

On the other hand, in our opinion, the prosocial methodology of professional education integrates the ideas of anthropological, axiological, valeological, humanistic, socio-professional, polysubject, existential approaches. So, for example, the ideas of the existential approach in the context of prosociality provide the opportunity for psychological and pedagogical support, helping learners when meeting their existential experience. The foundations of the polysubjective approach in integration with the prosocial one ensure the priority of the position of cooperation, partnership of various subjects of professional education in educational institutions of higher pedagogical education, etc.

Thus, as a result of our description of specific approaches and principles, we expect some methodological integration, optimization of processes, functionality, timely identification, prevention and elimination of inconsistencies, formation of a portfolio of educational projects and many other positive increments and effects in the context of the implementation of the process of professional education in pedagogical universities.

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INTELLIGENCE IN THE SPHERE OF NEURODIDACTICS

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This article discusses intelligence, its components, as well as intellectual models. The author attempts to consider the intellectual abilities of a person depending on age and gender. The article offers methods for assessing the cognitive abilities of students.

Keywords. Intelligence, neurodidactics, model, intellectual abilities, cognitive abilities, training.

A person's ability to learn is determined by their intelligence. The latter is defined by D.Wexler as a global human ability to think rationally, act purposefully and interact with the environment effectively. A. Binet, T. Simon define it as knowledge-based thinking, understanding, adaptive purposeful struggle, analytical reasoning, cognitive activity, idiosyncratic learning; R. J. Sternberg – as the ability to learn from experience, remember meaningful information and successfully meet everyday requirements; G. Eisenck, E. Hunt – as a set of elementary processes of information processing. J. Brunner, L. Levi-Bruhl, L. S. Vygotsky, M. A. Kholodnaya identify intelligence as the assimilation of cultural methods (styles) of information processing; L. Thurstone, R. Strenberg – as a measure of successful behavior in adapting to the world.

Over the 100-year history of the study of intelligence, objective data on its nature have been obtained. According to the conclusion of G.Yu. Eisenck, intelligence should be divided into: 1) biological (the neural and biochemical basis of cognitive activity associated with the structure and functions of the cerebral cortex), 2) psychometric (the levels of sensory and auditory discrimination measured with the help of tests, reaction time, - organizing his mental experience and those responsible for the quality of processing incoming information), 3) social, or practical (social adaptation, environmental adaptation, the ability to effectively solve situational problems, the development of adequate strategies, the quality of memory, information processing, understanding, learning) [1: 110-112].

Scientists agree that intelligence has a multifaceted structure. According to C. Snow, it includes thinking, understanding, analytical reasoning, cognitive activity, idiosyncratic learning [2: 44].

According to R. Sternberg, intelligence is the ability of speculation and cognition in conditions of incomplete education. A necessary condition for this is the separation of objective information, the formation of a consistent whole. They are responsible for information processing: 1) metacomponents of intelligence that regulate the dominant processes of its processing: problem, strategy, mental representation, organization of activities, control, assessment, 2) executive components: coding, relationships, logic, justification, comparison, response, 3) components of knowledge acquisition: selective coding, combination, comparison. Developing the idea of R. Sternberg, M.A. Kholodnaya refers to the basic properties of intelligence: procedural (reflection of intellectual activity up to elementary information processes, its operational composition and techniques), combinatorial (the ability to combine components of experience in different combinations), level (achieved level development of verbal and nonverbal cognitive functions and presentation of reality), regulatory (ensuring the effect of coordination of mental activity, its management and control) [2].

The development of a factor approach to intelligence based on latency (indirect manifestations in solving life problems), linearity and measurability, behavioral manifestations, led to the justification of the principle of guasi-measurement procedure. According to it, the difficulty of the task determines the level of intelligence development. Its factor models stand out: 1) a two-factor model based on the presence of a common intelligence factor G in people and a factor S determined by the specifics of intellectual activity (Ch. Spearman), 2) a model of primary mental potencies (mental abilities): spatial, perception, verbal understanding, fluency of speech, memory, logical reasoning (L. Thurstone), 3) hierarchical theory of intelligence, which compares intelligence with a pyramid based on narrow abilities according to Ch.Spearman, above them-primary abilities by L. Thurstone, in the superstructure - according to Ch. Spearman there is a single common factor G (D. Vernon), 4) the model of multiple intelligence by analogy with competencies (G. Gardner), 5) the model of intelligence a) potential, or fluid Gf, comparable to "General mental energy" by Ch. Spearman and b) connected or crystallized Gc consisting of competencies that are formed in the course of life (R. B. Kettel, J. Horn, Carroll).

The latter model, which has received the status of a theory and recognition in education, distinguishes limited, broad and general intellectual abilities. At the same time, broad abilities include verbal, quantitative, reading and writing, logic, short-term and long-term memory, visual and auditory processing, and speed of cognitive activity.

According To V. D. Shadrikov, intellectual abilities have a complex structure and reflect the system organization of the brain, cross-functional connections and the activity nature of mental functions [3: 37]. Such abilities form the basis for cognitive abilities. In the structure of intellectual abilities, M. A. Kholodnaya includes cognitive styles, or differences in the way information is received, processed, and used. Such styles include impulsivity / reflexivity, cognitive simplicity/ cognitive complexity, rigidity / flexibility of cognitive control [4: 45].

It is important for neurodidactics that the cognitive abilities that underlie learning develop themselves in this process. Cognitive functions change in the process of rebuilding the human brain in the process of creating new and removing unnecessary synapses, ordering connections between neurons. Thus, every new volume of knowledge modifies the brain structure.

The fundamental question for education is the speed of cognitive responses, or the speed of information processes in the brain. From studies of this phenomenon by V. N. Druzhinin, N. I. Chuprikova, S. J. Cohn, J. Carlson, A. R. Jensen, E. hunt, M. R. Leary, R. M. Kowalski, I. Liao, E. T. Shonkoff, E. Barnet, and others, it follows that there is no direct correlation between the speed indicators of cognitive responses and intelligence. According to N. I. Chuprikova [5: 219], a single mental speed to differentiate signals is characteristic of young children. According to the conclusion Of M. A. Kholodnaya, in the process of age-related development, the temporal ability of intelligence changes, specializing in different properties of signals and tasks [4: 61]. An adult shows high time indicators for some processes and low-for others.

In particular, when performing intellectual tests by adults, the time of correct answers is longer than the time of erroneous ones. According to the experimental data of E. Hunt [6: 470-473], D. Raven [7: 56-61], a high level of intelligence entails a slowdown in mental actions at certain stages of intellectual activity: building a representation of the problem, decision-making, etc. Reflective respondents tend to respond slowly and give more accurate answers to tasks. Impulsive subjects respond quickly and make

more mistakes. Haste in all cases, both strategies entail the tension, the extra mental effort and reduce the result.

So, a longer time interval leads to intelligent efficiency and a more productive solution strategy. The differences in problem solving and testing are explained not by speed, but by intellectual activity strategies. We agree with the opinion of V. D. Shadrikov that with a high intellectual potential, there is a certain type of organization of cognitive processes or their operational mechanisms [3: 71]. People with high intelligence do not have perfect mechanisms for processing information, but more formed mechanisms for regulating the available intellectual resources.

In the problem of the connection of intellectual abilities with learning, the issues of the general factor of intelligence G, specific aspects of mental activity, its dynamics in the learning process, motivation, learning style, an independent method for assessing students ' cognitive abilities, the condition of intelligence by heredity, socio-cultural conditions and aspects of the educational environment, etc. are updated. In particular, psychogenetic studies of G. Eisenck, L. Thompson, and R. Plomin allowed them to assert that genes are responsible for 68-70% of intelligence [1: 112-130]. The mechanism of hereditary influence extends to the biological maturation of brain structures that are responsible for intellectual abilities. Researchers Ya. Ponomarev, J. Piaget, L. Thurstone, and N. Reilly agree that natural/ genetic intellectual development of a person is carried out up to 20 years, and the period of intensity is marked by them from 2 to 12 years. The intellectual maximum corresponds to 19-20 years, then the intelligence is stable until 30-34 years, after which it begins to decline in activity. These conclusions fully correspond to the principle of age psychology about the sensitivity of learning to age-related stages of human development.

In Russia, the level of intelligence is steadily growing, starting from 11-12 years, approaching the peak at 17-24 years, after which it gradually decreases. At the same time, at the age of 34-64 years, there is a slight weakening of intelligence, and after 64 years, intelligence indicators approach the level of 11-12 years. Gender is not significant at the age of 15-75 years. At the age of 11-12 years, girls demonstrate better cognitive abilities than boys [8: 130-133].

The ratio of the influence of heredity and environment in a person at 15 years of age according to M. Karpenko, E. Chmyhova, N. Shlyakhta is 68% against 32% [9: 78-81]. The second, environmental indicator, includes financial and economic conditions (nutrition), psychological (communication, healthy relationships), cultural (hobbies, family leisure). From

the research of J. Honzik, M. Allen, S. MacFarlane [10: 89] it follows that intelligence indicators change by 15-20 points in accordance with the person's intention to acquire socio-economic status: children in intellectually and socioculturally oriented families show better IQ indicators than in families with minimal needs and prosperity. A pattern is noteworthy: if a child demonstrates high levels of intelligence in childhood, it is highly likely to manifest itself in adulthood.

Above, we mentioned the importance of developing a method for evaluating students ' cognitive abilities. Currently, there are several areas: test, educational, and neurophysiological. The first are reduced to establishing logical relations of analogy, classification, generalization between the proposed concepts and terms. In some cases, test tasks are made out in the form of geometric shapes, drawings, etc. The intelligence quotient is calculated based on the number of correctly completed tasks. The most common intelligence tests include: 1) scales for measuring intelligence by Wexler (WAIS) for determining verbal and non-verbal intelligence, 2) R. Amthauer's intelligence structure test (IST) for theoretical and practical abilities, 3) J. Raven's "Progressive matrices" test for measuring the general intelligence factor G, 4) General ability tests (GATB) for determining verbal abilities, ability to operate with numbers, accuracy of perception, degree of understanding, motor coordination, finger and hand motor skills, 5) culture-independent intelligence tests to measure non-verbal abilities, 6) culture-free intelligence test (CFIT) to measure "pure" intelligence, 7) Vanderlick test (KOT) for rapid diagnostics of adult intelligence, etc.

The educational diagnostics include 1) reading speed, based on which the conclusion is made about the development of RAM, concentration and stability of attention, 2) online activity as an indirect measurement of attention and cognitive activity of Internet users, the level and dynamics of their educational abilities, 3) the methodology for MASS research of intelligence in a university, 4) the method of "Rate of learning" on individual features of memorizing new concepts and learning.

Neurophysiological methods for assessing students' cognitive abilities are based on empirical data on the processing of new information by students and the amount of educational work they have completed. Data on the individual rate of assimilation of new knowledge allows you to get average values of the rate of assimilation of knowledge for students of different ages. The resulting dependence informs about the cognitive capabilities of a person in different time periods of life, allows you to calculate the standard training loads. So, the development of the student's intellectual abilities is mobile. In this regard, the idea of compensating for the lack of abilities with the need and desire for activity, creativity, transformation of reality (vigorosity) is productive. Thus, a high quality of education is achieved.

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QUELQUES ASPECTS DU SOUTIENT À LA PARENTALITÉ COMPÉTENTE DANS L'ESPACE ÉDUCATIF RUSSE À L'ÈRE NUMÉRIQUE

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The article reveals the main directions of social and educational national policy in Russia, focuses on important aspects of parenting support in the educational space. From the standpoint of pedagogical discourse, the author's view of modern parenting is proposed as a competence-based one, which orients parents towards their involvement in the education of their children and productive interaction with school. The tools of digital support for such parenting in the regions of the country are characterized. Problems that complicate competence-based actions of a family with children in the educational space are indicated. The author concludes that the issue of supporting parenting in the digital age needs further study by the social sciences.

Keywords: educational national policy, parenting support, digital support, pedagogical discourse, digital age

L'espace éducatif numérique est devenu une partie intégrante de notre vie. Il s'est élargi et continue d'ouvrir de nouvelles opportunités de participation, de coopération, de partenariat et, surtout, d'union les familles et les écoles dans l'enseignement et l'éducation des enfants. En même temps, cet nouvel espace touche le problème du soutien parental et aborde la question du développement des compétences parentales et / ou de l'acquisition de nouvelles compétences. Les recherches internationales et nationales montrent que la participation des parents au processus de changement numérique et d'innovation dans l'éducation numérique est insuffisante [5; 7], elle est encore peu nombreuse et tardive. Cette participation parentale en retard e retard est liée et s'expliquée par une variété de facteurs - sociaux, culturels, académiques, émotionnels, etc., définissant le spécifique contexte numérique du soutien parental dans la communauté locale.

SCIENCE. EDUCATION. PRACTICE

Le besoin d'enrichissement mutuel scientifique et pédagogique élargit le discours éducatif sur la parentalité et l'éducation numérique dans différentes cultures socio- et linguocultures, détermine la recherche commune d'outils numériques efficaces qui contribuent directement ou indirectement au développement des compétences parentales dans l'espace numérique de l'éducation d'aujourd'hui.

En caractérisant les directions prioritaires de la politique nationale familiale et éducative en Russie, cet article se concentre sur certains aspects importants du soutien à la parentalité compétente dans l'espace éducatif à l'ère numérique.

La Fédération de Russie s'est engagée à participer aux efforts de la communauté mondiale pour assurer le bien-être de la famille, qu'elle proclame comme la base fondamentale de la société russe. En faveur de la famille et des enfants les principaux documents stratégiques de la politique familiale et éducative de l'État ont été adoptés actuellement dans notre pays [8; 9]. Ils affirment la priorité des valeurs de la famille traditionnelle, la renaissance et la préservation des traditions spirituelles et morales dans les relations familiales et l'éducation familiale. Ces documents garantissent les conditions sociales pour assurer le bien-être de la famille, pour accroître l'autorité des parents dans la famille traditionnelle et la société, pour maintenir la stabilité sociale de chaque famille [3; 8]. La politique éducative proclame la parentalité responsable et compétente, garantit les conditions pour éduquer et conseiller les parents sur les questions juridiques, économiques, médicales, psychologiques, pédagogiques en faveur du développement des compétences sociales, communicatives et pédagogiques des parents. En Russie, les parents sont des consommateurs de services éducatifs et des demandeurs du système d'enseignement préscolaire et scolaire. Leur responsabilité parentale s'est considérablement accrue dans l'espace éducatif moderne, ce qui a conduit à l'augmentation de leurs compétences parentales non seulement dans l'enseignement scolaire des enfants, mais aussi dans leur propre développement parental. Tout cela oriente la science pédagogique russe vers une nouvelle compréhension de la gualité de la parentalité moderne, actualise l'étude scientifique de la parentalité compétente comme phénomène pédagogique et les possibilités du point de vue du discours d'éducation.

Le projet national 'Education', en particulier ses sous-projets 'Modern Parents', 'Nouvelles opportunités pour tous' [9], contribuent à ce besoin de la nouvelle compréhension, se concentrent sur la recherche de nouvelles formes et opportunités de soutien pédagogique des parents au but du développement de la parentalité compétente dans actuel espace éducatif, y compris l'espace numérique. Les sous-projets cités révèlent non seulement le public cible - parents et enseignants, mais orientent également le développement de chaque acteur dans l'environnement où les technologies numériques donnent à l'éducation une nouvelle dimension, l'opportunité pour chacun de s'impliquer dans l'apprentissage non seulement plus rapidement, mais aussi de manière différente. Cela nous convainc que tous - les enseignants, les élèves et les parents - doivent tout mettre en œuvre pour apprendre et être prêts à vivre et à travailler ensemble dans un monde numérique en évolution rapide. Dans ce monde incertain, les compétences de chacun, exprimées en actions réelles, représentent une sorte d'exigence sociale sous la forme et l'énergie d'un défi positif et compétent pour l'épanouissement personnel et professionnel de chacun.

Malgré les initiatives existantes aux niveaux national et régional visant à intégrer les technologies numériques dans l'espace éducatif, leur application dans le soutient à la parentalité compétente moderne est insuffisante pour que la communauté numérique des enseignants et des parents acquière des formes d'interaction durables dans l'intérêt d'éducation des enfants à l'ère numérique. Ce problème ne concerne pas uniquement l'enseignement russe, il est pertinent pour de nombreux systèmes éducatifs nationaux et régionaux de différents pays [4; 7]. Insuffisamment étudiée, le problématique du soutient à la parentalité à l'ère numérique encourage une recherche scientifique dans la méthodologie pédagogique, dans des approches interdisciplinaires pour l'enrichissement mutuel du discours pédagogique sur la famille, la parentalité et l'éducation.

En Russie, des initiatives visant à intégrer les services et les ressources numériques dans l'éducation sont mises en œuvre non seulement au niveau national mais également au niveau régional. Dans les régions de la Russie le soutient numérique à la parentalité se déroule dans le but du développement d'un espace éducatif d'information et de communication pour les familles avec enfants. La première direction du soutient numérique est représentée par l'interaction interministérielle du département ministériel régional de l'éducation et celui de l'informatisation et de la gestion ouverte. Elle fournit des services numériques présentés par deux modules: e-Education et Réseaux d'éducation en ville. Le premier est destiné à recevoir les demandes d'inscription scolaire (jardins d'enfants et écoles); le deuxième module fournit un flux de documents des établissements d'enseignement de la région. Ces modules sont accessibles et ouverts à tous les acteurs de l'éducation. Les deux modules sont demandés par les parents. Pour eux, le Réseaux d'éducation en ville qui donne l'accès au journal électronique de la classe, est la principale source d'information sur les progrès de leurs enfants et le ressource d'information sur les activités et la mission éducative de l'école.

L'originalité régionale du soutien numérique à la parentalité tient à la variété des e-projets initiés par les acteurs de la communauté éducative locale - enseignants, parents, élèves et autres.

Dans chaque cas, l'interaction dans l'espace numérique est intéressante, significative, utile parce qu'elle est orientée vers la pratique. Elle contribue à l'intégration des technologies numériques dans l'espace familial au profit de l'apprentissage des enfants. Ainsi, les technologies numériques sont des outils de d'acquèrir et développer des compétences parentales. Ces compétences permettent des parents de devenir des acteurs réellement actifs et compétents dans la communauté éducative de la région. En général, on peut dire que les parents sont des utilisateurs actifs d'Internet. Les Web sites scolaires, les forums, les livres d'or sont les services les plus demandés par les parents modernes dans l'école d'aujourd'hui. Les sujets des forums parental sont variés. Ainsi, le plus grand nombre de messages parentaux dans les forums sont consacrés à la santé et à la médecine des enfants dans la région, en second position l'éducation des enfants, en troisième - les activités exstrascolaires. C'est tout à fait compréhensible: la santé de l'enfant, sa réussite scolaire, sa socialisation dépendent largement des parents et de leurs compétences parentales. On peut lire les informations du forum parental pour avoir une idée de ce qu'est la parentalité dans la région et de problèmes vraiment intéressants pour les parents.

Aujourd'hui, il est important pour les parents modernes russes de comprendre ce qui se passe avec leur enfant, ils veulent influencer ce processus et y être inclus 'dans ce moment' et 'ici'. Ils sont axés sur les processus, ils s'intéressent à la façon dont leur enfant grandit et se développe. Les parents veulent influencer ce processus, même par l'interaction dans le réseau, mais ils s'efforcent de réaliser leurs compétences parentales et de devenir actifs sur le même rang que l'école dans l'éducation des enfants [1]. C'est pourquoi ils veulent voir la vie de leurs enfants à l'école en ligne, ce qui encouragera les parents à s'engager dans une véritable interaction avec l'école, les unira dans la communauté éducative numérique - des parents et des enseignants - dans tous les coins de la région.

Quel est le soutien numérique à la parentalité? Est-il suffisant por les familles des régions? Nous pouvons en juger par les enjeux qui concernent les familles avec enfants. L'inégalités numérique au sein de la famille entre les adultes, y compris les grands-parents est le problème le plus fréquent pour tous les modèles de famille. Selon les traditions familiales russes, tous ces membres de la famille jouent un rôle social et éducatif visà-vis des enfants. Ces adultes ont besoin de compétences en numériques pour bien s'engager dans l'espace commun d'éducation de leurs enfants. Une solution précoce à ce problème facilitera ce processus. Le problème aussi important est le manque ou la disponibilité insuffisante de dispositifs numériques modernes et nécessaires dans des familles. Ce problème est plus large, il est lié et reflète le bien-être et la situation matérielle des familles avec enfants dans les régions de Russie. Sa solution dépend directement de la politique sociale régionale, du soutien à la parentalité des familles nombreuses et des familles monoparentales. En général, ce soutien est effectué dans les régions russes, mais pas aussi vite que nécessaire.

Ainsi, les priorités de la politique familiale et éducative en Russie sont axées sur le soutien à la parentalité compétente. Grâce à laquelle les parents veulent et peuvent acquérir et réaliser leurs compétences parentales pour une intéraction productive avec l'école dans l'éducation de leurs enfants. Manifester leur propre intention de se développer comme parents compétents dans l'intérêt supérieur de l'enfant tel tel est l'accent de la parentalité compétente qui favorise les actions mutuelles avec l'école [2]. Le système éducatif dans chaque région du pays devrait y contribuer en introduisant des outils numériques dans l'éducation plus largement, créant ainsi des opportunités pour les initiatives des écoles et des familles, engageant les parents dans l'espace éducatif de la communauté locale.

Tout en évitant la stigmatisation et la normativité de la parentalité moderne, la création d'un environnement éducatif numérique holistique pour soutenir la parentalité dans chaque région peut élargir et élargira le contexte des politiques familiales et éducatives, améliorera la qualité de l'éducation nationale. Tout en évitant la stigmatisation et la normativité de la parentalité moderne, son soutien dans l'espace éducatif numérique de chaque région élargit et élargira le contexte des politiques familiales et éducatives, et améliorera la qualité de l'éducation nationale. Tel est l'objectif de l'éducation d'aujourd'hui à l'ère numérique, qui façonne notre avenir. Nos attentes pour cet avenir sont positives.

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NORMCORE AS A MEANS OF OVERCOMING SOCIAL EXCLUSION BY WOMEN OF THE «THIRD AGE»

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This article is devoted to the analysis of the capabilities of the normcore as a means of overcoming social exclusion by women of the "third age". The fight against social exclusion and ageism presupposes, in particular, the aestheticization of aging at the expense of fashion as an institution of resocialization and sociocultural adaptation. Normcore for women of the "third age" is considered as a kind of "social glue" that allows integrating different generations into society, blurring the boundaries between generations and social strata, and creating a single communicative space. The paper also presents the results of a questionnaire survey on attitudes towards normcore conducted among students of the Higher Folk School of Arts and Humanities of the FEFU.

Keywords: "third age", women of "third age", social exclusion, liberalization of aging, normcore, fashion.

After the Second World War, in the developed countries of the world, as a result of a significant increase in life expectancy and improved health status, there was a significant increase in the proportion of older people in the population. In this regard, it became necessary to revise the stereo-typical ideas about old age as a time of "dependence and survival". The revision, initiated by Western gerontologists and demographers back in the 1970s, was subjected not only to traditional ideas about a lifestyle appropriate for older people, but also the age threshold from which old age is usually counted, new conceptual models of "aging" were proposed [1].

For a long time it was believed that aging (an increase in the proportion of the population over the working age) is a problem of exclusively industrially developed countries, but today it is recognized that it also applies to countries with developing economies, to which modern Russia can also be attributed. According to the Federal State Statistics Service (Rosstat), in 2018, the share of the population over the working age (women aged 55 and over, men aged 60 and over) in the entire population of Russia was 25.4%, which is 5% more than in 2005 [2]. In other words, today in Russia more than a quarter of the country's population are pensioners. This alone makes research in the field of aging actual, taking into account its Russian specifics. However, as noted by D. M. Rogozin, "despite the significant contribution of Russian researchers to the study of old age, it cannot be said that Russia sets the tone in theoretical and empirical approaches to understanding aging" [3. P.175]. In this regard, of particular interest is the approach that has developed in foreign science, and is now actively used by domestic researchers, associated with the liberalization of aging or the freedom to choose one's own path.

In the discourse on the liberalization of aging, it is necessary to search for modern solutions and develop new social practices to overcome the social exclusion of older people. One of these areas of scientific research is the study of the possibilities of fashion in improving the quality of life in old age. This trend, by its very existence, presupposes a revision and renewal of outdated stereotypes, traditional values and worldview positions in relation to older age. This topic is especially relevant for women of the "third age", since "in Russia, aging has a distinctly expressed "female face"" [4. P.7]. At the same time, theoretical understanding and empirical studies of the possibilities of fashion as a factor of active longevity are not yet very common in the research field of socio-humanitarian knowledge, although these issues require actualization and active attention.

The purpose of this article is a theoretical understanding of the fashionable normcore style as a means of overcoming social exclusion by women of the "third age".

Women of the "third age" (according to P. Laslett) or "young old people" (in the terminology of B. Neygarten and E. Shanas) are a category that makes up the majority of the elderly. Their way of life in modern society often does not correspond to the traditional roles assigned to the elderly, and therefore new models of constructing life meanings and the formation of worldview positions are needed.

Liberalization of aging as a model of attitudes toward old age, not as a "period of dependence and survival", but as a time of discovering new meanings, opportunities and prospects, requires, first of all, the recognition of social exclusion as a negative phenomenon that characterizes modern Russian old age. Social exclusion as a phenomenon of experiencing social and economic deprivation, limiting the possibilities of selfrealization and self-identification in society, is most typical for women of the "third age" due to the prevalence of traditional aging models in society. Social exclusion is generated by age discrimination or ageism. As examples of latent ageism, L. V. Kolpina and E. V. Reutov cite fashionrelated visual practices that have become widespread in some organizations: "the dress code of some organizations, which instructs employees to paint over their gray hair, latently translates ageist attitudes towards older workers into the social environment" [5. P.35].

Normcore as a new clothing culture and ideology of style, characterized by utilitarianism, rationality and a pragmatic approach to clothing, can be seen as an accessible and modern practice of visual representation of fashion trends in the context of the liberalization of aging. It symbolizes fundamental transformations in the public consciousness and is currently a relevant style, most characteristic of the younger generation, reflecting its values. In this regard, normcore for women of the "third age" can be regarded as a kind of "social glue" that will allow integrating different generations into society, overcoming intergenerational barriers and creating a single communicative space.

The choice of the normcore presupposes a certain socio-psychological well-being, social inclusion in society and the corresponding behavioral models that make it possible to feel comfortable in society. Normcore is not just a modern practice of style and an approach to choosing clothes, but also a way of understanding oneself and one's place in the world, an attitude to one's physicality and a kind of visual code.

For further immersion and search for the semantic content of the normcore as a means of overcoming social exclusion by women of the "third age" in March 2020, the authors undertook an exploratory study on the basis of the Higher Folk School (HFS) - a structural unit of the School of Arts and Humanities of the Far Eastern Federal University. The total number of respondents was 35, with an average age of 67 years. The overwhelming majority of the respondents (97%) are women. 86% of respondents have higher education.

The purpose of this study was to identify the attitude of listeners (women of the "third age") to the normcore as a fashionable style.

Data collection was carried out using a group questionnaire. Before the start of the survey, the group was given the characteristics of the normcore as a fashionable style and the corresponding visual materials were demonstrated. The questionnaire consisted of 17 questions (taking into account the "passport"). For the convenience of processing and interpreting empirical data, the questions included in the questionnaire were divided into 3 thematic blocks: "Attitude to fashion", "Attitude to fashionable style normcore", "Degree of social activity". The processing of empirical data was carried out using the methods of grouping and typologizing data, comparing averages, and also frequency analysis.

Thematic block "Attitude towards fashion".

The first question in this block was aimed at identifying the respondents' understanding of fashion. To do this, they were offered several statements about fashion, from which they had to choose the most accurate. The overwhelming majority of respondents (80%) chose the following statement: "Not only clothes can be subject to fashion, but also the manner of communication, lifestyle, people's preferences in music, literature and cinema." This choice suggests that the respondents are characterized by an understanding of fashion as a phenomenon that extends to all external manifestations of a person, and not limited only to the sphere of clothing. This testifies to their familiarity with fashion theory. It is likely that this understanding is due to the fact that earlier at HFS, the audience was given a lecture on fashion issues.

The respondents' answers to the second question reflect the self-assessment of their orientation in modern fashion trends (fashion practices). Most of the elections received statements "I cannot call myself backward from fashion, but I am purposefully not interested in anything" (49%) and "I know about fashion trends in some areas of life that are important to me" (31%). In other words, the respondents do not assess themselves as "backward from fashion", "have lost interest in fashion": almost half of them know about fashion trends, but this knowledge is of a random nature ("they are not especially interested"); another third are aware of fashion trends in areas of life that are important to them (most likely, they are "especially interested").

The respondents' answers to the third question reflect the sources from which they draw information about the latest fashion. The main sources of information were "TV shows, TV shows about fashion" (31%), "social networks, Internet" (26%) and "illustrated/fashion magazines" (23%). In general, the answers to this question confirm our conclusion that at the "third age" people do not lose interest in fashion: 80% of the respondents named sources of information that, rather, indicate their purposeful interest in fashion than casual. It is also interesting that social networks and the Internet were named as the main source of information about fashion news. In other words, slightly more than a quarter of the "third age" respondents use digital technologies.

The fourth question: "To what extent is it important for you to follow fashion, to be considered a fashionable person?" was aimed at identifying the attitude of respondents to fashion. The most common answers were "not very important" (51%) and "rather important" (34%). It is impossible to unambiguously explain what is the reason for the fact that most of the respondents answered that following fashion is "not very important" for them. Perhaps this is due to the attitude to fashion that has developed at a young age, and perhaps - with stereotypical ideas that fashion is inappropriate at the "third age" or with the displacement of fashion problems to the periphery by more important problems: material wealth, health, etc. etc.

The fifth question was aimed at identifying what for the respondents, first of all, means the phrase "fashionable dress". They were offered eight interpretations of this word combination, from which they had to choose two that best suited their own ideas. The distribution of answers was quite expected: most of the choices received the statement that "dress fashion-ably" means "dress according to age and body characteristics" (66%) and "dress according to your taste" (54%). Probably, these answers reflect the selective approach of the majority of respondents to fashion designs.

The sixth question was aimed at identifying the perceptions of the older generation about whether fashion affects their youth acquaintances. The answers were distributed as follows: "affects mainly those who follow it" (37%), "only partially affects" (31%) and "yes, fashion has a great influence on them" (26%). In other words, representatives of the older generation believe that fashion has a great influence on those young people who follow it, but does not completely absorb their interests.

The answers to the seventh question reflect the respondents' perceptions of how many of their peers follow fashion trends. The distribution of answers indicates that there are few such people: 65% of the respondents believe that such people are "a minority" and 24% - "about half."

Thus, the attitude to fashion of people of the "third age" is ambiguous. They are well aware of the importance of fashion, which can extend to all external manifestations of a person (80%), are interested in fashion, using various sources of information about fashion novelties (80%), but few see themselves "in fashion": they know about fashion trends (31%) and believe that it is quite important to follow fashion (34%) no more than a third of the respondents. Note that even among their peers, few follow the fashion.

Thematic block "Attitude to the fashionable style of normcore".

The majority of respondents (63%) agree and another third (31%) "rather agree" that normcore as a fashionable style is acceptable and rel-

evant for people of all ages. In other words, 94% of the respondents expressed their agreement with the statement about the "out of age" nature of this style.

Moreover, the overwhelming majority of respondents consider normcore an acceptable fashionable style for themselves (77%), 14% found it difficult to answer and only 9% consider this style unacceptable for themselves.

Answers to the question "Do you have any young people who share the normcore style?" were distributed as follows: "yes, the majority" (31%), "yes, about half" (29%) and "yes, but very few" (23%). In other words, this style, in the opinion of the respondents, was widely recognized by the young people they know.

The next question is "Do you agree that normcore as a fashionable style allows you to feel as "inscribed" and included in the life of modern society as possible? was aimed at identifying the "inclusive" potential of this style. Most of the respondents expressed their agreement with this statement: 46% "agree" and another 43% "rather agree".

The twelfth question "What, in your opinion, is the main feature of the normcore?" was aimed at identifying the respondents' ideas about this style. They were offered a choice of six different characteristics of the normcore, from which they had to choose one, in their opinion, the main one. The answers were distributed as follows: "this style makes you feel out of age" (46%), "this style makes you feel active" (31%) and "this style is easy to create with simple things" (29%).

Thus, the familiarity of the respondents with the fashionable style of normcore allowed them to "see themselves in fashion". Most of them (77%) consider this style acceptable for themselves; relevant for all age groups (94%), allowing you to feel as "inscribed" and included in the life of modern society (89%).

Thematic block "Degree of social activity".

The first question of this block (the fourteenth question of the questionnaire) was aimed at revealing how the respondents consider themselves to be active people. 34% answered "yes" and another 51% - "rather yes". In general, 85% of respondents consider themselves to be active people to one degree or another. It is clear that in this case we can only talk about self-assessment, more or less adequate, since the very fact of visiting HFS may already indicate the activity of the respondents.

The fifteenth question was aimed at identifying the structure of leisure activities of people of the "third age". As priority ways of spending leisure time, most respondents single out "attending cultural events" (83%),

"physical education" and "walking" (57% each), "spending leisure time with family and relatives" (48%), "reading books, newspapers and magazines" (46%), "doing their own hobby" (43%), and "watching TV" (40%). The smallest percentage of respondents choose the options "I don't have time/mood for leisure" (3%), "I host or visit" (20%), "I participate in the activities of public organizations" (31%) and "I am engaged in a garden" (37%).

Thus, the HFS students who took part in the survey are undoubtedly active people. This is evidenced by their self-esteem and the structure of leisure practices. It is worth noting the non-leading role (in contrast to stereotypical ideas) of such traditional leisure practices as spending time with family and relatives, watching TV and doing gardening and horticulture.

Summarize. The research results demonstrate the presence of an active life position and the involvement of people of the "third age" in a variety of leisure activities. On the whole, they have a positive attitude to fashion, do not feel lagged behind it, but they also do not particularly strive to follow it: they do not see themselves "in fashion". However, the respondents' attitude to "fashion in general" differs from their attitude to such a fashionable style as normcore. Acquaintance with this style allows them to "see themselves in fashion": most of the respondents consider this style acceptable for themselves. I would especially like to note the socio-economic capabilities of the normcore - many respondents emphasize the possibility of creating this style using simple things. In addition, normcore is a way of visual representation that allows you to feel active outside of age, to be as "inscribed" and included in the life of modern society as possible.

In general, regarding the perception of normcore as a modern style, based on the example of this audience, it can be concluded that it is acceptable and a fairly positive attitude towards it. Presumably, we can talk about the possibilities of the normcore as a means of overcoming social exclusion by women of the "third age", thanks to resocialization and socio-cultural adaptation within the framework of the institute of fashion.

At the same time, the undertaken research undoubtedly actualizes a number of questions related to the ideas about the normcore of women of the "third age". In particular, clarification and detailing of the style itself and its visual capabilities in the socio-cultural space, awareness and acceptance of this style by other categories of older people are required. These issues require further reflection and development, and this topic presupposes a scientific discussion about the possibilities of normcore as a fashionable style in overcoming social exclusion by women of the "third age".

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PROGRAM FOR THE FORMATION OF PROFESSIONAL BEHAVIOR OF TEACHERS OF PRIVATE PRESCHOOL ORGANIZATIONS

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The article highlights the problem of professional behavior of teachers of private preschool organizations. The authors present the structure and content of the program for the formation of strategies for the professional behavior of educators, as one of the factors that increase the attractiveness of private preschool educational organizations in the educational services market. The comparative results of the study of the effectiveness of the application of the program for the development of professional behavior in the samples of teachers of public and private preschool organizations are presented.

Keywords: private preschool educational organizations, coping strategies, professional behavior

Analyzing scientific research on the problem of the professional activity of teachers, it can be noted that there are undoubtedly more studies devoted to the behavior of a teacher of various educational organizations than works studying the personality of a teacher of preschool organizations, as well as his professional behavior. Most of the traditional research focuses on the study of the personality of the child. Despite the large number of existing works on the professional behavior of a specialist in domestic and foreign research (A. Albert, E. P. Ilyin, S. B. Kaverin, A. V. Karpov, M. Mescon, E. G. Moll) works devoted to the problem of behavior of a specialist - teacher. The professional behavior of preschool teachers is covered in the works of L.S. Vygotsky, A.R. Luria, O.V. Berezhnova, R.S. Bure, T.M. Kapunova. There are very few studies of the features of professional behavior of teachers of private educational organizations [2,3].

In the context of the rapid growth and development of private preschool educational organizations, there is an increase in demand for the quantity and quality of educational services. The leading positions will be occupied by the organization making the greatest amount of efforts in the formation and improvement of the reputation of its organization, the system-forming factor of which is the strategies of professional behavior of its employees.

Despite the fact that behavioral strategies are relatively stable personality characteristics, some authors emphasize the possibility of the formation of these qualities in the context of specially organized educational activities. In this regard, we have developed a program for the formation of professional behavior of teachers of preschool organizations, the purpose of which is to form constructive styles of behavior for teachers of private preschool educational organizations aimed at interaction, cooperation, and independent problem solving.

The program includes the following modules:

1. Theoretical and substantive, the main goal of which is to form a teacher's own position in modern conditions of professional activity of educators of private preschool educational organizations. The main content of this module is implemented in the form of seminars and workshops on the following topics: "Educator of a preschool educational organization and his competence", "Behavior in conflict situations", "Constructive behavior of teachers of private preschool educational organizations in various pedagogical situations".

2. Diagnostic and prognostic. The purpose of this module is to identify strategies for the behavior of teachers in private preschool educational organizations. The main content is aimed at introspection and self-knowledge of one's own professional and personal qualities, identifying the individual characteristics of the professional behavior of teachers of private preschool educational organizations. The main work on this block can be implemented in the form of workshops: "Portrait of the teacher's behavior", "Methods of conflict management".

3. Technological. The purpose of this module is to form educators' ideas about the constructive professional behavior of teachers of private preschool educational organizations, to ensure that teachers master the technologies of preventing and correcting destructive behavior, as well as ways of self-help in difficult situations. The main content of this module is aimed at the analysis and discussion of documents reflecting the norms

of professional behavior of teachers of private preschool educational organizations, as well as the development of self-knowledge, reflection in the group, and the formation of a positive emotional climate. At the stage of implementation of the technological module, the skills of confident behavior are practiced, a comprehensive analysis of the strengths and weaknesses of the personality of the pupils, the result of which will be a formed feeling of inner stability and self-confidence. Prospects for further independent work on the development of the personal potential of professional behavior of teachers of private preschool educational organizations can also be discussed. The content of this module is realized in such forms of work as workshops, trainings. For example, in the process of passing the workshop "The practice of professional behavior of teachers in private preschool educational organizations", various problem situations are solved, questions about the essence of professional behavior, its components are discussed, the difficulties of professional behavior of a modern educator are highlighted and analyzed. By the end of the training, most of the seminar participants come to the conclusion that it is necessary to effectively organize not only educational activities, but also to develop productive activities, play, as well as be in direct contact with the child during the day and demonstrate appropriate behavior in various situations.

During the seminar, difficulties may lie in the difficult communication of teachers with the parents of children, since the requirements for the professional behavior of educators are currently quite high, and in unfamiliar situations it is rather difficult to choose a suitable productive strategy for behavior with parents.

4. Professional and reflective. The purpose of this module is to provide feedback, search for effective ways to form a reflective culture of educators, work out specific reflexive techniques, and predict professional behavior in the future. The main content is aimed at improving the skills of introspection and self-expression, the formation of the ability to listen and give feedback, analysis and generalization of the acquired experience of behavior. The work of this module is implemented in the form of such workshops: "Educator's Portfolio", "Stories as Behavior Models", "Education". At the end of the classes, the experience gained is discussed. In the course of using stories as a way of activating reflection, those abilities of teachers that were not noticed initially are revealed [2].

The effectiveness of the implementation of this program can be found in the dynamics of the strategies of professional behavior of preschool teachers, the criteria of which are described by us in the diagnostic and prognostic module of the program. To confirm this assumption, we carried out an empirical study, in which educators from state (n = 38, control group) and private (n = 36, experimental group) preschool organizations took part. For the study, we used the diagnostic technique "Indicator of coping strategies" by D. Amirkhan, adapted into Russian by N.A. Sirota and V.M. Yaltinsky [5]. The research results are shown in Figure 1.



Fig. 1. Dynamics of strategies of professional behavior of educators of public and private educational organizations (control and experimental groups)

From the analysis of the results it follows that in the experimental group there is a positive trend in the strategy of "problem solving", as well as negative - in the strategies of "avoidance" and "search for social support". The most significant changes in the experimental group occurred in relation to the strategy of "seeking social support", which is an important sign of the formation of teachers' independence, which in turn testifies to the effectiveness of the program.

The program developed by us for the formation of strategies for the professional behavior of educators is an effective management tool for the formation of the image of private preschool educational organizations, can be used in the practical activities of educators for the professional self-training of specialists.

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EDUCATIONAL PROCESS AS A INTERIOR BETWEEN THE PLAY FOR CHILDREN AND THE PLAY FOR ADULTS

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The work examines the socialization of students as a result of the counter impact of certain factors: a spontaneously emerging game and a purposeful educational process. Focusing on psychological and cultural studies, the authors consider play as an educational technology aimed at modeling the dynamic nature of sociocultural processes, as opposed to the traditional imitation of «Adult» schemes. Today's child at each stage of his development is a potential adult of another, future time. In this case, educational technologies play the role of a mediator in the activities of various levels, among which play as a form of assimilation becomes a factor of effective socialization for the society of the future.

Keywords: play, education, socialization, personality, mediator.

Introduction

The cultural process at the turn of the XX-first decades of the XXI century is associated with the breaking of ideological stereotypes, a significant change in the worldview and philosophical and methodological attitudes of many humanitarian areas. In modern conditions of pluralism of views and assessments, concepts, previously excluded from scientific use, have become possible, one of which is «Theory of the Play». And, children's games are only a part (albeit very considerable) of that huge world, which is defined by the concept of «Play». However, it is customary to call a game different types of activity, often outwardly completely different from each other. Children play, athletes play, actors play on stage and in movies, musicians play, gamblers play, etc. So, J. Huizinga defines a game as follows: «A game is a struggle for something or a representation of something» [7, p. 330]. Accordingly, among games, a significant role is assigned to the principles of «competitiveness» and, ultimately, human socialization. For example, «... language games were what we were before - and when will we cease to exist? - let's rise to the knowledge of the world « [2, p. 566].

Violation of the harmony of a person, associated with his work activity, results in what is called «one-dimensionality». This is, in essence, an alienation that must be overcome. Overcoming alienation often occurs in a playful way (this already refers to «Adult Games»). Z. Freud blamed the responsibility for alienation mainly on «our so-called culture» [5, p. 42]. For Freud, culture appears simultaneously with religion and further retains its dependence on it. The development of religion from polytheism to monotheism leads to further growth of alienation [6, p. 172 - 173].

H. Marcuse, who does not fully share Freud's position, adds to this: «As for the game, such a context allows us to consider it as a variant phenomenon, representing a kind of continuum ... The criterion of the rigidity of the rules and the rigidity of the scenario is one of the vectors that form the «Games of Adults», and at the same time the social identities of the players» [3, p. 152].

Materials and methods

The basis of the popularity of Johan Helsing's personality and his research, first of all, «Homo Ludens» (1938), was prepared in the 60-80s of the XX century by domestic researchers - S. Averintsev, S. Botkin, A. Mikhailov, N. Kolodkoy, I. Rozovskaya, G. Tavrizyan. In their works, for the first time, the original concept of the Dutch cultural scientist, his views on the history of world culture in general and on its individual periods are presented. Then his humanistic ideas came to the USSR. and were accepted thanks to the translations of the novels of Thomas Mann, Hermann Hesse, as well as the first published studies of the famous representatives of "cultural philosophy" of the late XIX - first half of the XX century - K. Jaspers, M. Heidegger, Jose Ortega- and- Gasset.

Despite the fact that in his writings on the history of world culture Huizinga delves into the past, there is always a feeling present His works «On the spiritual disease of our age»(1935) and «Tortured peace» (1945) reflect the thinking about the fate of culture, relationship between culture and power, the crisis of spirituality in the forms of daily life, attitudes and values, facing a new reality this time.

The study was also based on the works of Z. Freud («Inconvenience of culture», «A man named Moses», G. Marcuse («Eros and civilization»), as well as the author of this article («Play as a moment of socialization of a student»).

Speaking of psychoanalysis, it can be noted that the theorists of this direction have long been reproached for scientific inaccuracy. And this criticism did not go unnoticed. Modern followers of Freud's works pay attention not so much to his theoretical legacy, but to the latest empirical research.

Discussion

Developing in this article the problems of play as an aspect of education, we focused to the greatest extent on the research of modern representatives of schools of psychoanalysis, as well as representatives of Russian psychology, first of all, S. Vygodsky, who said: «Give the child the opportunity to play and create - and you you will see a projection of his adult life» [4, p. 49].

Vygotsky's followers are A. Leontyev, A. Luria, A. Zaporozhets, L. Bozhovich, P. Halperin.

Among the representatives of this direction, A. Lieberman, S. Coates and D. Schechter. They developed, in particular, the theory of attachment in the development of children's ability and mental representation of themselves and others. And here we can talk about play as a factor shaping the future of a person. But to a greater extent, we are still interested in the concept of Freud himself, who believed that play sublimates the energy of libido.

According to L. Bozovic, personality is formed gradually, in every age crisis of a child there are already personal components. D. Elkonin developed the structure of personality formation in the process of playing activity. In preschool age, he rightly believed, it is play activity that plays a leading role.

We base our research on the most general principles of the development of foreign and domestic philosophers and psychologists, in which the play of children is considered as an inexhaustible potential for preparing a child for the entire potential of an adult's life. And this potential has so far been used to a very small extent.

In this regard, the purpose of the study is to determine the role of the phenomenon of play in the process of socialization of an individual, taking into account the provision of players with the necessary information during the educational process.

Results

Children love to play, and in their games they often imitate the activities of adults. Children's play simulates «Adult» activity. In the child's understanding, the latter is the «Game of Adults.» It is the outer shell of adult activity that is captured and copied in children's games. At the same time, reflection is often reflected - what was seen on the screen, heard from adults, etc.

But the reflection of «adult games» in the games of children can be quite accurate. History, as well as fiction, has preserved numerous facts of this kind. The situation described by Herodotus is widely known when Astyages, thanks to the skillful fulfillment of the role of the king by the playing boy, realized that before him was his lost grandson - the future Persian king Cyrus.

Inheriting at birth such groups of qualities as external data, abilities and emotionality, a person still does not receive «ready-made» either his role or his future destiny. These qualities can be likened, to some extent, to the talents from the Gospel parable. What application to give these talents, what direction to give them - largely depends on the education received.

But there are other factors that influence (and very significantly) the process of introducing young people to the adult world. After all, the goal of the educational process, which is an integral part of socialization, presupposes not a victory over "competitors", but the formation of an optimal regime of relations with them. The very experience of human behavior shows that in order to be effective, it is necessary to quickly respond to an external challenge, making the most of the information contained in it.

Children's games, since they simulate those moments of «adult» activity that can be perceived by children as play, introduce this activity rather superficially. And yet, these games can bring a child closer to the society of adults to a greater extent than his physical maturation.

However, the latter is possible only under certain circumstances. Imitating the external side of the activity of adults without knowing not even the essence of a given type of activity, but at least its internal content, the child progresses rather slowly in comprehending «adult games». The real advancing of physical maturation by the social takes place only in those cases when education skillfully and tactfully intervenes in this process.

Thus, a number of children's games require serious preparation. Knowledge and art ensure the fulfillment of the play role. But the child's passion for play provides the corresponding potential.

Conclusion

At the end of the reasoning, note that, one of the main differences between children's play and adult play is the degree of competence. And, education can help blur the line that exists between them in this regard.

When it comes to the use of gaming technologies in education, we should first of all talk about the criteria that make it possible to correctly formulate tasks, assess performance, and develop procedural schemes of the game that focus on modern models of social relations. These include, first of all, the model of competitiveness, intellectualization, innovation.

Of no small importance is the task of integrating the game with the goals and objectives of a specific educational process, which will allow psychologically to interpret knowledge not as an abstract value, but as a personally significant reality experienced through play.

These are the real prospects for the development of this phenomenon in the conditions of the educational process of modern higher education.

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SPECIFICITY OF THE CONTENT OF THE IMAGE OF THE MOTHER AND THE IMAGE OF THE FATHER IN THE SELF-NARRATIVE IN WOMEN PRONE TO FOOD ADDICTION

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The article presents the results of a comparative study of the images of mother and father in women with food addiction. The study was carried out with the help of a narrative interview, which makes it possible to study existential experience in its variability (dynamics), gives an idea of the subjective interpretation of the events of one's own life, makes it possible to single out those events that a person endows with personal meaning, and which have important subjective meaning for him. As a result of the study, specific differences in the images of the father and mother were identified, consisting in the frequency of positive and negative statements, in the content of statements.

Keywords: self-narrative, narrative interview, phenomenological analysis, father image, mother image, women with food addiction.

Parents and relationships with them are the most significant factors for the development of a child, his psychological health, personal and cognitive development. Studies highlight the importance of mother and father in the formation of addictions, including food. From the point of view of representatives of the theory of object relations, the mother is the object of significant drives for the child, if she fails to meet the needs of the child, then the formation of addictions occurs through the mechanism of deficiency [9]. In case of unsatisfying needs in the relationship in the "mother-child" system, the mother is replaced by another object, and various dependencies on the substitute object are formed.

According to Kohut H, Khantzian E.J. if a person does not have a positive experience of reaction to himself on the part of his parents, allowing the child to maintain his integrity and self-esteem of the individual, then in this case he has a feeling of emptiness that needs to be filled with other objects that bring contentment [7, 8].

Today, many researchers believe that the main thing in addictive behavior is not an impulse to self-destruction, but a deficit in adequate internalization of parental figures and a violation of the ability to self-defense (Khantzian E.J.) [8].

This raises the question of the specifics of the content of the image of the father and mother in the retrospective experiences of people with food addiction.

The aim of the study is a phenomenological description of the experiences of the image of the father and mother of people suffering from food addiction.

The subjects were women with food addiction, 85 people in total, aged 20 to 40 years.

The main method used in the research is narrative interview. A narrative is a special story, a story about an event. Self-narrative is a story about oneself, in fact, "self-narrative" is a person's identity, which is presented as a socially constructed life story [2]. The use of Self-narrative (or autobiographical narrative) allows one to cognize existential experience in its variability (dynamics) and a simultaneous desire to preserve, to understand how a person interprets the events of his own life, which of them he endows with personal meaning, which are critical and which are not had a significant impact on the being of the individual. Since, first of all, important, "key" events in life are subjected to narratization, then through the analysis of Self-narrative of people with food addiction disorders, it is possible to investigate an event that makes sense for the personality, the event that triggered the development of addiction [3,5,6].

The narrative interview used in the study is a semi-structured interview that includes a number of topics to which additional questions are asked, while allowing for the possibility of digressions, clarifications, additions and variations in the wording of the questions.

The scheme of the narrative interview for the analysis of the content of the image of the father and mother included an introductory and main part. The task of the introductory part was acquaintance, establishing contact. Here it was briefly reported about the purpose of the study (we are interested in how you look at the world, how you relate to some things that are most significant to you). An agreement was concluded on recording interviews on a dictaphone and anonymity.

The main task is to collect data on childhood experiences concerning the father, mother of their relationship. The content of this part was the answers to the following questions: Remember, please, your first childhood impressions. What kind of child were you? How would you describe your family? Your relationship with your mom? Father? If you could express your life in childhood with one or two epithets (figuratively), how would you say? "What was my childhood like?"

The resulting content of the narrative interview was analyzed within the framework of the phenomenological approach [1,4] and using content analysis according to the following scheme:

1. Allocation of categories. The categories were the themes and subthemes of the narrative interview. For this purpose, significant statements were singled out - meaningful statements concerning some experience or direct experiences of the subjects. The boundaries of these statements were distinguishable semantic transitions and changes in the narrative.

2. Definition of units related to each category. The statements of the subjects were used as units. As a result of the markup, a number of statements were obtained concerning various aspects of the respondents' experience, which were assigned conventional names-codes that reflect and summarize their main content, if possible, preserving the words and formulations of the subjects themselves.

3. Quantitative analysis. It consists in calculating the absolute frequency of occurrence of each statement code and the relative frequency (specific gravity). Next, we used the method of mathematical statistics, Fisher's test, which allows us to determine the static reliability of differences in the frequency of occurrence of the received codes.

The primary content analysis of the narrative interview is presented in table 1.

Category	Code	Example of affirmation	Relative frequency of occur- rence, in%/ coefficient of specific gravity
Relationship with mother in childhood	Alienation, lack of support, expressions of love	"Mom a person of strict morals, rules, principles, if I can say so at all. There was no talk of any sup- port", "I don't remember my mother well in my childhood; she rarely hugged or kissed me"	53/0,53
Relationship with mother in childhood	hatred	"I hated her for that."	13/ 0,13
Relationship with mother in childhood	warm, friendly	"Relationships with mom and dad before adolescence can be called friendly." "And my relationship with my parents has always been and is good."	20/0,2
Relationship with mother in childhood	connected with corporal punishment	"I was beaten from early child- hood. Mostly by a mother. Mom sometimes hit me with a belt "	20/ 0,2
Relationship with mother in childhood	authority	"In my childhood, I remember mom and dad as I do now, but the only difference is that then I was a child, they are younger, although they have always been and remain my authority"	6,6/0,066
Relationship with mother in childhood	shame	"I was ashamed of my mother"	6,6/ 0,066
Attitude to the mother at the moment	Alienation, withdrawal	"We had no connection at all, not even now. "During and after adolescence - detached."	33,3/0,33

Table 1-Content analysis of the narrative interview

Father image	Positive: - love, closeness on a sensual level, friendly, warm, even	"As a child, I loved my father most of all." "I just have a completely different relationship with my dad. We can't talk about anything and neverthe- less feel for each other." "My rela- tionship with my father is friendly."	46,/0,46
Father image	Negative: - pity;	"I always felt sorry for my father".	20/ 0,2
Relation- ships be- tween father and mother	conflicting	"But as soon as he began to de- fend me, such a tirade fell upon him in general, he was afraid of her. Sometimes she didn't talk to him for months"	13/ 0,13

Quantitative (statistical) analysis revealed the following specific differences in the content of the images of the mother and father:

- the frequency of occurrence of negative statements is higher when describing to the mother than when describing the father ϕ^*_{emp} = 3.865 at p <0.01);

- the frequency of occurrence of positive statements is higher when describing the father than when describing the mother (ϕ^*_{emp} = 3.865 at p <0.01);

- relations with the mother in childhood are defined as alienated, cold more often than relations with the father (ϕ^*_{emp} = 4.153 at p <0.01);

- relations with the father in childhood are defined as friendly, warm, pleasant more often than with the mother ($\phi^*_{emp} = 3.621$ at p <0.01).

Thus, we can say that the image of the mother is emotionally rich, while the variety of negative emotions is much wider. So, the subjects describe the use of corporal punishment, alienation and coldness on the part of the mother, the lack of love, some subjects showed hatred towards the mother and a feeling of shame for her. Among the positive characteristics of the mother's image, one can distinguish friendly and emotionally warm ones, while such characteristics as love, care are not included in the positive qualities of the mother's image. In some subjects, the image of the mother is characterized by ambivalence - the simultaneous experience of the mother as warm, friendly and punishing. Ambivalence or negative emotional coloring of the image of the mother in childhood memories is, from the standpoint of classical psychoanalysis, a condition for fixation at the oral stage of development, it is at this stage that the dependent personality is formed. The negative image of the mother, indicating the lack of maternal function, serves as an impetus for the development of food addiction. Since the formation of addictions occurs through the mechanism of deficiency with the dissatisfaction of libidinal drives by the mother, as the object of the drive itself.

It should be noted that the descriptions of positive emotional relations with the mother mainly concern both parents, it is in these descriptions that the positive image of the mother is combined with the positive image of the father. In these descriptions, the word "parents" is used, for example, "And my relationship with my parents has always been and is good," or next to the word "mom" is the word "dad," for example: "Relationships with mom and dad before adolescence can be called friendly". A separate description of the mother's image is mostly negative. At the moment, the relationship with the mother of more than a third of the subjects is characterized by detachment and alienation, these emotional experiences show that the psychological traumas received from the mother are not forgotten, they simply transformed into a bad world, vivid negative childhood experiences have been processed, their intensity has decreased, but negative emotions have not turned into positive. Only a small proportion of subjects experiencing a negative image of their mother in childhood have a positive relationship at the moment. These subjects report that their relationship with their mother is established as trusting.

The image of the father is associated with such characteristics as love, closeness on a sensual level, friendly, warm, even relationships. At the same time, a feeling of pity for the father is mentioned, as well as the despotism of the father, but most often it manifests itself in relation to the mother.

In general, the range of positive characteristics of the father is wider and more diverse than that of the mother, while negative characteristics, on the contrary, are more widely represented when describing the image of the mother. The image of the father, most likely, acts as a substitute figure in relation to the image of the mother (the second most important close person, able to give love, attention, care, warmth), the image of the father is less conflicting for the subjects. It can be assumed that the image of the father is positive in contrast to the negatively perceived image of the mother, perhaps a father who does not show cruelty and does not punish is perceived positively a priori.

There is a feeling of pity in relation to fathers, in comparison with relation to mother. The experience of this feeling in relation to the father emphasizes his dependent position in the family, weakness in comparison with the mother. The subjects feel ashamed about the mother. Shame and pity create feelings of guilt in the child. So shame for the mother provokes guilt in front of others for the fact that the mother does not correspond to the ideas of what a mother should be. Pity for the father causes guilt, since the mother forces him to be weak, submissive, and the girl observing this family situation experiences pity for her father.

Comparison of the image of the father and the image of the mother in the descriptions of women with eating disorders shows that the image of the mother is more dominant, despotic, masculine. At the same time, these qualities of the mother are manifested not only in relation to the subjects in childhood, but also in relation to the father. The subjects characterize the relationship between the parents as conflicting (in the descriptions where they are mentioned). Some subjects have a negative experience of the lack of protection and support from the father in a situation where the father, standing up to protect his daughter, had a conflict with the mother. Thus, women with food addiction not only did not have a close relationship with their mother, but some of them were deprived of the psychological and physical support of loved ones (father), because in order to avoid conflicts with his wife, the father tried not to provoke her and not stand on the side of the child. Thus, in addition to shame and guilt, the women tested experienced in childhood a feeling of fear (before the mother, due to their own defenselessness and lack of father's support).

In general, people with eating disorders are characterized by negative experiences of childhood memories. Distortion of the mother's image the mother's image is defined as reluctant, detached, alienated, cruel, punishing, despotic. The image of the father is much more positive and less conflicting than the image of the mother. There are conflicts between parents, in which the father is weaker, less authoritarian than the mother.

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FEATURES OF MANIFESTATIONS OF READINESS OF DIFFERENT AGE GROUPS TO BE A PARTICIPANT IN PROJECT INTERACTION

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The publication presents empirical data characterizing the willingness of representatives of different age groups to be participants in group projects based on productive interactions. The article emphasizes the ambiguity of the concept of "interaction" in general and social psychology. The reader will find a comparison of the parameters of readiness for interaction in adolescent, youth, and adult samples, identified on the basis of the author's questionnaire. We also point out the difference between high and medium levels of readiness of adults in comparison with the other two age groups. The article focuses on the need to accompany the development of communicative competence in the online and offline space of the younger generation for coordinating actions in projects that are significant for them as the basis for successful socialization.

Keywords: interaction, joint activity, adolescents, readiness for joint activity, communicative competence, socialization.

Relevance of the problem under research is predetermined by the fact that the willingness to be a member of productive interactions serves as the basis of the most important competencies of a person (soft skills so highly valued in all spheres of social and professional life of a modern man). In the current situation of the development of adolescents, it is relevant to search for directions that allow accompanying the formation of the most important age-related neoplasms in the conditions of using the resources of the digital environment, the Internet. In Russian developmental psychology, it is generally accepted that the leading activity of adolescence is communication with peers in the context of the implementation of relevant activities for them.

The category of interaction is very ambiguous and is considered by the authors in different aspects. The readiness for interaction can be interpreted as a personal feature of a human, as a manifestation of self-presentation skills in adolescence, as a special activity, the subject of which is a group, etc. (I.A. Zimnyaya, G.M. Andreeva, N.E. Kharlamenkova, S. M. Dzhakupov). A number of authors emphasize the difficulties associated with correlating the category of interaction and communication. Consolidation of teenagers for the planning and implementation of socially important products of joint activity whether it is online or offline communication has a great potential for the development of the communicative competence (hereinafter – the CC), as it represents an important basis for the successful development of central psychological and social structures: readiness to participate in collective creative affairs, to assess their potential at the micro- and macro-level of social interaction, to realize their abilities to act as organizers of events that are interesting for peers and adults.

Communication which helps a group member achieve high levels of joint productive activity is a special subject of research. Nowadays, it is convenient to study this matter by analyzing the readiness of the members of the future group, working on one project, to communicate on the Internet, and that is why it is worth dividing communication into the coordination of group members and the actual interaction to create a product of activity. The means of coordination is communication. The need to accompany the communication of schoolchildren of all ages in the virtual space in the modern situation is becoming more and more urgent in connection with the widespread implementation of distance learning in conditions of quarantine caused by the COVID -19 pandemic.

The object of our research was the readiness of representatives of different age groups to interact in joint projects.

The subject of this study was the comparison of indicators of readiness for project interaction in the adolescent and youth group with indicators in other age groups.

We focused on understanding readiness for interaction as a psychological and social structure in the system, which has three aspects of manifestation: cognitive, emotional and behavioral. To varying degrees a person may have expressions of awareness of the need to be ready to participate in group projects, emotional acceptance of group work situations and the development of ways of correct communication in a group. Given this model of willingness to communicate, we conducted the online and offline survey with a great number of respondents of various ages.

Methods used: a survey method based on the test questionnaire "Readiness for joint activities". The author's tested questionnaire is based on identifying the cognitive, emotional, behavioral components of readiness for joint productive activity. The questions used in the test questionnaire are aimed at revealing the content of each of the areas in the context of the implementation of group projects.

This publication presents the results of the survey that allows us to identify the area of actual development of readiness for joint productive activity (hereinafter – JPA or JA) of respondents of different age groups and, in view of their results, respondents of teenagers and adolescents.

Subjects: the study involved 150 people of various social and wealth status, conditionally belonging to the group of norms. The age of the subjects ranged from 14 to 50 years. The subjects were randomized by age, as a result we got 3 groups of respondents: 1) group No. 1 (14-21 years old, 65 people); 2) group No. 2 (22-30 years old, 41 people); 3) group No. 3 (31-50 years old, 44 people).

Results: the following parameters were identified for the analysis of the data obtained, namely: the experience of participation in joint activities, the number of undifferentiated answers "I don't know", the representation in the answers of three aspects of readiness to participate in group projects.

Let us dwell on the characteristics of these parameters in each group, which are presented in Table 1.

Table 1.

Indicators of readiness for group project work of respondents in different age groups

Respondents		Group 1 - adolescents and teenagers		Group 2 - young people		Group 3 - adults	
Indicators		Num- ber (pers.)	Num- ber (%)	Num- ber (pers.)	Num- ber (%)	Num- ber (pers.)	Num- ber (%)
Total number		65	100	41	100	44	100
Participation in joint	No	0	0%	2	5%	1	3%
activities to create a project	Yes	65	100%	39	95%	43	97%
Number of "I don't know" answers		53	1.7%	66	3.3%	43	2.03%
High level of readiness for	0	0	1	2%	9	20%	
Average level of readine for JA	64	98%	39	94%	35	80%	
Low level of readiness for	1	2%	1	2	0	0	

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statistically significant according to Fisher's test (the empirical value of the differences $\phi *_{_{emp}} = 4.547$ is in the zone of significance with p less than or equal to 0.01)

Let's dwell on some of the significant parameters for comparison.

Group No. 1 – adolescents and teenagers.

Participation in joint activities: it is undoubtedly important to have experience of participating in group work to create a project earlier. All (100%) respondents noted that at least once in their life they took part in the activity of creating a group project, which indicates a high social activity of boys and girls participating in the study. This confirms the demand for the ability for self-presentation, interaction with peers, as one of the aspects of the leading type of activity at a given age. Despite the fact that all participants claim that they previously had experience in participating in group project work, we revealed that a dominant level of readiness for interaction was average. The average level is presented by 98% of the respondents and 2% demonstrate a low level. Such results can be explained by the fact that adolescents and teenagers do not have a sufficient level of awareness of the methods of communication and coordination of actions as part of group work, and also do not have the skills of meaningful self-presentation. As the authors point (N.E. Harlamenkova) adolescents and teenagers often use nonstructural self-affirmation strategy in the group, do not have applicable, ethically acceptable ways of doing so. It should be emphasized that the number of answers "I don't know" in this group is not big and shows only 2% in relation to the whole number of answers in this sample.

Group No. 2 – young people.

In this youth sample, there are more answers (5%) that the respondents had no experience of interaction in group work (than in the adolescent-teenage group). This can be explained by the fact that a team project older people have in mind does not correlate with the school or university projects and projects, but with the professional and social practice. A high level of readiness for interaction is noted only in 2% of respondents; exactly the same number, i.e. 2%, showed a low level of readiness for group project work; and 96% showed an average level. Number of answers "I don't know" is presented by 3,3% of respondents, slightly more than in the previous sample. This correlates with the lower level of experience of participation in it.

Group No. 3 - adults.

Adults in the amount of 97% confirmed the JPA experience, and, no doubt, they had in mind the social, industrial and everyday situations of interactions; 3% of respondents from the general sample of the group

wrote that they had no experience of interaction in group work. The high level of readiness for group interaction in this sample is superior to all others and amounts to 20%; average level is represented by 80% of cases. The number of answers "I don't know" is 2%, this indicates a high level of awareness of the representatives of this sample that the readiness for group coordination of actions is important.

Thus, representatives of the adult group demonstrated that readiness level which for representatives of the adolescence and teenage group could act as a "zone of proximal development". This demonstrates the need to support the growing up generation in achieving higher levels of readiness for group work. Slightly lower readiness indices of the youth group in comparison with the teenage group shows qualitatively different ideas about what can be designated by the concept of project group work. Implementation of group activities outside of schools and universities which relates to the social and productive activity serves as a more complex stage of socialization and can act for young people as an obstacle when entering in this practice.

Our analysis once again confirmed the relevance of the development of programs to support adolescents and young men in the process of mastering their communicative competence, which allows them to be productive participants in group interactions, to cultivate the values of cooperation and mutual help while uniting in activities to solve socially and professionally significant problems.

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RUSSIAN HISTORIAN S.P. MELGUNOV ON THE IMPORTANCE OF STUDENT SCIENTIFIC CIRCLES AND SOCIETIES IN UNIVERSITIES

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The article analyzes the views of the famous Russian historian and public figure Sergei Petrovich Melgunov on student scientific circles and societies in universities. It was revealed that S.P. Melgunov considered student scientific circles and societies at universities to be the most effective forms of work of teachers with students, which are of great importance for activating student youth as the intellectual and spiritual elite of the younger generation.

Keywords: Melgunov S.P., *universities, student scientific circles, active forms of work, specialization of students.*

Sergei Petrovich Melgunov (1879-1956) - a famous Russian historian and public and political figure. His scientific activity is so multifaceted that there are still many unexplored aspects of it. Our article is devoted to one of them. The relevance of considering the topic we have chosen is determined not only by its lack of study in historiography, but also by how relevant the ideas expressed by S.P. Melgunov sound in our time.

S.P. Melgunov knew the students well, their interests, problems, having personally passed the student years, participating in student circles and movements, being engaged in teaching activities, as well as social work in committees and commissions on student affairs. He studied at the Faculty of History and Philology of Moscow University. Among his teachers were the famous Russian historians V. Gerje and V. Klyuchevsky. During the years of study at the university, S.P. Melgunov participated in the student circle, and then, after the circle was transformed into a historical commission at the educational department for the dissemination of technical knowledge, he was its leader. Collaborated in many publications, both metropolitan and provincial. After graduation, he taught history at private Moscow gymnasiums. He was a member of the Pedagogical Society at Moscow University. Professionally engaged in student research, as evidenced by a large number of documents on the history of students, stored in his personal archive as part of the Archive of the Russian Academy of Sciences [1]. Such fundamental works of S.P. Melgunov as "From the history of student societies in Russian universities" and "Student organizations of the 80s – 90s at Moscow University" are devoted to students and their role in the social movement [2, 3].

S.P. Melgunov considered the student body to be the intellectual and spiritual elite of the younger generation, which largely determines the future of the country with its system of value orientations. He believed that only by comprehending the knowledge accumulated by history, political and legal ideas, cultural achievements, a person can become a real citizen, capable of transforming the fatherland by his activities. In his opinion, it is the student body that is the leading force in the social movement, and in the future today's students will lead both the social and the revolutionary movement.

In this regard, S.P. Melgunov paid great attention to the activation of student youth. He noted the need for the development of active forms of work of teachers with students, academic communication, student amateur performance. This, in his opinion, should have been facilitated by the creation of scientific circles and societies in which students would create libraries, catalogs of books for self-education, organize meetings to discuss abstracts. Communication with professors outside lecture hours, at meetings of circles, should, in his opinion, contribute to mutual understanding, rapprochement between students and teachers. The development of these forms of work seemed especially important, noted S.P. Melgunov, due to the fact that "the students themselves from time immemorial strived for such academic communication" [2]. From this position, S.P. Melgunov reacted with great hopes to the academic spring of 1902, when student scientific and literary societies were created. He was also delighted with the formation in Moscow of a central scientific society with a number of branches in specialties under the chairmanship of S.N. Trubetskoy. S.P. Melgunov took an active part in the work of this society: he participated in the development of the charter and work plan of the society, as well as in its management. He repeatedly spoke at meetings of the society with abstracts, in particular, with the work "On the Significance of Schism and Sectarianism in Russian Life", which became the basis of his Ph.D. thesis.

S.P. Melgunov paid special attention to the specialization of students.

He believed that specialization would help maximize student interest and better prepare them for future work by filling in the gaps in university courses. S.P. Melgunov noted that a detailed study by students of exactly the topic that is especially interesting to them is most capable of pushing students to scientific creativity, arouse their keen interest in science, and make it sustainable. In this regard, S.P. Melgunov emphasized the importance of not only the scientific authority of the teacher, but also his personal qualities, capable of "awakening" such interest in students. In his opinion, communication between teachers and students outside classroom hours, at meetings of scientific circles and societies, makes it possible to better reveal not only the personal qualities of students and their desire for scientific creativity, but also the personal qualities of the teacher. Traditionally established academic forms of work oblige the teacher to behave appropriately, with restraint. In addition, the number of hours devoted to a particular topic within the course does not allow him to often reveal in detail his scientific preferences. It is within the framework of scientific circles and societies that the teacher has more opportunities to captivate students, revealing their personal gualities and interest in a particular scientific problem.

Considering the formation of an active citizenship as the most important component of education, S.P. Melgunov criticized the setting of teaching history in universities. In particular, he noted that it has already become a tradition to teach courses mainly on ancient history, directing academic views into the old days, ignoring the latest problems. Later, S.P. Melgunov recalled that during his student years, only V. Gere's course on political and social theories of the XVIII century was taught at Moscow University. "It would seem, he reasoned, for me, as a Russian historian in the future, it would be much more important to learn how to practically read manuscripts than to comment on Lysia or Horace in detail for all four years, but this is precisely what was not taught at the university" [4, p.79]. While not challenging the importance of studying ancient monuments for both a young scientist and a student, S.P. Melgunov at the same time insisted on the need to study modern history, especially of his country. He condemned the persecution of historians, including the famous Russian historian V.I. Semevsky, for the study of topics "objectionable" to the government (V.I. Semevsky's book "Peasants in the reign of Catherine II" was recognized by the censorship as "unsuitable for student libraries and public reading rooms", his work on the Decembrists was assessed as publicistic, not scientific) [5].

In the tendency to recognize as scientific only the study of antiquity,

S.P. Melgunov saw an antisocial orientation, a desire to develop a tacit obedience to official science. In this regard, he constantly pursued the idea that science should be independent. The attempts of the academic school to justify the appeal to the study of ancient history by striving for historical objectivism, S.P. Melgunov considered unjustified. He pointed out that objectivism lies not at all in the topic of research, but in the methods of the historian's work, in considering the entire body of material that may be at his disposal. "The historian is tendentious when he deliberately rejects material that does not fit into the previously established and, therefore, artificial schemes" [6, p.5].

S.P. Melgunov noted with the bitterness of unfulfilled hopes that the goal of scientific student societies, created in 1902 and later, was not at all the development of scientific initiative of students, but only the direction of public thought along the safest channel, - its reorientation from public to academic [7]. The fact that each scientific circle should have a professor as its chairman (responsible person before the university administration) was assessed by S.P. Melgunov as an attempt to put student societies under the control of a professorial corporation. Believing that this could divide students and teachers, he opposed such imposition of police functions on professors. At the same time, analyzing the history of student organizations, S.P. Melgunov believed it was already impossible to turn the student movement back and all the attempts of the government to suspend the development of public consciousness of students considered in vain [2, 3].

S.P. Melgunov throughout his life continued to defend the thesis about the legitimacy of the study of any plot of history, including socio-political trends. Through his research activities, he revealed many important problems of Russian history: issues of religious tolerance, the relationship between church and state, the history of Russian popular representation, the role of students in the social movement. Later, in exile, S.P. Melgunov became one of the first researchers of the Russian Revolution and the Russian Troubles of 1917-1920, carrying out their systematic analysis. Not without reason, he called himself a "historian of the revolution", and then received universal recognition as such [8, p.184].

Thus, having become involved in social and political activities during his student years, S.P. Melgunov devoted a significant part of his scientific activity to the study of student societies and organizations in universities. Considering the student body the intellectual and spiritual elite of the younger generation, he paid great attention to the activation of student youth. This, in his opinion, should have been facilitated by the development of active forms of work of teachers with students, academic communication and student amateur activities, in particular, the creation of scientific circles and societies, as well as the specialization of students.

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CHANNELS FOR THE FORMATION OF REPRODUCTIVE ATTITUDES OF RUSSIAN YOUTH

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As an aspect of national security, demographic security directly depends on the reproductive attitudes of young people, the values of parenting and family that are desired and cultivated in society. According to surveys, young people in Russia are still focused on creating a family and having children, attaching great importance to the function of the state in protecting demographic institutions and ideological sovereignty. Nevertheless, there are a number of negative trends associated with the active promotion of alternative, negative attitudes towards marriage and children). The state, as a guarantor of safety, reproductive attitudes through the media (abortions, voluntary childlessness, postponement of childbearing age, should use information levers, resources of science, culture, traditional religions in order to counteract informational resistance to non-viable and antisocial ideas that run counter to the demographic demand of the Russian population, which contradicts the basic values and human rights.

Keywords demographic security, demographic sovereignty, reproductive attitudes, value orientations.

Representing the whole complex of judgments, behavior, attitudes towards the birth of children, reproductive attitudes determine the present and future demographic situation in the country. Forming in the pre-reproductive period, they are largely determined by the values of the parental family, the emotional component of the desired number of children and the form of future parenting are formed in the family, as well as attitudes towards competing social values of career and education [Paltseva, p. 1-3].

Sociological studies of the reproductive attitudes of young people in Russia indicate the preservation of traditional reproductive behavior. Students of most Russian universities are still focused on creating a family after completing their studies (92.8% of third-year students), with two (35.7%) or more children (42.8%). In the direction of rejection, the attitude towards abortion has changed, more than 78.6% of girls in 2019 spoke in favor of keeping the child at the onset of pregnancy [Kartysheva, p. 155], the majority of students completely reject abortion (62%). Students approve of the birth of children in a family (44% - two children, 28% - one child), the data indicate an early readiness to have children and marriage (24% - absolutely ready, 36% - rather ready, the age of respondents is 17-22 years old)) [Lebedeva, p. 65]. As before, childlessness is not a desirable scenario for either men or women, and a family with two children remains the most preferable in the eyes of young people [Lebedeva, p. 83].

But there are also negative trends, studies record the ever-increasing phenomenon of delaying childbearing up to 25-27 years (49.5%), the respondents themselves associate their decision with financial reasons and lack of housing, as well as the desire to live for themselves (25.1%) [Popova, p. 125]. The childless form of marriage is spreading more and more, and the prevalence of one-child and two-child is getting closer. There is a strong contradiction in the preferences for the number of children and their actual expected number [Churilova, p. 83]. These trends are typical not only for Russia, but also for the developed countries of Europe, USA, Canada, Japan. Young people in developed countries are demonstrating the extinction of the need for families and children, large families with three or more children are becoming a distinctive feature of migrants. For Europe, the decline in the reproductive attitudes of young people is largely a consequence of the global financial crisis, the influx of migrants from military conflict zones and competition with migrants in the labor market, in the absence of a stable income, creating a family and having children has become financially difficult for many Europeans.

A powerful threat of a new type is the systemic transformation of life values and reproductive attitudes of post-industrial youth. In the modern world of speed and technology for student youth, the need for control over personal time becomes more important than the need for childbirth. A model of behavior of the future is being formed, where people with systems thinking and possessing information technologies will be in demand. This is confirmed by numerous surveys of young people, they began to value free time, personal space, access to new professions, mastering new skills, expanding their own talents, travel, career growth more [Churilova, p. 382-396].

Another reason for the transformation of the reproductive attitudes of young people is the challenges of the external environment and the promotion in the media of the following concepts: targeting late marriage, persuading the preference of the model of late parenting and late childbirth, safety of abortion and contraception, popularization of a childless lifestyle (childfree), formation of a positive image about an alternative family lifestyle, support for childless forms of same-sex cohabitation, the formation of a positive image of experiments with the body ("my body - my choice", sex change, appearance change, organ transplant, alternative reproductive technologies, alternative forms of parenting and family, voluntary death).

According to polls, today the media, and not the family, are the main channel that forms reproductive attitudes and desired forms of parenting, from which young people draw information on issues of marriage and sex education. According to sociologists, 79% of young people watch films and TV shows at least once a week, 42% of young people aged 25-34 actively use social networks, blogs, online publications and news feeds are extremely popular. Content analysis allows us to say that a purposeful work is underway on the network to form a certain worldview and ideas among young people that relate to family and marriage issues, lifestyle in the new digital era, which, according to the ideas of the ideologues of the technological revolution, will radically change people's ideas about communication and life-giving meanings.

The content of the most rated youth resources allows us to draw a conclusion about purposeful systematic work to form attitudes that run counter to the traditional demographic needs and values of young Russians. Mass propaganda of contraception, protection of the right to abortion and childlessness, promotion of childfree and same-sex unions are an essential part of the news content of the Internet resources and media products most demanded by young people. Mass replication of this kind of content, for which there is an extremely insignificant demand in Russian society, nevertheless, forms a field for discussion and focuses attention in the youth environment on the proposed problems.

The promotion of such ideas contradicts the logic of the development of society and the tasks of demographic policy. Their goal is not only the formation of public opinion, but the preparation of a basis for the legal consolidation, modeled on Western countries, of a number of norms and restrictions related to issues of sexual orientation and gender identity. The experience of Western countries has shown that the request for the popularization of this topic comes from non-state actors, primarily large corporations and medical businesses. So, large TNCs very often finance human rights movements associated with feminism, contraception, abortion, childfree, same-sex unions, mass female education and employment - in the future, the future feminization of labor and universal employment will allow them to significantly reduce labor costs and master new world markets. The medical business is interested in promoting the demanded and expensive reproductive and medical technologies, it is they who finance campaigns in Europe and the United States to promote pro-abortion, sex reassignment surgery, surrogacy, in vitro fertilization, germ cell donation, antenatal screening, etc.

Be that as it may, the propaganda of these ideas runs counter to the goals of the development of society, raises questions of an ethical nature and in many respects contradicts the basic principles of protecting human rights, decades of feminist politics in Europe have led to the degradation of the institution of the family, with the growth of the migration factor, it threatens to be lost cultural code and national identity for many European states. The politics of struggle for gender equality caused the full employment of both spouses, which affected the redistribution of responsibilities in the family, led to overloading of parents and children in caring for young children, delegating the functions of caring for and raising children to outside people and organizations. Forced female employment led to competition between men and women in the labor market, which in turn affected wages in general, for both women and men, this not only aggravated the financial stability of families and households, but largely led to corrosion. Institute of Family and Motherhood in Europe. An attempt to introduce new medical technologies comes across ethical prohibitions and opposition from doctors who do not want to carry out procedures that contradict the norms of international law and the convictions of their conscience. In a global perspective, while maintaining this kind of trends, one should expect a further decline in the birth rate in developed countries, changes in family and marriage relations and the final corrosion of the reproductive attitudes of young people [Churilova, p. 382-396].

Can the state influence this situation? According to some scholars, family policy cannot be based on methods of coercion, the state should only create conditions to support the desired models of family parenting

[Esping-Andersen, p. 511-516] in order to give the opportunity to have as many children as people want to have [Antonov, p. 59], humanity has entered the era of depopulation, and be that as it may, it is necessary to adapt to this new world, which will inevitably lead to a transformation of the type of population reproduction [Medkov, p. 135-151]. In the opinion of others, the state is the guarantor of ensuring demographic security and development, must counter external information threats to demographic security, support information programs to increase the birth rate, using the resources of the media, culture, religion and education, science, and recreate the value of family and children in society [Popov, p. 39], to preserve and strengthen the institution of motherhood in society, which today, being extremely underestimated and unprotected in the system of social relations, still remains an irreplaceable basis for development, culture and spiritual values [Ramikh, p. 3].

Research confirms the effectiveness of social advertising methods and targeted information projects in the field of demography (projects "Mother and Child", "Safe Motherhood", "Healthy Child", "You are not alone") [Kalachikova, p. 71; 2, p. 156], but these projects should be supplemented with professional media products for youth, capable of competently and reasonably debunking non-viable and asocial concepts in youth consciousness, helping to navigate the flow of information, and independently choosing the path of development and creation. Otherwise, conditions will be created in Russia for the positive reinforcement of behavior, which in Russian society is still regarded as a pathology, but in the presence of legal preferences, it will create a new mechanism of social regulation and a threat to the country's demographic sovereignty.

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POLITICAL CORRECTNESS IN RUSSIAN POLITICAL DISCOURSE

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This article examines the concept of political correctness in Russian political discourse. This phenomenon is relatively new for Russia and therefore it has many supporters and opponents. The authors analyze the mechanism of the emergence and usage of political correctness in the spheres of social life in Russia, drawing attention that it is often used by politicians and public figures, and the media have become the main means. Political correctness is dynamic because its main cultural and behavioral aspect is closely related to socio-cultural and political processes.

Keywords: political correctness, tolerance, intolerance, cultural and behavioral aspect, a means of euphemization.

Political correctness is a widespread phenomenon that attracts the attention of scientists around the world today. It affects all areas of human life. There are supporters and opponents of this phenomenon in Russia. However, the presence of political correctness in world politics, philosophy, ethics, linguistics and culture remains indisputable.

The concept of political correctness has many aspects. Sometimes this term has an ironic connotation in many English-speaking countries. It is usually referred to excessive attempts by social or political liberals to change language and culture. The term political correctness is also used to describe the desire for respect for isolated groups, for example, the Canadian Oxford Dictionary defines this phenomenon as follows, "Political correctness is a term used to describe language, policies, or measures that are intended to avoid offense or disadvantage to members of particular groups in society [1].

In the publications of the Russian press, the term "political correctness" is often interpreted as a reality, which exists mainly in Western countries and the United States and affects Russian culture only to some extent.

S.G. Ter-Minasova notes: "political correctness is realized mainly in English, which is explained by: 1) high social and behavioral culture; 2) the mentality and ideology of the society that has established the cult of the individual, as well as commercial goals and interests "[5].

The interest in discussing political correctness is due to the relative novelty of this concept in Russia. Some scholars believe that there is no such phenomenon in Russia. Other scholars think that it exists but it is not one of the main values of national public policy.

Nevertheless, Russian media pay more and more attention to social stratification, national intolerance, gender inequality. These problems are considered within the framework of the theory of political correctness.

It would be a mistake to think that political correctness appeared in Russia not long ago. Shapina L.N. notes that political correctness was preceded by a "wooden tongue". The idea of a "wooden tongue" dates back to the late 19th century. In pre-revolutionary Russia, the expression "oak language" was used to denote the language of officials in tsarist apparatus. In the era of Bolshevism, such language was called "wooden" again because of the special manner of speaking and writing. It was a frozen, clichéd, codified language that was used at all levels of the administrative and political apparatus [3].

"Wooden language" was replaced by the term "political correctness" in the late 90s of the XX century. It was proposed by Karen DeCrow, who was the president of the American Organization for Defense of Women in 1983. This term has become actively used and today political correctness affects various aspects of people's lives around the world.

According to S.G. Ter-Minasova, "the political correctness of language is expressed in the desire to find new ways of linguistic expression to replace those that hurt the feelings and dignity of the individual, limit his human rights with the usual linguistic tactlessness and / or straightforwardness in relation to race, gender, age, health status, social status, appearance, etc." [5].
Scientists investigated the mechanism of the formation and functioning of political correctness and they state that it is based on socio-cultural taboo, which prohibits naming phenomena, which are undesirable for society and on linguistic euphemization, which helps to replace taboo. Speaking about political correctness it is necessary to single out the main

aspects:

1) the fist aspect is the cultural and behavioral aspect, which is closely related to socio-cultural and political processes;

2) the second aspect is namely linguistic. It deals with the correction of the linguistic code and evaluation of new means of linguistic expression aspect of political correctness.

The cultural and behavioral aspect of political correctness is dominant. Sometimes people identify political correctness and tolerance, but it is wrong because tolerance is wider that political correctness. Tolerance can be applied to certain groups of people: sexual or national minorities, the poor, people with some disabilities and some others. Certain aspects of political correctness are interpreted as manifestations of intolerance. The examples of intolerance are the introduction of speech codes that restrict freedom of speech, the editing of literary texts in order to exclude "inappropriate" vocabulary from them, and the cases of "reverse discrimination" of citizens who do not belong to minorities. The mass media are the main means of both political correctness and political incorrectness.

The issue of using certain terms and words in order to reduce the semantic coloring or to avoid clashes between certain social groups is especially relevant today, and the term "political correctness" is now becoming more and more popular in Russia.

Sometimes political correctness is perceived through the prism of humor in Russia: *poor - economically unprepared, homeless - person with flexible residence, prisoner - socially isolated person, illiterate - person using alternative grammar, mistake - experience gained during education, crime rate - index street activity.* Political correctness helps to avoid negative emotional coloring and allows you to find new words to describe this or that phenomenon, which helps to look at familiar things or concepts from a new, unexpected point of view.

Thus it develops the language itself, making it more flexible, rich and diverse. Political correctness demands that all offensive linguistic units be removed and positive, neutral words and phrases be substituted.

Scientists name political correctness as a strategy, because it concerns word formation, morphology, syntax and of course vocabulary. Euphemisms are called tactical tricks because they are responsible for the balance of interaction between individuals, groups, and communities and the balance is either observed or disrupted. In addition, political correctness is more a cultural phenomenon then linguistic. It is known that any language reacts to any transformation in culture, politics and transformation of the society influences the language. Thus it is the mutual process.

The most productive ways to create political economic euphemisms are: 1) abbreviation (OSCE, UN, GDP, housing and communal services); 2) the use of words with diffuse semantics (operation, material, product, event, action); 3) borrowed vocabulary (liberalization, liquidity, destructive measures, confrontation, inflation); 4) metaphorization of meaning (ethnic cleansing, physical elimination, gray economy); 5) negative prefix (failure, non-Slavic appearance).

The most common means of euphemization is the way of borrowing lexeme. The meanings of foreign words are often poorly understood by native speakers of the recipient language. Such vocabulary is perceived by listeners as more prestigious, euphonious [4].

Russian politicians often use political correctness to replace words, which sound unpleasant, with more neutral ones.

L.P. Krysin identifies the following areas of social life in which political correctness is widely used:

1. It is used in diplomacy. Diplomacy is the art of resolving international disagreements by peaceful means, and one of the concepts of diplomatic language is to use restrained, cautious phrases that allow diplomats and ministers to say the harshest things to each other without losing tact or showing impoliteness. The examples of words and phrases, which are used and were born in diplomatic speech, are: "go to extreme measures", "unpredictable consequences", "confrontation", "certain circles", "the relevant authorities", "peacekeeping actions", "principle of reciprocity".

2. The second sphere of usage is repressive actions of the authorities. The examples of this group are: "*detain*" instead of "*arrest*", "*capital punishment*" instead of "*death penalty*".

3. Political correctness is widely used in the sphere concerning the production of weapons, social institutions or even military secrets. For example, the words "*object*", "*product*", "*stuff*", "*instrument*" can be used instead of "*weapon*".

4. This sphere of usage is associated with police, crime, criminal investigation, army, and some other authorities. For example, such words as *"task"*, *"operation"* can be used in the meaning: *"go on a task"*, *"complete a task"*, *"carry out an operation to arrest a criminal"*.

5. The sphere of distribution and service is the fifth sphere of usage.

For example such words and phrases can be used here: "goods of high demand", "shortage" etc. These words were widely used in 90's in Russia but now they are gradually becoming less usable. Some scientists note this is characteristic to the vocabulary of any language. The world changes, the transformations take place and vocabulary reacts to these processes instantly.

6. It is used in relations between various national and social groups and the status of these groups. The phrase "*non-indigenous population*" can be used in relation to the Russians who live in the Baltic states or other former republics of the USSR.

7. The last group is represented by some types of professions. The goal is to increase the prestige of these professions or to hide the negative impression of the type of occupation: "milking machine operator", "cleaning work operator" [2].

Thus, at present, political correctness attracts the attention of the Russian public. Political correctness is important for Russian citizens who are increasingly participating in the process of intercultural communication. The ability to interpret the content of politically correct statements in Russian and English is the key to effective communication.

In addition, Russia is a multinational state and education of tolerance, linguistic and behavioral correctness in Russian society is especially important at present. Political correctness is dynamic at the moment, it reflects the processes of transformation of the modern sociocultural paradigm.

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PHOTOPOLYMER RESINS FOR SLA PRINTING IN PROSTHETIC DENTISTRY

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Dentistry is one of the most developing specialties in the field of 3D printing, and it is in orthopedic dentistry that not only the speed and accuracy of the manufactured orthopedic structures are most important, but also the properties of the materials used: safety; biocompatibility; compliance with medical. Despite the development of modern dentistry and the emergence of new basic materials for the manufacture of removable dentures, today, 98% of all removable plate dentures in the world are made of acrylate-based plastics. The article presents the results of a review of biocompatible photopolymer resins for the manufacture of removable dentures. The composition and characteristics of photopolymer resins and the stages of the polymerization process are described; a classification of biocompatible resins is presented. Analysis of the assortment of the Russian market of biocompatible photopolymer resins used in orthopedic dentistry for removable prosthetics showed that the main market share is occupied by only three companies producing these resins. The presented review of biocompatible photopolymer resins for removable prosthetics showed that today an active search continues in the field of developing modern base materials for the manufacture of complete removable plate prostheses with optimal characteristics.

Keywords: removable prosthesis, biocompatible photopolymer resin, 3D printing, SLA, stereolithography.

An analysis of the scientific literature shows an increase in the number of patients requiring removable prosthetics, in connection with which orthopedic dentists have to think about solving the current problem of orthopedic treatment of such patients [4]. The most important task of modern orthopedic dentistry is the restoration of the lost functions of the dentition in case of violation of the integrity of the dentition.

In modern orthopedic dentistry, the search for new methods, modern materials and the improvement of existing ones is the primary task in the development of modern dentistry. The basic material for the manufacture of complete removable plate prostheses is the base plastic. The basic material used in orthopedic dentistry, which is in direct contact with the tissues of the prosthetic bed and the biological fluid, must have medical and technical properties: not irritate the oral mucosa; have sufficient strength; firmly connect with artificial teeth; do not deform; do not change the volume while using the prosthesis; well sanded and polished; match the color of the oral mucosa. Today, there are a large number of base materials used in the manufacture of removable dentures, but not all of them are widely used in the dental laboratory.

Despite the development of modern dentistry and the emergence of new basic materials for the manufacture of removable dentures, today, 98% of all removable plate dentures in the world are made of acrylatebased plastics [2].

Dentistry is one of the most developing specialties in the field of 3D printing [3], and it is in orthopedic dentistry that not only the speed and accuracy of the manufactured orthopedic structures are most important, but also the properties of the materials used: safety; biocompatibility; compliance with medical parameters [1].

SLA 3D printers are equipment with which, using the stereolithographic method, it is possible to create orthopedic constructions, including removable plate prostheses. Photopolymer resins are composed of two groups, main and side; combinations of long and short monomers; oligomers; photoinitiators; additives [6]. This provides unique opportunities to create various formulas with a large number of optical, mechanical and thermal properties - from transparent to colored plastics, from flexible to rigid, from viscous to heat-resistant.

The chains of monomers and oligomers in the polymer have active molecular groups at their ends. When UV radiation hits the polymer, the photoinitiator molecule breaks down into two parts, and the bond connecting them forms two very reactive radicals. These molecules transfer reactive radicals to active groups of chains of monomers and oligomers, which in turn react with other active groups to form longer chains. As the chains lengthen and cross-linking occurs, the plastic begins to harden (Fig. 1). The entire process of transition from liquid to highly polymerized solid state takes place in milliseconds.



Fig. 1. Stage of the polymerization process

In the sterolithographic 3D printing process, the polymer components form covalent bonds, which provides high lateral strength, but the polymerization reaction is not completed. The 3D printing process (Fig. 2) is modulated in such a way that the layer is maintained in a semi-reacted state, which is called "green". The green state differs from the fully solidified state in one important point: there are still polymerizable groups on the surface, which form covalent bonds with the subsequent layer. When the next layer hardens, the groups of the previous layer are involved in the polymerization reaction, forming not only side covalent bonds, but also bonds with the previous layer. This means that at the molecular level, in terms of chemical bonds, there is no difference in the spatial axes X, Y and Z, the printed object using SLA technology is a continuous polymer network. A continuous object printed using SLA technology is isotropic.



Fig. 2. SLA Printing Process

Isotropy has both mechanical and optical advantages. Isotropic parts are ideal for dentistry because they reflect a number of properties of traditional base polymers, do not suffer from delamination and porosity. The formation of chemical bonds and the absence of visible layers inside the object allows printing optically clear parts.

After completing the stereolithography process, the printed part remains on the build platform in the aforementioned "green" state. Although it has a final shape and appearance, the polymerization reaction has not been completed, the mechanical and thermal properties have not been fully formed.

Additional UV curing completes the polymerization process and stabilizes the mechanical properties, which allows for the highest possible structural strength and becomes more stable, which is especially important in the case of functional plastics for dentistry.

Dental and medical SLA resins are divided into 2 classes of biocompatibility.

Photopolymer resin for medical devices - Custom Medical Appliances (class I biocompatibility). Class I biocompatible resins can be used for medical device manufacturing. Designs printed on this resin can be sterilized by autoclaving for direct use in the operating room.

Class I biocompatibility rules relate to materials that are allowed to be used for: non-invasive devices that come into contact with intact skin; devices for temporary use or short-term use in the oral cavity; reusable surgical instruments.

Dental Long Term Biocompatible Resin - Dental Long Term (class IIa biocompatibility). These resins are specially formulated for long-term dental restorations. Biocompatible class IIa resins may come in contact with the human body. High resistance to fracture and wear make this resin ideal for the manufacture of orthopedic structures.

Class IIa biocompatibility rules relate to materials that are allowed to be used for: devices that come into contact with biological fluids; devices used to inject a substance into or out of a human body; invasive shortterm devices; orthopedic constructions.

Today, in the domestic market, photopolymer resins for printing removable orthopedic structures are represented by several companies. All of them are certified on the territory of the EAEU and have registration certificates.

The Dutch company NextDent BV, spun off from Vertex-Dental BV in 2012, previously engaged in dental materials.

NextDent Denture 3D + is an acrylic ester based monomer used for printing on all laser and DLP printers, used in the construction of denture

bases. Due to the fact that the residual monomer in the resulting polymer after the polymerization process is minimal, the product is biocompatible, it has class IIa certification and is intended for continuous use in the oral cavity. It is characterized by low shrinkage rates (\pm 1.4%) compared to conventional PMMA materials used for dentures.

NextDent C&B MFH (Micro Filled Hybrid) is a class IIa biocompatible photopolymer consumable used in the construction of artificial teeth for removable dentures. It has strength and durability, the final products lend themselves to various types of post-processing, including polishing.

The next representative is Denture Base Resin and Denture Teeth Resin, from the American company Formlabs. The company was founded in 2011 at the Massachusetts Institute of Technology.

Denture Base Resin is a durable class IIa biocompatible polymer used for printing on SLA printers, designed for the manufacture of bases for removable dentures, supports print resolution of 50 microns. The shrinkage of this material should not be considered as it is only 0.05%. Available in LP (Light Pink), OP (Original Pink), RP (Reddish Pink), DP (Dark Pink) colors.

Denture Teeth Resin is a class IIa biocompatible polymer designed for the manufacture of artificial teeth for removable dentures, temporary artificial crowns. Available in A1, A2, A3, A3.5, B1, B2 colors corresponding to the Vita scale.

Denture Base Resin and Denture Teeth Resin: Non-mutagenic; not cytotoxic; do not cause redness of the mucous membrane or edema; do not cause systemic toxicity. Both materials comply with ISO standards: ISO 207951: 2013 (Dentistry. Basic polymers. Part 1. Basic polymers for dentures); ISO 22112: 2017 (Dentistry - Artificial teeth for dentures).

After reviewing biocompatible photopolymer resins for the manufacture of complete removable plate prostheses, it can be concluded that today an active search and development of new base materials for the manufacture of removable plate prostheses with optimal characteristics continues. An important task for further study is the study of biocompatible photopolymer resins, a comparative analysis of their properties, costeffective with known base plastics in orthopedic dentistry.

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AUTOANTIBODIES IN PATIENTS WITH PULMONARY SARCOIDOSIS

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The article presents the results of pilot study concerning the evaluation of anti-dsDNA and anti-neutrophil antibody (ANCA) levels in 40 patients with pulmonary sarcoidosis and 48 patients with other pulmonary dissemination processes. ANCA were revealed in 19 (45%) patients with sarcoidosis and 25 (52,5%) patients from control group and antidsDNA were revealed in 13 (32,5%) and 17 (35,4%) patients, respectively. Maximum rates of these autoantibodies were observed in patients with the duration of sarcoidosis from 1 to 5 years (91%). No correlations with clinical symptoms or radiologic picture were revealed.

Keywords: sarcoidosis, pulmonary dissemination, autoantibodies

Introduction

Sarcoidosis is a systemic granulomatosis disease, the ethiology of witch still remains unknown. The formation of sarcoid granuloma involved epithelial cells, fibroblasts and various types of immune competent cells, primarally histeocytes/macrophages and T-lymphocytes. Over the past decades, the study of the pathogenesis of pulmonary lesions in sarcoid-osis has made it possibly expand the understanding of the mechanisms of development of granulomatous inflammation and the formation of fibrous post-inflammatory changes in the lung tissue [1,2]. Studies have shown that the process of fibrosis is determined by persistent inflammatory stimuli that affect the production of growth factors and the synthesis of fibrogenic cytokines. [3-5] It was found that granulomatous inflammation in sarcoidosis is characterized by a shift in the balance towards Th1 lymphocytes [6,7].

The most unpleasant outcome of the inflammatory process in sarcoidosis is fibrosis of the lung tissue, the clinical manifestation of witch is respiratory failure [8]. One of the methods for early detection of this pathological process is the study of broncho-alveolar lavage fluid [1,7]. But this procedure, like any other invasive method, had a number of limitations and contraindications.

The study of the humoral response in sarcoidosis, in particular, the production of autoantibodies, has received little attention so far. At the same time, at present, the understanding of the biological role of autoantibodies has significantly expanded. It has been established that they play an important transport role, participating in the clearance of DNA degradation products that arise during inflammation, necrosis, and apoptosis; they regulate inflammatory responses by limiting the production of pro-inflammatory cytokines; they affect the processes of proliferation and differentiation; some of them have catalytic functions [9,10]

The aim of this study was to determine the production of autoantibodies in sarcoidosis of the lungs and to assess their possible role in the progression of the disease.

Material and methods

40 blood serum samples were examined from patients with morphologically and X-ray confirmed sarcoidosis of the lungs and intraguric lymph nodes aged from 29 to 67 years. The duration of the disease ranged from 3 months. up to 25 years old. In 38 patients, there was a combined lesion of the lungs and intrathoracic lymph nodes, 2 had an isolated lesion of the lungs. Radiographically, stage I was noted in 20%, stage II - in 58.8%, stage III - in 14.7%.

21 patients showed signs of a prolonged (more than 3 months) active course of the disease in the form of periodic low grade fever, weight loss, or progressive radiological changes in the pulmonary parenchima. 19 patients showed no signs of active pathological process, 14 of them showed radiological signs of pulmonary fibrosis. The comparison group included 48 patients with pulmonary disseminations of a different (non-infectious) etiology, comparable in terms of sex, age and disease duration. In all patients in the serum of peripheral blood, the content of antibodies to double-stranded DNA (anti-dsDNA) and antineutrophil antibodies (ANCA) was determined by enzyme-linked immunoassay.

Results

Analysis of the data obtained showed that the studied antibodies with a fairly high frequency are found both in sarcoidosis of the lungs and in other pulmonary disseminations: ANCA - in 19 patients with sarcoidosis (47.5%) and 25 patients (52.1%) from the comparison group; anti-dsDNA, respectively, in 13 (32.5%) and 17 (35.4%) patients, including 6 (15%) patients with sarcoidosis and 5 (10.4%) patients from the comparison group, both types were simultaneously detected autoantibodies

When comparing the frequency of detection of autoantibodies and the duration of the disease, the following results were obtained. In patients with sarcoidosis with a disease duration of up to 1 year, the detection rate of autoantibodies was 66.6%, from 1 to 5 years - 91%, from 5 to 10 years - 85%, more than 10 years - 66%. With pulmonary dissemination of other etiology, the frequency was 66%, 71.4%, 66.6% and 50%, respectively.

Thus, in patients with pulmonary sarcoidosis, ANCA and anti-ds DNA were more common with a disease duration of more than one year (the maximum frequency was with a duration of 1 to 5 years). In other pulmonary disseminations, the detection rate of these autoantibodies did not depend on the duration of the disease. Correlations of the studied parameters with the peculiarities of clinical manifestations, as well as with the X-ray picture were not revealed.

Conclusion

Thus, in patients with pulmonary sarcoidosis, ANCA and anti-ds DNA were more common with a disease duration of more than one year (the maximum frequency was with a duration of 1 to 5 years). In other pulmonary disseminations, the detection rate of these autoantibodies did not depend on the duration of the disease. Correlations of the studied parameters with the peculiarities of clinical manifestations, as well as with the X-ray picture were not revealed.

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WHOOPING COUGH IN CHILDREN MODERN VIEW OF THE OLD PROBLEM

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Whooping cough (pertussis) remains a serious problem not only for Russia, but for the whole world. According to WHO, annually about 60 million people is taking ill in the world, about 1 million children die, mostly before reaching age one.

Purpose: To study the clinical and epidemiological features of pertussis in children.

Keywords: pertussis, whooping cough, Bordetella pertussis, Russia, children.

Materials and methods: An assessment of the epidemiological situation of whooping cough and the study of the clinical course of the disease in children were holding to achieve this goal. Methods included: a clinical blood test, a chest X-ray, a bacteriological method, ELISA and PCR.

Paying attention to high mortality and incidence of whooping cough 50-60 years ago currentlymany domestic pediatricians, including infectious diseases, consider pertussis as a problem of the past. But after decades, thanks to initiated and ongoing vaccine prevention, the incidence decreased up to 25, and the number of deaths up to 1000 times. However, it should be noted that the recent increase in the incidence of whooping cough in children aged 9-16 years mainly occurs in mild and atypical forms.

The epidemiological alertness of doctors towards this infection is reduced, which leads to a late diagnosis of whooping cough in both children and adults and aggravates both the immediate and long-term outcomes of the disease. From 2019-2020 a survey was conducted using

all modern diagnostic methods (bacteriological method, PCR, ELISA) for detection of pertussis in Blagoveshchensk. 34 children under 3 months were examineduntil reaching 17 years old. They have epidemiological and clinico-laboratory data for the diagnosis of whooping cough. All patients coughing for more than 14 days (2 times bacteriological examination and / or 1 time PCR) were subject to mandatory laboratory examination. PCR is highly sensitive and currently is the most common method for diagnosing whooping cough. Bordetella pertussis is a Gramnegative, aerobic, pathogenic, encapsulated coccobacillus of the genus Bordetella, and the causative agent of pertussis or whooping cough. The causative agent is cultivated in a special environment (casein-coal, potato-glycerin agar). Amoxicillin or cephalexin is now added in the environmentto suppress the growth of competitive microflora. Bordetella pertussis is very unstable in the external environment, so transferring it to theindispensable environment must be done immediately after taking the material. Under the influence of disinfectants Bordetella pertussis quickly dies, but in dry sputumit can persist for several hours. Bordetella pertussis has eight agglutinogens, the leading of which is 1.2.3. Depending on the presence of leading agglutinogens, four serotypes (1.2.0, 1.0.3, 1.2.3 and 1.0.0) can be allocated. And in the last decade, serotypes 1.2.0 and 1.0.3 are prevalent, which stand out from vaccinated children with mild and atypical forms of the disease. At the same time, serotypes 1.2.3 are allocated from unvaccinated children, primarily from an early age, and the disease occurs more often in severe and less often in a medium-heavy form.

Bacteriological and PCR-studies of pertussis were conducted during the first 3 weeks of the disease. In clinically unclear cases, with negative results of bacteriological and PCR-studies andlate terms of the disease, 2-fold serological examination was performed with an interval of 10-14 days by ELISA (Enzyme-linked immunosorbent assay). The enzyme-linked immunosorbent assay uses purified protein antigens of pertussis (such as FHA, PT, PRN or FIM 2/3) to measure serum IgG and IgA responses following disease or vaccination. Confirmation of the clinical diagnosis of pertussis in unvaccinated patients is a single detection of specific IgM and /or IgA and/ or IgG (IgA) or antibodies in a titer of 1/80 or more (PA). In vaccinated people the level of specific IgA, and / or IgG (IgA) or antibody level is increased or decreased four or more times. Diagnostic and prognostic value in pertussis has hematological changes - lymphocytosis and normal ESR.

Peculiarities of the disease: rise of disease in fall-winter is typical with a peak in December-January. schoolchildren from 9 to 14 years old (80.9%) are dominate, most of them are vaccinated according to the na-

tional calendar (99.5%). However, the official statistics data most likely do not reflect the actual situation of pertussis incidence, as in practice, no more than 10-12% of cases are diagnosed.

It should be noted that whooping cough in cis accompanied by barking cough that is mistakenly diagnosed as acute laryngitis or laryngeal edema, and in younger age groups cough is classic spastic.

Peculiarities of whooping cough in different age groups: In early childhood whooping cough may occur with a short catarrhal period, a longer period of spasmodic cough (up to 2 months), there may be no recapitulation, coughing may result in apnea. Currently, whooping cough in unvaccinated children retains all of its typical manifestations. The risk of complications is very high.

Whooping coughin adolescents and adultsoften occurs in atypical forms, for which they usually receive ineffective treatment from the therapist. It should be noted "insufficient vigilance" of doctors toteenagers and adults leads to detection of the diseasein late terms.

Infants, patients with severe complicated pertussis, children with concomitant pathology are subject to hospitalization without taking into consideration the degree of severity of the disease.

Prevention of pertussis: Vaccination remains the most effective method of prevention of pertussis. Vaccination begins at the age of four months and consists of three injections of adsorbed pertussis-diphtheriatetanus vaccine (DTT) at an interval of 1.5 months, the booster dose repeats in 1.5-2 years after the vaccination course.

Vaccination against whooping cough in most cases prevent the disease, but after 5-7 or more years after vaccination, there is a decrease in postvaccinal immunity, and vaccines can get ill. Pertussis in vaccinated people occurs mainly in mild form, a specific complication develops 4 times lower than in the unvaccinated, lethal outcomes are not observed. Pertussis in the unvaccinated occurs in the classical version and there is a very high risk of complications (pneumonia, atelectasis, seizures, encephalopathy).

Conclusions: Pertussis remains a pathogen of global importance despite having been a recognized cause of whooping cough for one hundred years. Although high vaccination coverage among infants has been achieved in many countries, pertussis cases and deaths are reported annually among children and adults. In existing surveillance systems, underreporting, particularly among adolescents and adults, remains an ongoing multifactorial challenge due to factors including low awareness of pertussis among health care professionals, lack of standardized and efficient diagnostic assays, and weak surveillance infrastructure in many countries. At present, neither currently available vaccines nor previous B. pertussis infection can provide long-lasting protection against later infection. Multipronged approaches to develop new vaccines or enhance the currently available vaccines (e.g., development of more durable and less reactogenic vaccines) will likely require global initiatives aimed at creating new-generation pertussis vaccines through public-private partnerships.

The rapid improvement of laboratory research methods in the fields of genomics, immunology, and bioinformatics heralds a new era in research on pertussis that will allow for integration of disciplines and sharing of global research tools such as B. pertussis isolates.

As indicated in the beginning, in surface, where Bordetella pertussis is cultivated, amoxicillin or cephalexin is now added to inhibit the growth of competitive microflora. Hence the conclusion that penicillin group and cephalosporin I generation can enhance cough and promote negative dynamics. 7-10 years ago, antibiotics of the penicillin series (amoxiclav, augmentin, etc.) were traditionally used in the treatment of whooping cough. Our observations have proved all of the facts above. From antibacterial drugs that prevent the colonization of Bordetella pertussis on the cylindrical epithelium of the upper respiratory tract, preference is given to macrolides (clarithromycin, azithromycin, josamycin).

Bronchodilators - promote the expansion of the respiratory tract, reduce the sensitivity of respiratory receptors and promote positive dynamics (berodual, atrovent, salbutamol).

IGKS-facilitate the course of the disease, shorten the duration of spasmodic cough, reduce the risk of complications and respiratory failure. This allows to reduce the cost of care for these patients and the length of stay in the hospital (pulmicort). Against the backdrop of IGKS, systemic glucocorticoids have receded into the background. However, indications for the administration of systemic glucocorticoids are cases of severe pertussis: the presence of coughing attacks with apnea, cyanosis of the face in coughing attacks in children of the first months of life, etc. Hydrocortisone is used in a daily dose of 5-7 mg / kg, prednisolone 1-2 mg / kg. This doses is used until the therapeutic effect is obtained, usually within 2-3 days. Reduction of doses of HA should be gradual, as with rapid withdrawal of the drug it is possible to resume for a short time severe attacks of cough.

Mucolytic drugs were not prescribed, due to the fact that the effectiveness of these drugs has not been proved.

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MOLECULAR FEATURES IN THE TESTIS OF COVID-19 PATIENTS

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Summary

Despite some progress in the study of the effect of COVID-19 infection on the human body, many issues related to pathological processes, as well as the developing deficiencies, remain not clear understood. One out of such issues is the effect of SARS-CoV-2 on fertility.

The aim of this work is to assess the molecular profile in testicular tissue in patients affected by COVID-19.

Materials and methods. Fragments of the testes of patients with confirmed COVID-19 (n = 48) were studied by real-time polymerase chain reaction to determine the expression of viral RNA.

Results. in patients affected by COVID-19, the presence of coronavirus genetic material in the testis was recorded.

Conclusion. Current research demonstrated the presence of SARS-CoV-2 in testicular tissue.

Keywords: Testis, SARS-CoV-2, RT-PCR.

Introduction

The emergence and fast spread of the novel Coronavirus infection (CO-VID-19) caused by SARS-CoV-2 has led to over 45 million cases and about 1 300 000 deaths worldwide [Kogan E. A., Demyashkin G. A. et al, 2020]. The penetration of SARS-CoV-2 into human cells occurs through specific interaction with Angiotensin converting enzyme 2 (ACE2) and serine protease – Furin [Hoffmann M. et al, 2020]. Possessing tropism for these proteins localized on the membranes of various cells, SARS-CoV-2 can lead to damage of internal organs like the kidney, heart, intestines, lungs and others therefore COVID-19 can be considered a systemic disease [Kogan E. A., Demyashkin G. A. et al, 2020]. At the same time, the question of damage to the male reproductive system, and most importantly spermatogenesis, remains open.

According to PCR analysis, SARS-CoV-2 was detected in testicular tissue, with further immunohistochemical studies revealing an increase in ACE2 receptors in spermatogonia, as well as Leydig and Sertoli cells Сертоли [Fan C. et al, 2020; Douglas G.C. et al., 2020]. However, single cell RNA-Seq of male germ cells and their microenvironment to detect SARS-Cov-2 showed controversial results: in most cases, no evidence of the virus was found in both testicles or sperm [Song C. et al., 2020; Pan F. et al., 2020], with at least one study [Li D., 2020] claiming the opposite.

Considering the small amount of information about the possible damaging effects of SARS-cOv-2 on male gonads, as well as the newfound interest in the problem of male fertility in the context the ongoing COVID-19 pandemic, research in this area remains of importance.

Objective: to assess the molecular profile in testicular tissue in patients affected by COVID-19.

Materials and methods

Experiment design. Group I (n = 48; age from 25 to 91 years, average – 59 years) – autopsy material of testicles of patients who died with established clinical and pathoanatomic diagnosis: coronavirus infection (COVID-19, PCR+). Exclusion criteria: mumps, infertility, sepsis, bacterial infection, carrier of HIV, hepatitis B and C viruses, Epstein-Barr virus.

Morphological examination.

For histological examination of autopsy material of the testicles, a standard method was used and afterwards serial sections 8microns thick were prepared for RT-PCR.

Total RNA was isolated from the obtained testicular tissue using the RNeasy Mini Kit. To detect *SARS-CoV-2* Real-time PCR was performed using the QuantiTect single-step PCR kit.

For statistical analysis and data processing, quantitative data obtained during qPCR was analyzed using ANOVA rank analysis of variance.

Results

In all the studied samples (n=48), *SARS CoV-2* was detected in the testicular tissue during qPCR, while it was negative in the epididymides.

Discussion

This study focuses on the SARS-CoV-2 viral load in testicles and epididymides in patients with a confirmed diagnosis of COVID-19 in different age groups using real-time polymerase chain reaction.

In RT-PCR analysis, *SARS-CoV-2* was detected in all the studied samples (n = 48) of testicular tissue, which is partially consistent with the results of other studies and indicates the vulnerability of the male reproductive system. However, the probability of penetration of the virus through blood-testicle barrier (BTB) can be considered hypothetically.

At the same time, SARS-CoV-2 was not detected in the epididymides. This fact indicates the ability of the virus to infect only cells characteristic of the male gonad parenchyma, namely, germ cells, Sertoli and Leydig cells, and to exclude the stromal component represented by connective tissue in both organs.

Conclusion

According to the results from Real-time PCR for the identification of SARS-CoV-2, it is possible to state with a high degree of probability about the viral load of the testis.

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FEATURES OF METABOLIC ACTIVITY OF THE VASCULAR ENDOTHELIUM AT *PUUMALA*-ASSOCIATED HEMORRHAGIC FEVER WITH RENAL SYNDROME

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It has been determined blood levels of circulating endotheliocytes, VE-cadherin, VEGF, VCAM-1, endothelin-1, NO, ACE activity at Puumala-associated hemorrhagic fever with renal syndrome. Circulating endotheliocytes levels are significantly upregulated, while the level of VEcadherin is significantly downregulated in all patient groups compared with healthy controls. VEGF and ET-1 blood levels are significantly upregulated in the febrile phase of the disease. Serum levels of stable NO metabolites and ACE activity are significantly higher than in healthy individuals. The most pronounced changes in all indicators were found in severe complicated HFRS. VCAM-1 blood levels are predominantly statistically significantly high at all forms of disease. It was concluded that the pathogenesis of Puumala-associated HFRS is accompanied by intensive desquamation of endotheliocytes, possibly due to the internalization of the VF-cadherin molecules. In moderate and severe uncomplicated HFRS, pronounced inflammation of the endothelium is observed, while the activity of this process in severe complicated disease is very weak, up to its complete endothelial areactivity. In moderate and severe uncomplicated HFRS, the endothelium is able to maintain normal vascular tone, however, in severe HFRS, there is a significant change in the synthesis of vasomodulating substances that can contribute to the development of HFRS complications. It was concluded that Puumalaassociated HFRS is associated with development of angiogenic, adhesive and vasomotoric types of endothelial dismetabolism.

Keywords: hemorrhagic fever with renal syndrome, endothelium; circulating endotheliocytes, VE-cadherin, VEGF, VCAM-1, endothelin-1, nitric oxide (II), ACE

Endothelium is a unique tissue providing inner layer for organs of cardio-vascular system and consisting of 10¹⁴ cells. Endothelium plays the key role in regulation of hemostasis, blood vessel tone, angiogenesis, inflammation and macrophage activation [3]. Hypoxia, intoxication, hypercholesterolemia, hyperglycemia, and cytokines can affect endothelium activity causing up or down regulation of biologically active agents normally produced by endothelium.

Currently, it widely accepted that endothelia cells are the main target for viruses causing hemorrhagic fevers such as filoviruses [8], arenaviruses [10], flaviviruses [12], hantaviruses [14, 16, 24]. Published data demonstrated changed serum concentration of biologically active molecules produced by endothelial cells in patients with dengue, Ebola and Crimean-Congo, Argentine hemorrhagic fevers and hemorrhagic fever with renal syndrome (HFRS) associated with Seoul virus [2, 5, 6, 9, 11, 15, 20, 23]. However, the role of biologically active substances produced by endothelial cells in pathogenesis of viral hemorrhagic fevers remains unknown. In addition, data on the metabolic status of the endothelium during infection of the human body with Puumala hantavirus remain limited. Therefore, the aim of the study was to determine the levels of circulating endothelial cells (CEs), VE-cadherin, vascular endothelial growth factor (VEGF), vascular endothelial cell adhesion molecule type 1 (VCAM-1), endothelin-1 (ET-1), nitric oxide (II) (NO), and angiotensin converting enzyme (ACE) activity in the blood serum/plasma of patients with Puumala-associated HFRS depending on stage and severity of disease to assess metabolic activity of the vascular endothelium and the extent of its damage by the Puumala virus or by products of changed metabolism induced by this infection agent.

Materials and methods

To study the metabolic status of the endothelium, a dynamic followup was performed on 137 patients (114 men and 23 women) aged 21-62 years (average age 35.0 [25.0; 47.0] years) who were treated in hospitals of Ufa city (Russia). Exclusion criteria were arterial hypertension, heart and blood vessel diseases, diabetes mellitus, cancer, liver and kidney diseases. The severity of the disease was determined according to classification by B.Z. Sirotin [21]. The moderate type of the disease was diagnosed in 61 patients (44.5%), severe uncomplicated type - in 43 patients (31.4%) and severe type with complications - in 33 patients (24.1%). Complications included infectious toxic shock, acute renal failure, disseminated intravascular coagulation, acute respiratory failure, renal hematoma, acute erosive gastritis, acute respiratory failure, epistaxis and gastric bleeding, toxic metabolic encephalopathy with cerebral edema. Control group consisted of 44 healthy individuals, matching by age and sex. Blood was collected and used to separate plasma or serum. Plasma and serum were stored at -30°C until use. The CEs count was determined by method described by J. Hladovec [7]. Phenotype analysis of these cell populations was performed streptavidin method. Briefly, cell suspension was incubated with anti-CD31 monoclonal antibodies (Dako; 1:50) followed by streptavidin staining. Serum levels of VE-cadherin and sVCAM-1 were determined using Bender MedSystem ELISA kit (Austria), VEGF blood levels - by BioSourse ELISA kit (Belgium), ET-1 blood levels - by Biomedica Group ELISA kit (Austria), blood levels of the final metabolic products for NO - by R&D Systems kit (USA), ACE blood activity – by Buhlmann kit (Switzerland).

Statistical analysis was performed using Statistica 7.0 (StatSoft, Inc., 2004) program. Results were assessed by the nonparametric statistics method, defining the median (Me), the interquartile range (25% and 75%), maximum and minimum values and represented as Me [25; 75], Min – Max. The statistical significance of inter-group differences in mean values was evaluated using the Mann-Whitney U criterion with the False Discovery Rate (FDR) correction for multiple comparisons [4]. Significance was established at a value of p < 0.05.

Results and discussion

It has been found significantly increased amount of CEs in the blood of the HFRS patients in all stages of the disease excepting convalescent phase in severe complicated type as compared to healthy controls (Fig. 1).



Fig. 1. Amount of the CEs in the blood of *Puumala*-associated HFRS patients at standard therapy. Here and next: 1 – healthy control; 2 – febrile phase; 3 – oliguric phase; 4 – diuretic phase; 5 – convalescent phase. I – moderate type; II – severe uncomplicated type; III - severe complicated type. p<0.05 as compared to: * - healthy control group; + /moderate type; o – severe uncomplicated type; dotted line – median value for healthy control. * - p<0.046 with FDR correction.

During febrile phase at moderate HFRS, CEs counts were increased 1.5 fold, while 1.8 fold increases in CEs was detected at severe uncomplicated disease. Even higher numbers (2.8 fold increase) of CEs was found in the blood of patients with severe HFRS with complications. During oliguric period, amount of CEs was increased 2.4; 2.9 and 3.6 folds in patients with moderate, severe uncomplicated and severe complicated HFRS respectively. During diuretic phase, amount of CEs was increased 2.9; 3.5 and 5 folds respectively. Finally, in convalescent phase, numbers of CEs was 3.4, 2.6 and 1.2 fold higher respectively as compared to healthy controls. Therefore, we conclude that the severity of the disease is associated with higher frequency of endothelial cell desquamation. CEs levels are normalized only at convalescent phase in patients with severe complicated HFRS.

VE-cadherin in blood levels remained rather low regardless of the severity of the disease, and the most pronounced decrease in the level of this adhesive molecule was observed in patients with severe complicated HFRS (Fig. 2).



Fig. 2. Concentration of the VE-cadherin in blood serum of *Puumala*-associated HFRS at standard therapy. * - p<0.02 with FDR correction.

Febrile phase of moderate HFRS was accompanied by increasing of VE-cadherin levels. Blood levels of this adhesive molecule were decreased with progression of the disease, reaching level 1.6 fold lower compared to healthy controls in convalescent phase. Severe uncomplicated disease was characterized by significantly lower serum level of the VE-cadherin (2.15 fold lower compared to healthy controls), which was gradually normalized in the oliguric and diuretic phases of the disease and again decreased in the convalescent phase. Similar dynamics of the serum VE-cadherin was detected at severe complicated HFRS. However, serum levels of this substance in severe complicated HFRS were significantly lower at all phases of the disease. Therefore, we conclude that severity of the HFRS correlates with decreased levels of VE-cadherin.

Dynamics of the VEGF levels differs from that for VE-cadherin, although, it remains closely associated with the severity of the disease (Fig. 3).



Fig. 3. Concentration of the vascular endothelial growth factor in blood serum of *Puumala*-associated HFRS at standard therapy. * - p<0,046 with FDR correction.

VEGF serum levels at febrile phase of the moderate type were significantly lower (7.8 folds) as compared to healthy controls. Levels of serum VEGF continued to increase till diuretic phase. However, VEGF concentration significantly decreased at the convalescent phase. Serum VEGF levels were statistically significantly low throughout the disease in severe uncomplicated and complicated HFRS. And this growth factor blood levels were significantly lower in severe uncomplicated type as compared to that in patients with moderate type. Levels of VEGF abruptly increase at the end of the oliguric phase and beginning of the diuretic phase (123.3 folds increase) and significantly downregulated during the convalescent phase as compared to healthy controls.

VCAM-1 blood levels were significantly increased at moderate and severe uncomplicated HFRS as compared to healthy controls (Fig. 4).



Fig. 4. Concentration of the VCAM-1 in blood serum of *Puumala*-associated HFRS at standard therapy. * - p<0,046 with FDR correction

VCAM-1 levels were increased 2.7 folds during febrile phase in patients with severe complicated type as compared to healthy controls. Later, in oliguric phase its blood levels were 0.27 folds decreased, in diuretic phase were increased 1.7 folds and significantly normalized in convalescent phase.

ET-1 blood concentrations were significantly lower in course of all types of disease with the lowest levels during febrile phase (Fig. 5).



Fig. 5. Concentration of the endothelin-1 in blood plasma of *Puumala*-associated HFRS at standard therapy. * - p<0.05 with FDR correction.

Moderate and severe uncomplicated HFRS are characterized by graduate decrease of ET-1 serum levels from febrile phase to diuretic phase of the disease. Interestingly, levels of ET-1 were significantly lower at severe uncomplicated type as compared to that in patients with moderate type. Similar dynamics were observed at severe HFRS with complications. ET-1 levels were significantly lower at severe complicated type as compared to that in serum of patients with severe uncomplicated disease.

NO blood levels were increased at the beginning of the disease to disease progressed and decreased to convalescent phase (Fig. 6).



Fig. 6. Concentration of the nitric oxide (II) in blood serum of *Puumala*-associated HFRS at standard therapy. * - p<0.045 with FDR correction.

Changes in NO serum levels are more pronounced at severe uncomplicated HFRS. Similarly, severe complicated type is characterized by increased serum levels of NO during all phases of the disease as compared to healthy controls and patients with moderate and severe uncomplicated types. Interestingly, levels of NO in serum of HFRS patients with severe complicated type did not return to the levels in healthy controls at the convalescent stage.

Dynamics of serum ACE activity were similar to that for NO (Fig. 7).



Fig. 7. Activity of the angiotensin-converting enzyme in blood serum of *Puumala*-associated HFRS at standard therapy. * - p<0.042 with FDR correction.

Serum activity of ACE were non-significantly decreased during febrile phase, significantly increased during all another phases of moderate HFRS as compared to healthy controls with maximal activity in the diuretic phase (3.1 folds increase). Similar dynamics of this enzyme activity was observed in severe uncomplicated HFRS. Severe complicated disease is characterized by ACE hyperactivity without any fluctuations throughout the disease. Increased activity of ACE was significantly higher as compared to patients with moderate type as well as severe uncomplicated type.

Increased desquamation of the endothelial cells in *Puumala*-associated HFRS in all types of severity suggests damage to endothelium caused by hantavirus and products of changed cell metabolism such as reactive oxygen species, peroxinitrate, etc. We suppose that significant decrease of the circulating endotheliocytes level during convalescent phase of the severe complicated type is due to the fact that the majority of the damaged cells have been detached during early phases of infection. Increased number of CEs has been also shown in patients with denge hemorrhagic fever [5]. The severe disease the higher desquamation of the endothelium. Increased detachment of the endothelial cells results in exposure of subendothelial layer containing pro-coagulating substances like collagen type IV. It will lead to activation of intrinsic pathway of blood clotting cascade. It can be one of the reasons of development of DIC-syndrome which can cause tissue ischemia and following multiple organ failure.

Predominantly reduced VE-cadherin production or its endocytosis may be the best way to counter virus. Mackow et al. established that in vitro infection of endothelial cells with pathogenic hantaviruses Hantaan and Andes induces internalization of adhesion molecules [11]. On the contrary, when endotheliocytes were infected with the non-pathogenic Tula hantavirus, the effect of internalization of these molecules was not observed [10]. In addition, Schnitter et al. established that supernatants collected from macrophages infected with Marburg virus induce reorganization of the VE-cadherin-catenin complex [19]. A decrease in the expression of VE-cadherin by endothelial cells causes a decrease in intercellular contacts in the endothelial monolayer, which leads to its increased permeability. High endothelial permeability is important to facilitate the migration of monocytes through it. In addition, the decrease in VE-cadherin production promotes the removal of endothelial cells infected with the hantavirus, which prevents migration of this infectious agents from one cell to another. It would be expected that increased desquamation of endotheliocytes will cause increased expression of VEGF as reaction of regeneration of endothelium damaged by hantavirus. However, we did not observe changes in blood levels of VEGF. Therefore, we suppose that there is delay in processes of reparation of the endothelium at HFRS. Our data on VEGF concentration in blood of HFRS patients differ from data collected in vitro, when endothelial cells were infected with Andes hantavirus [20] and dengue virus [23]. We consider that different expression of VEGF in Puumala virus infected patients and Andes virus infected endothelial cells is due to adaptive delay in production of VEGF which causes increased endothelial monolayer permeability, since permeability of the endothelium is already compromised by inflammation and increased serum levels of NO. Differences in the expression of VEGF in patients infected with HFRS and dengue virus can be explained by the peculiarities of metabolic cell responses to different viruses. Significant increase in serum levels of VCAM-1 in HFRS patients with moderate and severe uncomplicated types of the disease lead us to suggest hantavirus infection causes protective reaction of endothelial inflammation. Even higher increase in serum levels of VCAM-1 in hantavirus patients with severe uncomplicated type of the disease suggest higher virus load leading to more inflammatory reaction. Decreased serum concentration of sVCAM-1 in severe complicated HFRS suggests less pronounced inflammatory response due to weak activation of the immune response, which could be sign of the poor prognosis.

Increased production of VCAM-1 has been shown in patients with Ebola and Marburg hemorrhagic fevers [18] and Crimean-Congo hemorrhagic fever patients [6], suggesting that this might be the universal metabolic reaction to hemorrhagic fever causing virus infection.

Serum levels of ET-1 remained significantly decreased in all types of HFRS. This could be explained as compensatory reaction to the high levels of NO, since NO inhibits production of ET-1 by endothelial cells [1]. Our results are similar to those published by Jiang and colleague, where low serum levels of ET-1 were observed in dengue fever patients [9]. Decreased levels of ET-1 during viral infection could help to facilitate monocyte extravasation and migration into the damaged tissue.

Serum levels of NO were significantly increased in all types of HFRS. Similar results were obtained by Valero and colleague in patients with dengue fever [25]. It could be explained by activation of both endothelial and inducible NO-synthases [13]. NO in high concentration, on the one hand, causes vasodilation to help monocyte migration into inflamed tissue, on the other hand, shows the marked antiviral effect [16, 17, 22].

ACE activity in serum of HFRS patients remained up-regulated during all phases and types of the disease. We suppose that this is counterbalancing reaction to low serum concentration of ET-1 and high serum concentration of NO, aimed to support normal arterial blood pressure.

In conclusion, observed changes in metabolism of endothelial cells at *Puumala*-associated HFRS are aimed to protect endothelium from damage causing by hantavirus. During moderate and severe uncomplicated types of infection, degree of endothelial cell desquamation is increased. Never the less, endothelium is actively reacting to the virus infection by decreasing VE-cadherin and ET-1 production, by increasing synthesis of VCAM-1, ACE and NO. However, significant damage of endothelial cells at severe complicated HFRS could explain decreased synthesis of compounds supporting normal activity of these cells.

Thus, our data suggest that one of the key links in the pathogenesis of HFRS is the development of angiogenic, adhesive and vasomotoric types of endothelial dysmetabolism, and these changes in the structure and function of the inner lining of blood vessels are the basis for development of dangerous complications of *Puumala*-associated hemorrhagic fever with renal syndrome.

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TO THE QUESTION OF MOLECULAR CHANGES OF THE SKIN IN SEPSIS

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Summary

Analysis of the specialized literature has shown a small number of studies investigating the mechanisms of regulation of proliferative and regenerative processes of skin components in sepsis, despite its important role in barrier function and maintaining homeostasis. Cytokine balance is one of the main factors in the stability of the skin barrier. Cytokine signals can have various effects on the skin barrier. Thus, impaired expression of cytokines can lead to an imbalance of the epidermal barrier. Thus, a change in the level of TNF- α , which is responsible for regeneration, leads to a weakening of the barrier function. TGF- β stimulates the migration of
endothelial cells, as well as inhibits the proliferation of keratinocytes and slows down re-epithelialization during wound healing. IL-6, on the contrary, accelerates the proliferation of keratinocytes, stimulates angiogenesis and collagen synthesis.

Conclusion. With sepsis, a shift in the cytokine balance leads to a violation of the barrier function of the skin.

Key words: sepsis, skin, cytokine, inflammation

Analysis of the specialized literature has shown a small number of studies investigating the mechanisms of regulation of proliferative and regenerative processes of skin components in sepsis, despite its important role in barrier function and maintaining homeostasis.

Based on the materials of Sepsis-3 (Fernando et al., 2018) and the Conciliation Conference of the American College of Pulmonologists and the Society of Critical Medicine (ACCP / SCCM), it is now customary to distinguish the following pathological processes: sepsis and septic shock.

In recent years, our understanding of pathological changes in sepsis and the methods of intensive care for critical conditions have improved significantly, but mortality in sepsis remains at an indefinitely high level - 30 - 90% (Fernando et al., 2018). Sepsis and its complications are still among the most common causes of death in the intensive care unit among noncardiac pathologies (Fernando et al., 2018).

Violation of the integrity of only 15% of the skin area is already sufficient for the complete depletion of the skin barrier function with massive loss of extracellular fluid, the development of hypovolemic shock and possible death (Blais et al., 2013). In addition to the mechanical barrier, consisting of dense structures of the epidermis and dermis, the skin is also an active immunological barrier due to the presence of antimicrobial peptides, low temperature, pH, Langerhans cells, etc. (Matejuk, 2018).

Cytokine balance is one of the main factors in the stability of the skin barrier. The constancy of the skin barrier largely depends on the state of the corneocytes, which form the most important protective layer - the stratum corneum. For right organization of skin barrier epidermal cells undergo a long differentiation process based on well-regulated cell interaction. Keratinocytes and other cells of the skin secrete cytokines responsible for the implementation and control of intercellular interaction. Cytokine signals can have various effects on the skin barrier. For example, cytokines can influence the proliferation and differentiation of keratinocytes by modulating gene expression in these cells. Only one of the consequences of this effect is the control of cytokine expression, leading to a complex network of signaling intermolecular interactions that affect the morphofunctional state of keratinocytes and the quality of the skin barrier. Thus, impaired expression of cytokines can lead to an imbalance of the epidermal barrier, as is observed in many skin diseases, for example, atopic dermatitis (AD) and psoriasis (Guttman-Yassky et al., 2011).

Thus, a change in the level of TNF- α , which is responsible for regeneration, leads to a weakening of the barrier function (Terajima et al., 1998). Several studies have shown that overexpression of TNF- α , detected in psoriasis, leads to a disruption in the normal functioning of the skin barrier (Ettehadi et al., 1994; Proksch et al., 2008). When analyzing the specialized literature, it was found that an increased secretion of TNF- α contributes to a decrease in the expression of genes *filaggrin (FLG)* and *loricrin (LOR)* (Kim et al., 2011), which, as noted above, play an important role in the formation of the stratum corneum.

TGF-β stimulates the migration of endothelial cells, as well as inhibits the proliferation of keratinocytes and slows down re-epithelialization during wound healing (Mori et al., 2016). It is noted that there are 3 isoforms of TGF-B. In the skin, TGF-B isoforms are expressed differently depending on the cell type. It is generally accepted that TGF-\$3 and a small amount of TGF-B1 in the basal layer are mainly observed in a healthy epidermis, which is necessary for maintaining epithelial homeostasis (Ramirez et al., 2014). It is recognized that TGF-β expression increase in all layers of the epidermis during the healing of acute wounds and the presence of acute inflammatory processes in the skin. However, there is no clear description of the patterns for each isoform. It should be noted that at present there are quite paradoxical effects of TGF-ß in the epidermis during inflammation. Early studies revealed that TGF- β has a proved anti-inflammatory activity. These conclusions were based on the results of an experiment in which it was shown that mice lacking TGF-ß died from severe systemic that affected several vital organs within a few days after birth (Kulkarni et al., 1993). On the other hand, more recent studies have shown the molecular biological aspects of the pro-inflammatory properties of transforming growth factor. This duality based on the different effects of TGF-β on innate and acquired immunity. TGF-B is known as chemoattractant for endothelial cells and fibroblasts, as well as for innate immune cells such as neutrophils and monocytes (Gilbert et al., 2016). In addition, it stimulates these cells to release pro-inflammatory mediators such as IL-1B, IL-6, TNF- α , and macrophage differentiation. Interestingly, at the same time, TGF-β inhibits the release of IL-2, as well as prevents the proliferation and differentiation of native T cells; however, together with IL-6, it participates in the activation and differentiation of Th17 (Das and Levine, 2008). It was found that in many skin diseases TGF- β has a greater pro-inflammatory effect (Han et al., 2012).

IL-6, on the contrary, accelerates the proliferation of keratinocytes, stimulates angiogenesis and collagen synthesis. These effects have been shown in various studies to be extremely important in restoring the skin's protective barrier. Although, it should be noted that traditionally IL-6 belongs to the pro-inflammatory cytokines, which are usually characterized by a damaging effect (Wang et al., 2004). As noted earlier, together with the transforming growth factor β IL-6 promotes the activation and differentiation of Tregs in Th17, the overproduction of which can lead to massive autoimmune changes in the inflammation focus (Tanaka et al., 2014).

It should be noted that nowadays the role of IL-10 and IL-12 in healthy skin remains unclear; however, there is evidence that shows the importance of these proteins in the pathogenesis of a number of inflammatory skin diseases. (Asadullah et al., 2004; Toichi et al., 2006)

Conclusion. Cytokine balance plays a key role in maintaining the protective function of the skin barrier. With sepsis, a shift in the cytokine balance leads to a violation of the barrier function of the skin. Thus endogenous skin damage occurs requires further study in future studies.

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MIXED ASSOCIATES AND BIOFILMS IN CONNECTION WITH PATHOLOGIES IN MUCOSAL BIOTOPES: APPROACHES, PROGRESS AND PROSPECTS FOR MEDICAL BIOTECHNOLOGIES

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Based on own results, the prospects of the mucosal fungal-bacterial and fungal-fungal associates and biofilms were evaluated in connection with prognostics, diagnostics, prophylaxis and therapy on examples of Candida, Staphylococcus, Lactobacillus and probiotic high molecular mass metabolites recognizing and binding glycoconjugates.

Keywords: fungal mixed biofilms, probiotics, diseases, postbiotics, glycoconjugates

It is of importance to consider mucosal biotopes (MB) as mucosal organs (MO) containing specific microbiocenoses [12]. Formation of mixed associates and biofilms (BF), their architectures and related features of MB metabolism and microecological niches in the MO are unique. Upon pathologies in organism, early and late mature architecture, network metabolism types, distribution of reaction gradients and diversity of antagonistic and synergistic communications can be registed in mixed fungal biofilms (MFBF) [1, 6, 10, 15, 18, 19]. New types of antimicrobial agents and new combinations of the known antimicrobial ingredients are required to withstand the varying and increasing MFBF antibiotic resistance [1, 9, 21, 23]. Candidiases, bacterioses, fungal-bacterial pathologies of microecological balance, other altered states (on the background of inflammation; system primary/ early and secondary/ chronical infectious and autoimmune diseases) contribute to the appearance, conservation and increase of severity of MFBF in the MB of the organism open cavities of [3, 12]. There are many reasons for that freshly isolated associative minimal MFBF samples with original source properties of the pathological opportunistic microbiocenoses may serve indicators of aforementioned diseases [4, 5]. This is the prognostic-diadnostic potential of freshly isolated patient MFBF that can help in choice of strategy needed against established MFBF [1, 4, 14].

The aim is, based on own data, to evaluate approaches, progress and prospects of mixed associates and BF in connection with pathologies of mucosal biotopes.

Approaches, progress and strategies in evaluation of the metabolizing microbiocenosis BF potential

MFBF reflect events in vivo and can serve as prognostic and diagnostic models of antimicrobial resistance that is important for prophylaxis and therapy [3]. MFBF counteraction is observed and registered at the level of "communicative bodies" (CB) of massifs and BF [1, 4]. This takes into account the new factors proposed by us such as probiotic lectins (PL - recognizing and binding glycoconjugates [GC] proteins, imitators of probiotic cell actions, system metabolomebiotics, cultural synchronizers. signals and communicators, redistributers of microecological niches; other important infrastructural components within MB and MO such as GC (natural and synthetic - imitators of natural biopolymers) [3-5]. Anti-fungal and anti-bacterial synergism of high and low molecular mass lactobacillar and bifidobacterial postbiotics as well as metabolite phyto-preparations play important basis role in the struggle with MFBF [1, 2, 18, 20]. This struggle is manifested through antagonists - antimicrobial agents and other factors influencing assembly and disassembly of MFBF (in reactions of regulation of initiation, layer ordering and thinning, decreasing volume, "loosening" mature BF, changing the architecture type).

Strategies for medical biotechnologies in investigation and application of symbiotic mixed associates and BP of indigenic microflora involving high molecular mass metabolites of probiotic direction [1, completed]

*Using approaches to working with uncultivated, latent, and silent isolates [7] of fungi and bacteria of medical interest in connection with

chronic and recurrent infections: a) working with isolates at the level of MFBF; b) development of methods of uncultured isolates accumulation, storage and activities.

*Consideration of factors increasing MFBF (adhesion due to hyphae genesis; stimulation of growth biomass, thickness, layer ordering and metabolic activities) [8, 16].

*Consideration of conception of CT (ideas about the skeleton of dynamically developing BF, areas of sensory and increased survival and resistance, mono- and multicentricity, new criteria of pathogeneicity, physico-chemical, biochemical or cell surface factors of increasing or decreasing CT) of the mixed fungal massifs and MFBF [1].

*Further using CT conception in context of strategy "Target-in-Target" on example of mosaic multipoint territorially dependent attack on MFBF involving synergistic participation of PL, phytolectins and antibiotics [1].

*Ensuring the availability of antibiotics and antibiotic-like structures (also as associated, detergent-like) to MFBF protected external masked or internal layer areas (for example, as it was established as thinned areas observed during early multicenter assembly of a single BF) [1].

*Predictable and controlled external and internal lysis of MFBF and targeted elimination of pathological cell subpopulations or preliminary specifically sensibilized (through cell surface modification or genetically) cells in the presence of PL, hydrolases, biosurfactants (BS), polysaccharides, other posbiotics and their combinations [1] that simplifies further massive synchronized attack of antimicrobial agents against residual MFBF targets.

*Acidic PL nanoparticles with preferential ranged specificities to GC, as the new type system antimicrobials [1].

*Cationic PL and peptides associated with BS-micelle-like structures (affine biolofical somes can reveal antibiotic-like properties similarly to other types of the detergent protein-carrying micelles [1, 22]. Such PL architectures could provide additional contribution into inhibition and delaying growth of MFBF, massifs and BP of *Candida* or *Candida+Aspergillus*.

*Using topographical features of surfaces (also for development of nano-materials as BP carriers) which possess physically or affinely attractive 3D- or 2D-sites for initiation of preferentially directed assemblies of BP. Basis surface and the first layer (*C. albicans* as sorption site for fungi of other species and bacteria) act as key initiators of further gradient assemblies [1, 11, 15, 18].

*Using antimicrobials which target staphylococci within MFBF (especially in cases of *S. aureus*) [1, 10, 16, 18, 22].

*Using antagonism to the survival of microbes in compositions of mixed co-aggregated associates and MFBF (inter-Candida species, Candida-Gram positive bacteria) [6, 8, 10, 14, 15, 16, 18, 19]. C. albicans, C. tropicalis, C. glabrata and C. krusei form varying combinations of inter-Candida MFBF. In this case, C. krusei weakens (inhibits morphogenesis, decreases filament forming), and C. glabrata strengthens (thickness, volume, resistance to antibiotics) C. albicans BP. Thus the modulation of C. albicans MFBP takes place. It is expected that the lag period of dissociation of freshly isolated associative C. krusei BF will be longer compared to C. albicans [1]. Among staphylococci, S. aureus interact preferentially with C. albicans (as it is observed in cases of the patient candidiase blood [18]). There are antagonistic effects in the vulvovaginal environment (inhibition of hyphae- and BP-forming) between lactobacilli (L. acidophilus, L. plantarum, L. rhamnosus or L. reuteri) and Candida species [18]. L. acidophilus and L. plantarum metabolites/ postbiotics inhibit majority of Candida strains and isolates in oral cavity (with the exception of C. albicans and some C. krusei isolates) [20].

* Substitution and displacement of MFBP by masking, conservation, or by initiated elimination involving probiotic/ symbiotic BP. For example, using *Saccharomyces* or probiotic bacterial BP or their co-cultures or mixed *Saccharomyces*-Probiotic bacteria BP.

*Using postbiotics of the lectin type with potential for prophylaxis and therapy [13].

*Suicidal action of the opportunistic microorganism aspartyl acidic proteinases (EC 3.4.23.-.) and other hydrolases (EC 3.-.) [17] in respect of own MFBF (as a result of the contribution of fungal hydrolases in amplification of the recognizing GC anti-BF-products of PL conversion) [1].

*Using new phenotypic criteria of the increased pathogenicity of CT and MFBF (resistance to PL or combinations with antibiotics, BS or other antimicrobials. For example, when PL together with antimycotic do not decrease lysis of CT in areas close to the antibiotic [1].

*Using additional phenotypic criteria for choice of probiotic strain candidates according to strain effectiveness in respect of fungal or/and bacterial CT: the capability of leader strains for ordering and re-ordering microecological niche relationships between opportunistic microorganism species and subspecies (potential targets for the probiotic attacks); the capability of such strain PL to participate effectively in the prolonged conditions of MFBF degradation and lysis; ability of the PL to synergize with antimicrobials) [1]. **Conclusion**. Aforamentioned data on current approaches, progress and strategies in respect of modulation of mixed microbial BF or MFBF of MB indicate medical biotechnology prospects in prophylaxis and therapy.

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EVALUATION OF THE APPLICATION OF PLANT GROWTH AND DEVELOPMENT REGULATORS FOR BIOLOGICAL RECULTIVATION

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Among the plant growth stimulants, preparations of a humic nature stand out in particular [1-4]. They are made from natural raw materials, regulate the growth and development of plants, and adapt them to adverse conditions. We studied the effect of the humic preparation Rostok on agricultural crops (5-7). But it is possible that it and other humic preparations can be used to increase the efficiency of biological reclamation, because they stimulate physiological processes, enhance nonspecific immunity and increase the plant's own resistance to stressors.

Keywords: regulators, humic preparations, biological reclamation, vegetation experience, Rostok preparation.

Research methodology. The study of the influence of 6 regulators of different nature on the growth and development of plants of the test culture was carried out in vegetation experiments. Liquid humic preparations: Lowland peat sprout, manufactured by OOO NPTs Evrika (Russia), Gumiam - ammonium humate from brown coal, manufactured by Agrofirma Hermes (Ukraine). Dry humic preparations from brown coal: Natural humic acids and Humate balance, manufactured by NPO Power of Life LLC (Russia), liquid humic preparations were prepared from them using the technology of the Rostok preparation. PreCedetm is an aqueous mixture of trace elements Mp and Zn (4-7%), phosphoric acid ions (10%), potassium monophosphate (30-40%), manufactured by ATP Nutrution (Canada).

The scheme of vegetation experiment No. 1: 1. Control (water), 2. Sprout, 3. PreCedetm, 4. Gumiyam. The scheme of the vegetation experiment No. 2: 1. Control (water), 2. Sprout, 3. HP from Humate balance, 4. HP from Natural

humic acids. The scheme of the vegetation experiment No. 3: 1. Soil of arable land (control), 2. Soil of the landfill of household waste, 3. Soil of the landfill + Humate balance (1000 kg / ha), 4. Soil of the landfill + Sprout. The content of bulk and mobile forms of lead and zinc in the landfill soil exceeded the MPC.

The 500 ml beakers were filled with dark gray forest soil. Test culture - spring wheat. The seeds were soaked in water and regulators for a day in Petri dishes, sown in 15 pieces. on the vessel. The vessels were placed in a KS-200 SPU climatostat at $t = 20^{\circ}$ C with a changeable day and night program. The experiments were carried out in 4 repetitions. Calculation of germination energy - on the 4th day, germination - on the 7th day, biometric indicators of seedlings - on the 14th day. For statistical processing of the research results, the analysis of variance of the data of the vegetation experiment was used using the Microsoft Excel Starter 2010 program.

Research results. In the first vegetation experiment, all three preparations significantly increased the germination energy in comparison with the control. The increase in the growth rate of the preparation Rostok is higher than the preparations PreCedetm and Gumiam by 10 and 15% (Table 1).

Options	Germination energy,%	Germination,%					
Vegetation experience № 1							
Control (water)	31,7	68,4					
Rostok	68,3	80,0					
PreCede™	58,3	78,4					
Gumiyam	53,3	66,7					
HCP ₀₅	5,8	3,3					
Vege	tation experience № 2						
Control (water)	29,0	73,0					
Rostok	73,0	98,0					
GP from Humate balance	58,0	84,0					
GP from Natural humic acids	53,0	93,0					
HCP ₀₅	18,4	9,7					

Table 1 - Influence of regulators on the sowing quality of seeds

In terms of germination, Rostok and PreCedetm preparations exceed the control by 12 and 10%. The Gumiam preparation reduced seed germination by 2%, but the difference was not significant.

In the vegetation experiment No. 2, when the seeds were treated with the Rostok preparation, in comparison with the preparations from brown coal,

the germination energy was higher by 26 and 38%, the germination capacity was by 17 and 5%, respectively.

The number of roots exceeded the control when using Rostok and Pre-Cedetm preparations by 18 and 9% (Table 2). In the drug Gumiam, the increase is not significant. The length of the root system during seed treatment with regulators exceeded the control by 24-28%, but the difference between the preparations was not significant.

Options	Number of roots, pcs.	Root length, cm	Root weight, g / vessel
Vegetation ex			
Control (water)	3,4	15,9	0,85
Rostok	4,0	20,4	1,45
PreCede™	3,7	20,1	1,16
Gumiyam	3,5	19,8	1,01
NSR ₀₅	0,11	1,07	0,09
Vegetation ex			
Control (water)	4,1	19,8	1,3
Rostok	5,0	22,8	1,6
GP from Humate balance	4,6	21,4	1,3
GP from Natural humic acids	4,6	21,2	1,4
NSR ₀₅	0,31	12,5	0,17

Table 2 - Influence of humic preparations on the root system

The mass of the root system significantly exceeded the control when all drugs were used, but Rostok was significantly superior in this indicator to the other two - by 35% PreCedetm and 52% by Gumiam.

Humic preparations in the second experiment increased the number of roots in comparison with the control: Rostok - by 22%, coal - by 12%. Biometric indices of the root system were higher than the control when using Rostok - by 15 and 26%, when using humic preparations from brown coal - from 3 to 8%.

All preparations in the first experiment significantly increased the height of plants, but the increase is different. In terms of this indicator, Rostok was significantly higher than PreCedetm and Gumiam by 21 and 28% (Table 3). The preparations Rostok and PreCedetm significantly exceeded the control by the weight of the aboveground part of plants - by 93 and 24%. The difference with the control for the drug Gumiam is not significant.

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In the second experiment, the height and weight of plants exceeded the control: Rostok - by 18 and 15%, humic preparations from brown coal - from 9 to 15%.

Options	Plant height, cm	Plant weight, g / vessel					
Vegetation experience № 1							
Control (water)	18,7	1,79					
Rostok	25,8	3,45					
PreCede™	21,9	2,21					
Gumiyam	20,5	1,82					
NSR ₀₅	1,65	0,19					
Vege	tation experience №	2					
Control (water)	28,0	2,7					
Rostok	33,1	3,1					
GP from Humate balance	32,1	3,0					
GP from Natural humic acids	31,5	2,9					
NSR ₀₅	21,7	0,19					

Table 3 - Influence of humic preparations on plants

In vegetation experiment No. 3, the soil of the landfill had a negative effect on the germination of seeds of the test culture, the germination energy and germination rate decreased by 22 and 12% compared to the control (Table 4).

The introduction of a dry humic preparation into the soil of the landfill did not eliminate its negative effect on the seeds of the test culture. When the seeds were treated with the Rostok preparation, the germination energy and germination capacity increased significantly by 42 and 13% compared to the treatment with water on the landfill soil.

Options	Germination energy,%	Germination,%		
Arable land (control)	84,4	95,5		
Landfill soil	65,5	84,4		
Landfill soil +Humate balance	64,9	88,3		
Landfill soil + Rostok	93,3	95,5		
NSR ₀₅	11,3	7,6		

When germinating on the soil of the landfill, the plants experienced oppression: the number of roots decreased by 7%, the length and weight of roots by 8 and 19% (Table 5). The coal preparation further reduced the mass of the root system - by 33%. Biometric indices of the plant root system above the landfill soil were obtained using the Rostok preparation: the number of roots - by 13%, the length and weight of roots - by 27 and 64%.

Options	Number of roots, pcs.	Root length, cm	Root weight, g / vessel
Arable land (control)	4,6	17,0	0,27
Landfill soil	4,3	15,7	0,22
Landfill soil +Humate balance	4,3	16,2	0,18
Landfill soil + Rostok	4,9	20,0	0,36
NSR ₀₅	0,3	1,2	0,1

Table 5 - Influence of humic preparations on the root system

Also, a negative effect was observed in the landfill soil on the height and weight of plants - a decrease by 22 and 30% in comparison with the control (Table 6). When using the Rostok preparation, the height and weight of plants were 36 and 81% higher than on the soil of the landfill with seed treatment with water.

Options	Plant height, cm	Plant weight, g / vessel
Arable land (control)	23,2	1,13
Landfill soil	18,1	0,79
Landfill soil +Humate balance	21,0	1,08
Landfill soil + Rostok	24,6	1,43
NSR ₀₅	1,5	0,1

Table 6 - Influence of humic preparations on test-culture plants

Conclusion. According to the effect on the sowing qualities of seeds and biometric indicators of seedlings of the test culture, the drug Rostok prevailed - an increase of 17-116% to the control. Compared to Rostok, PreCedetm has a two-fold lower increase in the number of roots, the length and mass of the root system, and a 4-fold lower increase in the weight of the aerial part of plants. The Gumiam preparation is lower than the control in terms of germination, in terms of the number of roots and plant weight - an increase is not a substance, in terms of other indica-

tors, the increase is significant, but significantly lower than the previous preparations.

When the seeds are treated with the Rostok preparation, prepared from low-moor peat humic acid gel, the effect on plants is higher than that of preparations from brown coal.

During biological reclamation, the pre-sowing treatment of seeds with a humic preparation Rostok eliminated the negative effect of the waste dump on the growth and development of plants. The introduction of dry humic fertilizer from brown coal into the soil of the landfill did not improve seed germination and plant development.

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OPIOID LEU-ENKEPHALIN CORRECTION OF EXPERIMENTAL HYPOTHYROIDISM UNDER STRESS

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The effect of a synthetic analogue of the opioid leu-enkephalin on the production of thyroid hormones and corticosterone in blood plasma of white rats with experimental hypothyroidism after 6 hours of immobilization stress was studied. It has been shown that the administration of leu-enkephalin supports stress-induced effects - an increase in the level of thyroid hormones and a decrease in the mass of the thyroid gland. In the stage of stress anxiety, the concentration of corticosterone increases significantly, in the stage of resistance, the level of corticosterone decreases, which may indicate a decrease in the functional activity of the adrenal cortex. On the 14th day of observation, the concentration of corticosterone increases again, there is a delayed stress associated with a deficit of energy metabolism. The introduction of leu-enkephalin protects the body from the damaging effects of stress.

Keywords: immobilization stress, hypothyroidism, corticosterone, thyroid hormones, white rats.

Introduction

In modern society, the problem of stress is becoming increasingly important [14, 9, 12, 16]. The constantly changing environmental conditions have shaped stress as a process of adaptation of the organism. Against

the background of prolonged and intense exposure to stress, the adaptive capabilities of the organism decrease, and as a result, pathology develops [2, 7]. The territory of Eastern Siberia has long been characterized by an insufficient content of iodine in the biosphere, which in some places has a more complex character [13]. The deficiency of this microelement was the reason for the development of hypothyroidism in the region. In connection with the existing problem, the search and development of complex studies in the combined course of hypothyroidism and stress and the possibility of their correction remain relevant to the present. The most promising is the use of a synthetic analogue of the opioid leu-enkephalin (dalargin), which has a broad spectrum of biological activity. Dalargin has an immunomodulatory effect, has anti-stress activity, restores the disturbed morphological and functional properties of blood [8]. In the future, research in this direction will expand the database on the adaptive capabilities of the body in these conditions and improve the methods of their correction.

Materials and methods

The studies were carried out on outbred white male rats weighing 180-200 g in the autumn-winter period, taking into account the ethical requirements set forth in the European Community directive (86/609/EC) and the Declaration of Helsinki. The experiment used 70 rats. Ten of them remained intact (group Int. N = 10). In all other animals (n = 60) experimental hypothyroidism by oral administration (with food) of a synthetic thyreostatic - mercazolil at a dose of 10 mg/kg daily for 8 weeks were simulated [5, 10]. Of these, 20 rats made up the control group (G. n = 20). The rest of the rats were divided into two experimental groups (2 and 3), which were immediately subjected to a single 6-hour immobilization on their backs [15]. The second experimental group (GS, n = 20) included stressed hypothyroid rats not receiving dalargin. The third experimental group (GSD, n = 20) included stressed hypothyroid rats receiving intramuscular dalargin at a dose of 0.1 mg/kg twice a day and immediately before immobilization. The dose and regimen of drug administration were selected on the basis of literature data on the most pronounced immunomodulatory and stress-limiting effects of leu-enkephalin (dalargin) [8]. The animals were removed from the experiment after ether euthanasia. The carotid artery was opened and blood was drawn. Blood plasma was obtained by centrifuging whole blood at 3000 rpm for 15 minutes on the 2nd (anxiety stage) and 7th days (resistance stage) after the end of the hypothyroidism and stress simulation [6].

In animals of all groups in the blood plasma, the concentration of thyroid hormones was determined by the radioimmunoassay method using test systems "CIS-bio International" (France). The concentration of corticosterone was determined by the enzyme immunoassay on a "Scrun master" biochemical analyzer manufactured by "Hospitex diagnostics" (Italy) using standard kits from "Vital" (St. Petersburg).

The data obtained were processed by the method of variation statistics. The significance of the differences in mean values was determined by the Student's t-test at p < 0.05.

Results and discussion

After simulating experimental hypothyroidism for 8 weeks, by the end of observations, the mass of the thyroid gland (TG) in white rats after the termination of the administration of mercazolil increased. On the 2nd day it increased 5.3 times (p < 0.05), from the 7th day it began to decrease and exceeded the norm by 2.8 times (p < 0.05, tab.) [3]. In stressed hypothyroid animals for 7 days, the TG mass decreased in the same way as in animals of the control group (G). Thus, the increase in the TG mass in hypothyroidism does not depend on the stress effect, but occurs as a result of the action of mercazolil and, after its withdrawal, begins to decrease.

Throughout the entire observation, the production of thyroid hormones by the end of the experiment significantly decreased, and the concentration of corticosterone showed rhythmic fluctuations. In the control group (G) in hypothyroid rats, on the 2nd day after discontinuation of mercazolil, the level of T_3 in the blood plasma decreased by 5 times (p <0.05), free T_4 by 6.5 times (p <0.05), compared with intact rats. At the same time, the concentration of corticosterone increased 1.9 times (Fig.). By the 7th day, the level of free T_4 increased 3.5 times (p <0.05) in relation to the previous period. The T_3 concentration showed a tendency to increase, but remained three times (p <0.05) lower than in intact rats. By the 7th day of observation, the level of corticosterone increased 2.2 times as compared to the previous period and exceeded 4.3 times (p <0.05) the concentration of this hormone in intact animals (fig.).

In rats with hypothyroidism, stress exposure (group GS, 6-hour immobilization on the back) did not lead to a significant increase in the concentration of thyroid hormones, but a positive effect of stress on the change in its level was observed (tab.). In particular, on day 2, the concentration of T_3 increased by 3.2 times (p <0.05), and a tendency to double the level of free T_4 was observed. By day 7, the T_3 level continued to increase and exceeded 3.6 times (p <0.05) the concentration of this hormone in control rats (G), while the T_4 content was 2.7 times less (p <0.05), in relation to control rats (tab. 1).)

On the 2nd day of observation, in rats with hypothyroidism after stress

exposure, the concentration of corticosterone increased 1.4 times (246.8 \pm 15.6), compared with control animals (178.5 \pm 15.5). By the 7th day, the level of corticosterone decreased 3 times (131.4 \pm 0.4 fig.), Compared with the control group (G, 396.2 \pm 1.9). Probably, during the stress reaction anxiety stage, activation of the adrenal cortex is observed and, accordingly, the concentration of corticosterone increases, the TG morphology corresponds to the state of hypothyroidism. In the stage of resistance, the functional activity of the adrenal cortex decreases and, as a result, the concentration of corticosterone decreases [11]. On the 14th day of the experiment, the level of corticosterone again increased and exceeded the control value by 3.3 times (p <0.05, fig.). Probably, at this stage, delayed stress appears, which is a consequence of insufficient energy metabolism.

Group of animals	Timing (day)	T₃ nM/l	T₄ nM/l	Weight TG (mg)
intact n=10		2.5±0.45	17.5±1.1	21.7±4.01
Q (a satural) as 00	2	0.5±0.01 ¹	2.7±1.1 ¹	114.5±8.31
G (control) n=20	7	0.8±0.0041	9.4±0.4 ¹	61.7±4.8 ¹
GS	2	1.6±0.23	5.6±1.5 ¹	111±6.9 ¹
n=20	7	2.9±0.4	3.5±0.9 ¹	51.7±4.01 ¹
GSD	2	1.4±0.21	1.8±0.3 ^{1,2}	51.7±4.8 ^{1,2}
n=20	7	3.2±0.3	14.6±2.02 ^{1,2}	43.3±4.9 ^{1,2}

Table 1 - Concentration of thyroid hormones in blood plasma (M ± m)

Notes: ¹ - difference from intact animals at p <0.05,

 $^{\rm 2}$ – difference from stressed animals with hypothyroidism corrected with dalargin, at p ${<}0.05$

G - rats with experimental hypothyroidism (control);

GS - stressed rats with experimental hypothyroidism who did not receive dalargin;

GSD - stressed rats with experimental hypothyroidism treated with dalargin.

When dalargin was administered to hypothyroid rats after immobilization stress, its stress-limiting effect was taken into account, which was most clearly manifested when it was administered one day and immediately before immobilization. With the indicated mode of introducing stress into the anxiety stage, the TG mass decreased by 2 times (p <0.05) and did not change any more. The concentration of T₃ in the blood remained at the level of stressed rats that did not receive dalargin, and the concentration of free T₄ on day 7 increased 4.2 times (p <0.05), tab.). Consequently, dalargin did not eliminate the positive effect of stress on thyroid hormone production, but increased free T₄ levels and also decreased TG mass. Under the influence of dalargin on day 2, the concentration of corticosterone did not change significantly in comparison with animals that did not receive dalargin. By the 7th day, the level of corticosterone increased 2.4 times (p <0.05), and on the 14th day it decreased 7 times (p <0.05, fig.), To the level at the stage of resistance. Thus, dalargin protected the body from the damaging effects of stress.



Figure. - Plasma corticosterone concentration

Note: Int. - intact rats

G - rats with experimental hypothyroidism (control);

GS - stressed rats with experimental hypothyroidism who did not receive dalargin;

GSD - stressed rats with experimental hypothyroidism treated with dalargin.

Conclusion

As a result of our experimental study, we noted a positive effect of stress on the production of thyroid hormones in rats with hypothyroidism. This is probably due to the stimulating effect of stress hormones on metabolism. Stress leads to an increase in the level of thyroid hormones under the influence of adrenaline, which stimulates the capture of iodides from the blood, their transport across the basement membrane of thyrocytes, and the oxidation of iodides to iodine [4]. In addition, stress in the stage of resistance (on day 7) simultaneously increases the level of T_a and decreases the level of T₄, which probably reflects the increased reversal of T_4 to T_3 in the liver under the influence of stress-realizing hormones [1]. The presented data give grounds to conclude that stress in hypothyroidism corrects the thyroid status by stimulating the production of thyroid hormones. The administration of the opioid leu-enkephalin supports the stress-induced effects of increasing thyroid hormone levels and decreasing thyroid mass. It significantly reduces the concentration of corticosterone in the blood, thereby protecting the body from the damaging effects of stress. The revealed changes are due to metabolic hormonal influences and can be partially corrected using opioid enkephalins, in particular dalargin.

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INORGANIC GLASSES ACTIVATED BY THE METAL NANOPARTICLES AS PROMISING MATERIALS FOR THE SURFACE-ENHANCED RAMAN SPECTROSCOPY¹

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The article discusses ways for the implementation of substrates for the surface-enhanced Raman spectroscopy (SERS) based on various technological solutions. It is proposed to use inorganic glasses activated by noble metal nanoparticles as SERS substrates. The possibilities of using glasses with nanoparticles obtained by ion exchange, as well as nanoporous glasses impregnated with nanoparticles, are considered.

Keywords. Surface-enhanced Raman spectroscopy, SERS substrate, glass, nanoporous glass

The ability to detect and identify trace amounts of molecules, including biomolecules, is in demand in many analytical techniques for applications in medicine, criminology, and other fields. Raman spectroscopy is a universal research technique that provides spectral information about the molecular structure of an object with a micron spatial resolution. When utilizing the effect of surface-enhanced Raman scattering (SERS), it is possible to obtain an amplification of the Raman scattering signal from molecules by 6-14 orders of magnitude, which makes it possible to detect unknown substances with single-molecular sensitivity.

This circumstance puts Raman spectroscopy in the leading position among analytical methods for quantitative and qualitative analysis of a substance. The Raman spectrum, like the infrared absorption spectrum, consists of a set of spectral lines that correspond to a set of frequencies of vibrational and rotational movements of molecules that is unique for each type of molecule. In practice, to obtain the Raman spectrum, the laser beam is focused on the sample, after which the scattered light is analyzed

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by a spectrometer with an optical detector. To measure the SERS spectra from various analyzed molecules, it is necessary to bring the test substance into contact with the SERS amplifying substrate in a certain way.

The working principle of the SERS amplifying substrates is based mainly on amplifying the amplitude of the electromagnetic field near curved and nanostructured surfaces of noble metals. Field amplification is observed on sharp edges of a metal surface, on individual or aggregated metal nanoparticles, and on nanostructured metal surfaces. According to the current understanding of the electromagnetic mechanism of the SERS, the amplification occurs due to the plasmon response of the metal nanostructure and is localized in its near-surface zone. In addition. amplification occurs for both the field of the exciting light wave and the field of the scattered wave. Therefore, SERS amplifiers are characterized by a certain operating spectral range associated with the resonant band of surface plasmon vibrations of a particular nanostructure. Among the SERS amplifiers used, the class of SERS substrates, i.e. flat nanostructured SERS active surfaces, on which the analyzed substance is applied, is widely distributed. The SERS signal is then measured in standard installations for measuring Raman scattering spectra, which makes SERS substrates convenient to use.

To solve the problems of quantitative analysis and identification of trace amounts of substances, SERS substrates are subject to requirements not only for the absolute value of the signal gain, but also for reproducibility and uniformity of the gain from sensor to sensor. Since the discovery of the SERS effect, several types of the SERS substrates have been proposed, some of which are listed below. The simplest type of SERS-active substrates, on which the SERS effect was discovered, is an electrochemical roughened surface of a metal electrode (for example, silver)^[1] which undergoes several redox cycles. As a result of the oxidation stage, a layer of metal salt (usually a halogen) is formed on the electrode. During metal recovery, the surface of the electrode remains rough and is a random metal relief with a characteristic roughness size of several tens of nanometers. In this type of substrate, the gain factors reach 106-108, but they are non-reproducible and extremely heterogeneous on the sensor surface. There are known types of the SERS substrates formed by colloidal metal nanoparticles immobilized from a solution on a solid surface. Most often, the surface of this type of substrate is randomly aggregated clusters of individual nanoparticles. The distribution of the SERS-gain coefficient over the cluster is extremely irregular, but it was on them observed record gain coefficients of 10¹¹-10¹⁴ times.

Another type of the SERS substrates is a nanostructured surface formed by island films of metal nanoparticles [2]. Metal island films deposited on the surface of a dielectric (glass, guartz, silicon, silica, etc.) or on layered structures of metal and dielectric layers are a random twodimensional array of metal droplets with a certain distribution of shapes (close to flattened spheroids) and sizes (typically 2-20 nm depending on the parameters of the metal and substrate). In many implementations of metal island SERS substrates, the films are separated from the underlying mirror metal layer by an intermediate layer of optically transparent dielectric, the thickness of which determines the force of interaction between plasmons in nanoparticles and metal layers. Metal particles act as nanoscale antennas that "pump" the energy of the incident electromagnetic wave into the energy of plasmon polaritons localized near individual nanoparticles or their ensembles. The amplification of the amplitude of the electric component of the field of such nanoantennas occurs in the near zone and depends on the spectral position of the plasmon resonance of the nanostructure, which in turn depends on the characteristics and thickness of the dielectric and metal layers. For nanostructured metal SERS substrates, the characteristic gain coefficients of the Raman scattering signal are in the range of 105-107 with a degree of surface uniformity of the order of one percent. Also, there are several types of regular nanostructured substrates, which are periodic nanostructures and are obtained using nanolithography processes. As an example, we can consider commercially available SERS substrates "Klarite" by "Renishaw", the surface of which consists of a periodic array of pyramidal depressions covered with a layer of gold. The claimed gain of such substrates does not exceed six orders of magnitude, but it is characterized by a high degree of uniformity and good reproducibility. Other original types of nanostructured substrates include homogeneous hexagonal arrays of silver or gold nanoparticles obtained by the method of so-called nanospheric lithography [3], periodic arrays of nanoparticles of various shapes obtained by electron lithography [4] and others.

In all these cases, the final layer of the SERS substrate is a nanostructured metal surface and is intended to provide direct contact of the analyte molecule with the metal providing maximal gain of the Raman scattering signal from the molecules. However, upon contact with the nanostructured surface of the SERS substrate, some of the analyte molecules are strongly adsorbed to the metal and cannot be eliminated in any non-destructive way. In addition, when exposed to air, the metal surface of the nanostructure gradually oxidizes and accumulates organic molecules adsorbed from the air, which leads to a decrease in the efficiency of the substrate and the appearance of a parasitic signal. Cleaning metal nanostructured surfaces in solvents and other chemical reagents or plasma cleaning systems leads to the destruction of the nanostructured layer or leaves a significant part of the molecules adsorbed to the metal surface. For this reason, regardless of the specific morphology of the active layer of SERS substrates, all such structures have a common key drawback – single use mode due to the low efficiency of amplification when applying reused ones. In the case of regularly structured SERS substrates produced by lithographic techniques, one-time use makes the substrates unprofitable.

In this regard, recently approaches have been actively developed that allow creating active SERS substrates with multiple actions while maintaining high efficiency of the Raman signal amplification. One of the most promising approaches in this area is the use of oxide glasses containing alkali metal ions (mainly sodium ions) as substrates. Using ion exchange technology, in which a glass sample is placed in a molten noble metal salt and sodium ions are replaced with gold or silver ions, the researchers produce glasses with a surface layer enriched with the noble metals. Subsequent temperature or laser treatment of such glasses leads to the formation of metal nanoparticles in the near-surface zones, thereby activating the surface for applications in the field of SERS spectroscopy [5, 6]. Studies of the effect of the metal type on the efficiency of SERS signal amplification in such structures have shown that the greatest efficiency can be achieved when gold and silver are used together, forming either core-shell nanoparticles or insular silver nanostructures covered with a layer of gold nanoparticles [7].

However, approaches that use the ion exchange process to enrich the glass surface with the noble metals have known disadvantages. On the one hand, these are small concentrations of the introduced metals, since due to the ion exchange process, the maximum concentration of the introduced gold or silver is limited by the concentration of sodium ions on the glass surface, while due to the peculiarities of the glass structure, not all sodium ions are subject to such an exchange. On the other hand, the inhomogeneity of the glass surface enrichment with metal ions due to fluctuations in the chemical composition of the glass and the difficulty of ensuring a uniform quality of the glass surface over the entire interaction surface. Thus, despite the advantages of using glass as an active SERS substrate due to its chemical inertia, low cost, and the ability to form nanoparticles in the near-surface layer, the disadvantages associat-

ed with the low concentration of nanoparticles and their inhomogeneous distribution narrow the possibility of this method for applications in the field of molecular detection.

At the same time, nanoporous glasses (NPG) can be another candidate for the applications considered. The composition of the NPG is almost equal to the fused silica [8] and its inherent porosity allows it to be compacted, opens up a significant variation in the refractive index. The pore size in such glasses can vary under synthesis conditions (from 3-4 to 100 nm or more). High adsorption capacity determines the use of NPG as matrices for impregnation with various substances [9]. In this case, the pore size of such a material can be fabricated much smaller than the wavelength of visible radiation, which ensures high transmission of the material in the visible spectral range and allows it to be used as a matrix for photonic applications. Porous glasses, including those impregnated with solutions of various salts, are studied for the manufacture of various sensors, microanalytical systems, laboratories on a chip, etc. [10].

The possibilities of creating a gas analyzer consisting of an array of NPG plates impregnated with organic dyes that react to changes in the surrounding atmosphere were also shown. However, the integration of elements on a single NPG plate could not be implemented because there were no technologies that allowed locally changing the density of this material, creating a set of physical barriers on a single glass plate, which would allow local control of adsorption and other processes in the NPG. At the same time, using modern laser systems, it is possible to implement local consolidation (compaction) by intensive absorption of laser radiation on the silicon-oxygen bonds of glass, which leads to its local heating, changes in viscosity and subsequent collapse of the pores. All processes occur only in the near-surface layer, and the compaction depth is limited by the thermal characteristics of the NPG and the size of the irradiation zone. With such a compaction mechanism, it is possible to realize a local change in the structure in a transparent dielectric material when using near-IR laser sources with femtosecond pulse duration, the radiation of which is weakly absorbed by the material, but leads to nonlinear absorption of radiation, which makes it possible to focus and carry out modifications at a given depth [11]. The use of such approaches to local laser compaction of nanoporous glasses impregnated with gold or silver nanoparticles can open the way for the development of integrated SERS amplifiers.

The implementation of such an integrated system of SERS amplifiers based on glass was recently shown [12]. Instead of the nanoporous glass,

fused silica glass placed in a solution of silver salt was used. Under the irradiation of the femtosecond laser beam, micron-sized zones containing silver nanoparticles were formed on the glass surface. Nanoparticles were precipitated due to local heating on the "glass"- "silver ion solution" interface. The developed integrated SERS amplifiers made it possible to increase the Raman signal of the studied molecules by 10¹¹ times. It is assumed that if nanoporous glass impregnated with a high concentration of silver and/or gold nanoparticles will be used, the efficiency of the formed integrated SERS amplifiers of magnitude higher and will open up new prospects of the development of integrated optical sensors.

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SCATTERING OF ELECTROMAGNETIC RADIATION BY SOOT PARTICLES

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This paper presents the results of calculations of the scattering characteristics of soot particles having the shape of an infinite cylinder and sphere for a wavelength of 8 microns (infrared range band). It is shown that when an electromagnetic wave falls normal to the cylinder axis, the values of the extinction, scattering, and absorption factors differ from the characteristics of a spherical particle, especially with an increase in the diffraction parameter. The scattering indicatrix extends into the front hemisphere as the diffraction parameter increases.

Keywords: scattering, extinction, extinction, electromagnetic wave, soot particles, the scattering indicatrix.

Introduction

The problems of remote sensing of dispersed medium and the formation of atmospheric thermal radiation are related to the study of aerosol scattering characteristics. Soot particles are one of the main components of atmospheric aerosols. They are notoriously formed in the atmosphere as a result of fires, volcanic eruptions, activities of various industries, etc. They are differ in size and shape. When studying the scattering characteristics of aerosols, it is usually assumed that they have a spherical shape, although in nature their shape may differ significantly from it. As a result, the scattering characteristics may differ significantly from those of a spherical particle of the same volume. Many problems related to the study of the scattering characteristics of soot particles can be adequately considered in the framework of the infinite cylinder theory. Detailed studies of light scattering on cylindrical particles were carried out in [1-4].

In this paper the results of calculations of soot extinction, scattering, absorption, and scattering indicatrix factors that have the shape of an infinite circular cylinder, carried out using the Lind and Greenberg formulas,

are presented [5]. The case of an electromagnetic wave with a length of 8 microns falling on a cylindrical particle along the normal is considered. For comparison, the results of calculations of the same characteristics for spherical soot particles made by Mi are also presented.

Research materials and methods

An infinite circular cylinder on which an electromagnetic wave falls along the normal is considered. It is known that electromagnetic radiation is described by vectors of electric and magnetic field strengths, respectively. There are two possible directions of polarization of the incident wave: the electric field is polarized parallel or perpendicular to the axis of the cylinder.

Case 1. The electric field is directed parallel to the axis of the cylinder. Expressions for scattering, extinction, and absorption efficiency factors have the form:

$$Q_{sca,I} = \frac{2}{\rho} \left[\left| b_{0I} \right|^2 + 2 \sum_{n=1}^{\infty} (\left| b_{nI} \right|^2 + \left| a_{nI} \right|^2) \right],$$

$$Q_{ext,I} = \frac{2}{\rho} \operatorname{Re} \{ b_{0I} + 2 \sum_{n=1}^{\infty} b_{nI} \},$$

$$Q_{abs,I} = Q_{ext,I} - Q_{sca,I},$$

where $\rho = 2\pi r / \lambda$ – diffraction parameter parameter (*r* – radius of the cylinder, λ – wavelength of electromagnetic radiation)

Case 2. The electric field is directed perpendicular to the axis of the cylinder. Then the previous formulas have the form:

$$Q_{sca,II} = \frac{2}{\rho} \bigg[|a_{0II}|^2 + 2\sum_{n=1}^{\infty} (|a_{nII}|^2 + |b_{nII}|^2) \bigg],$$

$$Q_{ext,II} = \frac{2}{\rho} \operatorname{Re} \{ a_{0II} + 2 \sum_{n=1}^{\infty} a_{nII} \}.$$

 $Q_{abs,II} = Q_{ext,II} - Q_{sca,II}$

Expressions for coefficients a and b are given in [5].

Results of calculations and their discussion

There were calculated the factors of extinction, scattering, and absorption of soot particles in the form of an infinite cylinder and sphere, provided that the complex refractive index of soot is constant m = 1,82 - i0,74, which physically corresponds only to the change in the particle radius

when the wavelength is fixed $\lambda = 8 m km$ [6,7]. The calculation results are shown in table 1.The scattering, extinction, and absorption factors in the Rayleigh scattering region grow monotonically, reaching their maximum value. Then they decrease, tending to their asymptotic values. The table shows that when an electromagnetic wave falls normal to the cylinder axis, the scattering characteristics differ from the characteristics of the sphere. In the case when the electromagnetic wave is directed parallel to the axis of the cylinder, the scattering factor is greater than in the case of perpendicular incidence, but slightly larger than the spherical particle. As for the extinction factor, in the case of spherical soot, it significantly exceeds similar values for cylindrical soot, and for both polarizations.

	Infinite cylinder						Sphere		
Ρ	Q _{ext, I}	Q _{sca, I}	Q _{abs, I}	Q _{ext, II}	Q _{sca, II}	Q _{abs, II}	Q _{ext}	Q_{sca}	Q_{abs}
0,1	0,4368	0,0128	0,4241	0,0817	0,0012	0,0805	0,1091	0,0001	0,1090
0,5	1,7846	0,6817	1,1029	0,6135	0,1393	0,4742	0,7117	0,0603	0,6514
1	2,3664	1,1626	1,2038	1,6426	0,6551	0,9874	2,1045	0,6695	1,4351
1,5	2,5219	1,3762	1,1457	2,1614	1,0134	1,1481	2,7374	1,1488	1,5886
2	2,4852	1,3906	1,0946	2,3229	1,1210	1,2019	2,9188	1,3054	1,6134
2,5	2,4036	1,3577	1,0459	2,3333	1,1138	1,2195	2,8603	1,3163	1,5439
3	2,3387	1,3324	1,0063	2,3056	1,0949	1,2107	2,7967	1,3097	1,4871
3,5	2,2990	1,3227	0,9762	2,2923	1,0904	1,2019	2,7282	1,2957	1,4325
4	2,2746	1,3219	0,9527	2,2818	1,0921	1,1897	2,6737	1,2934	1,3803
4,5	2,2573	1,3234	0,9339	2,2749	1,0981	1,1768	2,6333	1,2937	1,3396
5	2,2431	1,3246	0,9185	2,2687	1,1031	1,1656	2,5972	1,2951	1,3020
5,5	2,2306	1,3249	0,9058	2,2614	1,1070	1,1544	2,5675	1,2965	1,2710
6	2,2195	1,3245	0,8950	2,2544	1,1098	1,1446	2,5405	1,2971	1,2434
6,5	2,2097	1,3240	0,8858	2,2473	1,1121	1,1352	2,5168	1,2974	1,2194
7	2,2010	1,3232	0,8777	2,2407	1,1139	1,1268	2,4955	1,2974	1,1981
7,5	2,1932	1,3225	0,8707	2,2343	1,1154	1,1189	2,4763	1,2972	1,1791
8	2,1862	1,3217	0,8645	2,2284	1,1168	1,1116	2,4590	1,2969	1,1621
8,5	2,1799	1,3209	0,8590	2,2227	1,1179	1,1048	2,4431	1,2964	1,1467

 Table 1 - The extinction, scattering and absorption efficiency factors

 for soot particles

9		2,1741	1,3200	0,8540	2,2174	1,1189	1,0985	2,4287	1,2959	1,1327
9,5	5	2,1687	1,3192	0,8496	2,2123	1,1197	1,0926	2,4153	1,2953	1,1200
10		2,1638	1,3183	0,8455	2,2075	1,1204	1,0871	2,4030	1,2947	1,1083

Figure 1 shows the scattering indicatrix for the soot particle for different values of the diffraction parameter.

When $\rho = 0,1$, the indicatrix scattering of spherical and cylindrical particles are symmetrical and scattered back and forth equally (Fig. 1 a). As the size increases, the scattered energy is redistributed and the particles begin to disperse more into the front hemisphere than into the back (Fig. 1b, 1c, 1d). When $\rho = 5$ and 6, the scattering indicatrix begins to stretch forward, the graphs (Fig.1c and 1d) are plotted on a logarithmic scale for clarity of the side lobes. So, for example, the electromagnetic wave is scattered in the direction of 45° from the spherical soot by an order of magnitude less when falling in parallel, and by two orders of magnitude less when falling perpendicular. In all cases, the scattering indicatrix for a perpendicular incidence of an electromagnetic wave is scattered in all directions equally and almost does not change with increase of ρ .

Thus, for small values of ρ , the shape of the indicatrix depends almost little on the particle size. With the increase of ρ in the scattering indicatrix appear secondary maximums. The size and shape of these lobes depends on the shape of the particles. For spherical soot, the value of these maxima is less pronounced than for cylindrical soot.
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a) $\rho = 0,1$; b) $\rho = 1$; c) $\rho = 5$; d) $\rho = 10$

Figure 1 – The scattering indicatrix of soot particles: solid line – scattering of a spherical particle, dotted line – scattering of a cylindrical particle in a perpendicular falling, dot-and-dash line – in the case of parallel falling of an electromagnetic wave

Conclusion

Studies of the scattering characteristics of spherical and cylindrical soot particles have shown that the shape of particles can be ignored when diffraction parameter , and when it is further increased, the shape of the particles must be taken into account.

The results obtained can be useful for creating a disguise of various objects and false targets, as well as an aerosol layer to protect against frost.

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CONCEPTUAL CONFINEMENT-MODEL OF A KNOWLEDGE BASE FOR TECHNICAL DIAGNOSTICS OF BUILDINGS AND STRUCTURES

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An important condition for ensuring safety of buildings and structures is timely technical diagnostics. The objectivity and reliability of the information provided by experts on the technical condition of the construction site to a large extent depends on the experience of the expert, i.e. from the human factor.

The introduction of intelligent technologies in the expert activity of a civil engineer is motivated by the need to transfer the knowledge of experienced experts to specialists of different qualifications to expand and strengthen their professional capabilities. The logic of the reasoning of a human expert in an intellectual system should easily yield to machine processing, it must be structured, i.e. present in the form of a conceptual diagram of the organization of the knowledge system.

An effective confinement-modeling method is presented on the example of creating a conceptual structure of the knowledge base for diagnosing the technical condition of buildings and structures, which allows to unify the process of developing ontological knowledge bases, helps to filter out unimportant factors and focus on those that really affect the result. The developed structure is the basis for the implementation of the next stage - the construction of an integrated knowledge base of the intellectual system for diagnosing the technical condition of construction objects of various structural forms and purposes, made of different materials. This knowledge base should also include: methods for digitally processing the results of laser scanning of structural damage; methods for assessing risks and determining the residual life of buildings and structures using the theory of fuzzy sets and fuzzy logic; economic effect of measures to ensure the safety of buildings and structures.

Keywords: technical diagnostics, structures, buildings and facilities, intelligent systems, ontology, knowledge base, confinement-modeling.

Relevance of the topic

In modern society, new technologies are actively developing, the methods of transferring and processing information are dynamically changing. Advances in information technology make people's lives extremely rational and impetuous. The virtual world has become an integral part of life, and one of the urgent tasks of our time is to increase the efficiency of using the previously accumulated theoretical and practical experience through the use of intelligent technologies in solving emerging problems. Models and methods of artificial intelligence have great prospects for practical application in industrial and civil construction. Building objects are sociotechnical systems, as they are designed, built and operated by people who, as is known, are prone to make mistakes. In the norms for the calculation and design of buildings (structures), human errors are not taken into account, and the requirements for the safe operation of construction objects are controlled at the state level [1]. Timely technical diagnostics of buildings and structures is an important condition for ensuring their safety and is aimed at solving two main issues:

"How to prevent emergency destruction of a building or structure?" and

"How to minimize the negative consequences associated with possible emergency destruction of structures?"

For a reliable prediction of the risk of an accident or assessment of the residual life of a construction object, it is not enough to use only the classical apparatus of the theory of strength and probability. The main task of intelligent technologies today is the *processing of knowledge* related to solving complex problems in which *logical* (or semantic) information prevails over *computational* [2, 3]. This technology allows you to give a rigorous mathematical description of an expert's vague statements, realizing an attempt to overcome the linguistic barrier between a person, whose judgments and assessments are approximate and fuzzy, and a computer, which can only execute clear instructions. Technical diagnostics, project evaluation, decision-making and forecasting, design of buildings and

structures, optimization of design solutions - this is, by far an incomplete, list of promising areas of the construction industry where these technologies work well.

Unfortunately, there are still many practitioners and scientists who are skeptical about the possibilities of intelligent technologies. They doubt that this theory can help solve practical problems. This is the case with any new theory. In any case, in order to judge a theory, one must first of all know it.

Prospects for smart technologies for the construction industry

Artificial intelligence (AI) is an actively developing interdisciplinary science in which new applied areas are mastered every day. Al techniques are varied. They are actively borrowed from other sciences, adapted and changed for the tasks being solved. We can say that artificial intelligence is both science and art and technology and psychology. This scientific direction arose in the 50s of the XX century at the intersection of cybernetics, linguistics, psychology and programming. The subject of AI study is the processes of human thinking. The goal is to create a model of human intelligence and implement it on a computer. Initially, the name of this science came from a not entirely successful translation of the fundamental term "Artificial intelligence", introduced by the American computer scientist John McCarthy in 1956. The exact translation of the word "intelligence" is "the ability to reason", not intellect. D. McCarthy, introducing this term, explained: "We understand some of the mechanisms of intelligence and don't understand others. Therefore, within the framework of this science, intelligence means only the computational component of the ability to achieve goals in the world".

Knowledge - is a combination of theoretical understanding of a problem and rules of thumb (heuristics) for solving it. The sources of knowledge that are stored in natural language are an extensive base of practical and theoretical research presented in scientific and technical literature, regulatory documentation, as well as heuristic knowledge and reasoning of experienced experts.

A significant contribution to the emergence and development of the theory of artificial intelligence was made by *D. McCarthy, N. Nilsson, L. Zadeh, F. Hayes-Roth, D. Waterman, D. Lenat, R. Schenk, D.A. Pospelov, E.V. Popov, A.N. Averkin, R.A. Aliev, V.L. Stefanyuk, V.F. Khoroshevsky, G.S. Osipov, T.A. Gavrilova, A.P. Rothstein, M. Minsky, G.V. Rybina and others. [5 -11].*

The introduction of intelligent technologies into the expert activities of a civil engineer related to diagnostics and inspection of plans of build-

ings and structures is motivated by the need to improve the technology for making decisions about the safety of construction facilities, as well as to assess risks or determine their residual resource based on defects in load-bearing and enclosing structures identified during the examination and grounds; for informed decision making on reconstruction, overhaul or demolition of a building or structure.

Complex structure of building constructions, multifactorial nature, incomplete, sometimes inaccurate and contradictory information obtained from the results of an engineering survey of an object, lack of communication between some regulatory documents, insufficient formulated evaluation criteria, the problem of the "length of the technical state scale" (GOST scale, which includes only 4 categories) and the blurring of boundaries between them, require deep knowledge in the field of construction and largely depend on the experience of an expert [12].

The issues of technical diagnostics of the buildings and structures in operation have been and are being dealt with by many domestic, foreign scientists and specialists of the construction complex, such as A.G. Roitman, K.I. Eremin, V.V. Ledenev, V.T. Grozdov, V.I. Skrylev, V.G. Kozachek, N.V. Nechaev, S.N. Notenko, I.S. Guchkin and A.I. Bedov, V.V. Znamensky, A.I. Gabitov, V.F. Saprykin, M.E. Dementieva, A.I. Malganov, V.S. Plevkov, A.I. Polishchuk, A.N. Dobromyslov, V.V. Gabrusenko, V.M. Kalinin, S.D. Sokova, O.S. Vershinin, N.V. Pryadko, V.G. Kazachek and others.

There is a certain gap between the technical development of methods for general and detailed technical inspection of building constructions of buildings and structures [13-16] and the methodology for organizing expert knowledge for intelligent systems [17-19], and hence the possibilities of their wider practical application in construction. This is due to the apparent lack of textbooks and specialized literature, limited funding for research in this extremely promising area and a weak domestic market for software products for their development.

The most common type of applied intelligent systems - is *expert systems* (ES) [4], using professional knowledge of a specific subject area. ES are focused on replicating the knowledge and experience of highly qualified specialists for solving various types of problems (diagnostics, management, interpretation, planning, design, control, etc.).

The current state of ES developments in the construction industry can be characterized as a *stage of increasing interest*, as evidenced by both foreign and domestic publications: *E. Bernat, L. Gil, K. M. Hamdia Van Balen, H. Li, S.D. Shtovby, O.D. Pankevich, V.A. Sokolova, T.N. Soldatenko*, [20-24] and others. The introduction of intelligent technologies into the expert activities of a civil engineer is able to provide specialists of different qualifications with alternative solutions. For this purpose, it is advisable to introduce an *additional* technological level into the process of diagnosing a *technical condition*, including the use of computer tools for processing knowledge. At the same time, the knowledge embedded in the *computer-oriented knowledge base* (KB) must be organized and formalized in accordance with certain *structural rules* so that the computer can autonomously use them in solving a specific problem and give the result of the solution to the user based on *logical inference*.

An important task for ES developers is to promote it to the end user and to function effectively at the most important stage of the "life cycle" when solving real problems.

The main provisions of the representation of the structure of the knowledge base

The AI system, in a certain sense, models the intellectual activity of a person and, in particular, the logic of his reasoning. Any intellectual activity of a person is inherently systemic, involving the use of a set of interrelated procedures on the way from setting a task and goals to finding and using solutions. And since the logic of reasoning of a human expert in an intellectual system should be easy to machine, it must be structured, i.e. to present in the form of a conceptual scheme the knowledge system of the subject area. And for this it is necessary: to have professional knowledge (theoretical and practical); understand the thinking process of a person - an experienced expert or a Decision-maker in a specific type of activity, highlighting the main steps of this process; develop or use a ready-made software tool that reproduces these actions.

To structure information, numerous models and methods of knowledge representation have been proposed, and with varying success, tested: *various logical models, semantic and neural networks, frames, production rules, etc.* [10, 11, 32].

In recent years, implementing new methods of processing and presenting information at the junction of systems analysis, artificial intelligence and applied data analysis, work has been developing on *meaningful ontologies* - conceptual schemes for organizing the *knowledge system* of specific subject areas and ways of targeting this knowledge [25-28]. Ontologies are widely used in all areas of natural language information processing.

The term "Ontology" in the theory of artificial intelligence is used by

specialists as one of the main formalisms of knowledge representation. This is knowledge, formally presented in the form of a description of a set of *objects*, *concepts* and *connections* between them.

In the simplest case, the *construction of an ontology* is reduced to the allocation of basic *concepts* of a given subject area and the construction of links between *concepts* - the definition of relationships and interactions of basic notions.

An important feature of ontological models in intelligent systems is that they are intended not so much for people to work with them as for their processing by agent programs. And since a computer cannot understand the state of affairs in the world, just like a person, it needs to present all information in a formal form.

Computer ontology – is a formal expression of conceptual knowledge about the subject area in the form of a hierarchical structure that should be easy to machine processing and analysis, ensuring their unified and repeated use on different computer platforms, by different research groups, in solving different problems. For this, all concepts must be linked, and patterns must be established, i.e. it is necessary to identify the structure (*frame*) of the expert's *conclusions*.

Domain ontologies are usually built by or with assistance from domain experts. In this case, it is not so much the concepts themselves that are important as people's knowledge of these concepts and their use by people. When reconstructing an expert's reasoning, they most often rely on the two most popular theories of thinking — *logical* and *associative*.

Traditional logic forms criteria that guarantee the accuracy, consistency of general concepts of reasoning and conclusions (classification, generalization, comparison, categorization, inference, abstraction, etc.). But a person rarely thinks in terms of mathematical logic [10], his thinking is a chain of ideas connected by general concepts. The main operations of such thinking are: associations acquired on the basis of various connections; recalling past experiences; trial and error with random success, etc. It all depends on the specific tasks and source material, on how complex the subject area under study is.

One of the advantages of using ontologies as a cognitive tool is a *systematic approach* to studying the subject area, which provides: a holistic view of the subject area; allows you to restore missing logical connections; make inferences from the information provided and manipulate them. *Ontological models* are considered as *knowledge bases* of a special kind.

Since any model is always a simplification of reality, it is fragmented. But when identifying various pieces of knowledge, one should not forget about the main thing. That is, it is important to single out the so-called "center of the situation", a kind of integral image or structure, as a basis for understanding processes and phenomena, in relation to which knowledge about the subject area develops.

The principle of *the integrity of perception, as the basis of thinking, is called* **Gestalt** (German Gestalt). This term, borrowed from Gestalt *psychology*, was introduced into the use of knowledge engineering by Christian von Ehrenfels. The most important property of Gestalt - is the *drive for completion*. This means that when identifying different fragments of knowledge, one should not forget about the main thing, about Gestalt, which affects the rest of the components and *connects them into a certain structure* [10].

When solving real problems, it is important to know *how* to highlight the main thing. Method for determining the main components of the system and studying their influence on each other

was suggested by T.V. Gagin [29]. The developers called this model of a fundamentally stable, self-reproducing system the **Confinement@model**. The term "Confinement" is taken from physics. The essence of this approach lies in the presence of the *fact of the closure of the system in the form of a system loop*, which contains the necessary and sufficient direct and inverse cause-effect relationships. Elements of the system loop are our *focuses of attention*, sights - where to look and where to search (fig. 1). It is assumed that the result is generally known, and the model is focused on the strategy for achieving the result.

Confinement modeling –is an *application tool* that makes it easier to build system models and make the right decisions. Recently, this tool has become actively used in scientific research in various industries [30, 31]. The confinement system allows you to see key points and important relationships, helps to highlight the *most important and necessary for solving a specific problem*. To understand how this tool works, it is useful to compare the proposed model with reality.

An example of constructing the structure of a conceptual model for diagnosing the technical condition of buildings and structures

Let us consider, using an example (Table 1), the process of constructing a *structure* - a conceptual model of an *integrated intelligent system for diagnosing the technical condition of buildings and structures* (ontograph), using confinement modeling technology and a ready-made template (fig. 1). This example will allow you to understand the rules for constructing a confinement model of the subject area (fig. 2), to see key points and important relationships. The main criterion in deciding on the degree of accidents or on the need to take measures to bring the construction object to further safe operation is the **Category of the technical condition** (CTC) of the building or structure (standard, operable, partially operable or emergency technical state).

Technical diagnostics of construction projects is carried out by a combination of mutually consistent and complementary practical, calculation, research and analytical procedures. Strict filling of the confinement model, at the level of common sense (the numbers of the elements correspond to the order of their determination) allows you to discover not only the elements necessary for understanding the system, but also their most important interrelationships: each element in its place must be logically linked to six others: **three** must *evoke it*, and **three** must *follow from it*. Thus, each element is both an *effect* and a *cause*.



Table 1. The process of building a conceptual model structure

Filling sequence (1 check)											
1 —is the actual result (goal) of the system, its observable manifestations	Purpose of the system -determine the CTC of the object as a whole (1) to assess the risks of destruction and re- sidual life (9), which also makes it pos- sible to assess the economic effect of measures to ensure structural safety.										
2, 3 and 4 — the immediate reasons for this result (1). Their choice is dictated by the following requirement. All three together, they must produce a result with necessity and sufficiency. In this case, the reason (2) should, in addition to the result itself, cause and strengthen the cause (3), and that, in turn, the cause (4). In this case, element (4) must itself cause the result and at the same time be strengthened by it.	The CTC of an object as a whole (1) depends on the results of an engineering (visual and instrumental) examination of individual structures (2); the results of <i>verification calculations</i> - in the presence and taking into account the identified defects and damages (3); as well as from CTC expert judgments of individual building structures (4).										
5 — Now we need to find an element that simultaneously causes all three previous reasons. Not "it is alone", it is more important that "all three". Reason (5) is related to (2).	The main tasks of technical diagnostics of constructions of buildings and struc- tures (5) are: <i>identification of the most</i> <i>significant defects and damages</i> found as a result of an engineering survey (2), determination of the <i>reasons for their</i> <i>occurrence</i> and the necessary calcula- tions (3), as well as from checking the operational suitability of structures and compliance with the design parameters (4).										
6 — This is the reason for (2) and (5) at the same time.	In accordance with the requirement of the "Rules for the Inspection of Building Construcions of Buildings and Struc- tures" and other regulatory documents, engineering inspection (2) and diagnos- tics (5) must be carried out <i>regularly</i> (6) at least once every 10 years and at least once every five years for buildings and structures or their individual ele- ments operating in adverse conditions.										
7 — Should call (6) and (2).	If significant <i>defects, damages and de- formations</i> are detected during main- tenance (7), an engineering survey of the technical condition of buildings and structures is also carried out (6, 2).										

I

8 — This element is interconnected with (7) and causes (6) and (5).	Based on the results of accidents, the consequences of fires, natural disasters associated with the destruction of a building (structure) (8), an engineering survey (6) and diagnostics (7) are also carried out.					
9 — A very important element. This is the first serious test of our reasoning. It must close the system, i.e. cause (7) and (8), being both a consequence of both cause (4) and, more importantly, the main result of system (1).	The assessment of the risks of de- struction and the determination of the residual life (9) are the necessary con- sequences in case of an identified de- crease in the category of the technical state of individual structural elements (4). They are also the basis for making a decision on the repair, reconstruction or demolition of an object when significant defects, damage and deformations are detected (7) or when buildings are de- stroyed as a result of natural disasters (8), and for assessing the economic ef- fect of measures to ensure the safety of a construction object in the whole (1).					
Second	check					
The links indicated in the diagram by the dotted line, which represent a vicious circle: "6" - "3" - "9", are de- scribed by the word "calls".	The check is performed:. closing the middle circle: "6" - "3" - "9" to determine the residual life and as- sess the risks, it is necessary to exam- ine the structures, in accordance with the regulations, and carry out calcula- tions					
Third	check					
The confinement model is clearly layered into three circles: <i>inner, middle</i> and <i>outer</i> . The inner and outer circles are practically equal. And the central one serves as a connecting link, trans- ferring the impact from the inner circle to the outer and vice versa. The middle circle is considered to be the steward . The inner and outer circles as a whole are more likely to be related to the giv- en, <i>to the results</i> , and the central one - <i>to the intermediate causes</i> .	The check is practically in progress. There is a transfer of influence from the inner circle to the outer one and vice versa.					

Fourth check											
There are three sectors within the model. Let's mark them in different colors: " \mathbf{R} " - red, " \mathbf{G} " - green, " \mathbf{B} " - blue. Items in the red sector describe "key results", "specifics". These are the most "real", obvious parts of the system.	Elements are grouped according to their belonging to the "sectors": « R » : 1-4-9 - key diagnostic results;										
The green sector is an incentive to transform the specifics of red into actions and conclusions of blue.	«G»: 5-2-3 – ways of solving problems;										
The blue sector - "procedural-think- ing", covers the area of decisions, rules and conclusions. The "blue" elements are "effects", "meanings" and "subjec- tive judgments."	«B»: 6-8-7 – motivating factors for diagnostics of technical condition.										
The logic of checks suggests the magi- cal role of the element, which is simul- taneously located in the "control" cen- tral circle and the "transforming" green sector - the element (6) in the scheme. It often turns out to be significant and decisive.	It is also interesting to note that the "need for regular inspection of struc- tures" falls into the very (6) element that is significant and decisive.										

As a result, we received a conceptual confinement model for *diagnosing the technical state of buildings and structures,* which can be considered a first-level ontology, including the required number of system processes. The resulting confinement model can be continued in both directions, i.e. to be a connecting link for other ontologies, the construction of which can be reduced to similar actions. Moreover, at each level of building a specific ontological model, it is possible to use different techniques. And examples of such applications are presented in publications [32, 33].

Understanding the principles of constructing a confinement model makes it possible to unify the process of developing ontological knowledge bases and other subject areas, to facilitate the building of the structure in comparison with the known methods of constructing ontologies [10, 26, 27]; helps to weed out unimportant factors (which seemed important) and focus on those that really affect the result.

The developed structure can also serve as the basis for the implementation of the next stage - building a knowledge base of *an integrated intelligent system for technical diagnostics of construction objects* of various structural forms and purposes, made of different materials, which can also include methods for digital processing of the results of laser scanning of structural damage, methods for assessing risks and determining the residual life of buildings and structures using the theory of fuzzy sets and fuzzy logic, as well as an assessment of the economic effect of measures to ensure structural safety. But at the same time, it should be understood that there is no single correct way to model the subject area - there are always viable alternatives.

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MODERN TECHNOLOGY TO INCREASE THE DURABILITY OF PISTON RINGS

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The steel-molybdenum coating applied to the piston rings group made of high-strength cast iron provides good conformability, low wear ability rate, and low coefficient of friction is determined. This fact is explained by the specific characteristics of molybdenum oxides.

Keywords: steel-molybdenum coating, conformability, wear ability rate, microhardness, characteristics of molybdenum oxides.

Analysis of publications

The significant increase of reliability and endurance of units and machine parts is one of the main problems in the development of modern engineering.

This problem can be solved by the urgent development of the new technologies, especially, for the details which work in the condition of friction as well as amortization.

The well-known strengthen technologies have some disadvantages, for example: the microgeometry of details is changed after strengthening,

skellering of the of the product's surface and the appearance of stresses inside it, affects the operability of the machine unit, the need to create special and expensive conditions for the process of strengthening, environmental problems, etc.

This scientific research is devoted to the process of planning and investigation of the structure and the features of piston rings group after coating them with steel-molybdenum.

Material and methods of research

The coatings were applied to the piston rings group made of highstrength cast iron, used in batch production

At the present time the electrolytic bichromated coating is applyied to the piston rings group.

That is why the researches were conducted simultaneously with the piston rings group, which were reinforcement according to the proposed technology of hardening, the results of the research were compared by the main features, which characterize serviceability of piston rings group during operation.

The piston rings, which were to be covered with the steel-molybdenum coating, were grouped in twenty items. The assembling of the piston rings group was carried out in a special appliance, imitating the bushing of the working cylinder. Rings on the mandrel were assembled in such a way that there was no opening of the locks.

On the working surfaces of the piston rings group, a special groove is provided under the coating, which increases the adhesion of the coating to the substrate.

The technological process of applying the steel-molybdenum coating to the piston rings group includes the following stages: preliminary cleaning, bead blasting treatment, spraying.

The bead blasting treatment deals with cleaning the surface of the base coat, increase the surface roughness of the substrate, which increases the total area of the coating adhesion sections with the substrate and the adhesion of the coating.

Molybdenum and steel wires were fed at a certain speed. The coating was applied by electric arc spraying on the same mandrel as shot blasting. The molybdenum wire is connected to the positive pole of the power source, the steel wire to the negative pole.

The application modes of the steel-molybdenum coating are given in the table. 1.

Table 1

Coa corr sitio % wei	ting ipo- on , by ght) • Wire di- ameter, mm		wire spee n	wire feed speed, m/ min		Coating compo- sition , % in vol- ume		ic current, A	Pola	arity	Stored air pres- sure,	r-blast nozzle, mm	l distance, mm
Мо	St	Мо	St	Мо	St	Мо	St	Arc	Electr	Мо	St	kgf/sm²	Diametr of ai	Spraying
50	50	1,5	1,7	3,8	3,8	44	56	35	220	+	-	4,5÷5,0	7	100 - 110
50	50	2,0	2,3	3,8	3,8	44	56	40	400	+	-	5,0÷5,5	8	100 - 110
60	40	1,5	1,7	3,8	2,47	53	47	35	220	+	-	5,0÷5,5	7	100 - 110
60	40	2,0	2,3	3,8	2,47	53	47	40	250	+	-	5,0÷5,5	8	100 - 110
40	60	1,5	1,7	3,8	5,84	33	67	35	220	+	-	5,0÷5,5	7	100 - 110
40	60	2,0	2,3	3,8	5,84	33	67	40	400	+	-	5,0÷5,5	8	100 - 110

The modes of steel-molybdenum coating sputtering

The temperature of the piston rings group during the application of the steel-molybdenum coating is 150 °C. The coating was sprayed to a thickness of 0.8 mm. After the coating was applied, a mechanical treatment was carried out. The thickness of the coating in the final finished ring is 0.5 ± 0.1 mm.

The results of the conducted research

The structure of the steel-molybdenum coating was studied using a metallographic microscope with an increase from x100 to x300.

The microstructure of the coating has a typical character of gas thermal coats layered with uniformly spaced pores (Fig. 1). The industrial etching of the samples was carried out with a Murakama reagent (10 g NaOH, 10 g K_3 Fe (CN) $_3$, 10 ml H_2 O), which is used to reveal the structure of Mo and other refractory materials.

The structure of the steel-molybdenum coating after etching is shown at the figure 2. The microstructure of the coating is a combination of molybdenum (dark, etching areas) and steel (light, non-etching areas).

The large-dispersed component of molybdenum appears with a larger increase in the structure of the coating, apparently, due to the high rates of crystallization during the coating process (Fig. 3). Besides the two main phases, the other structural components are observed in the coating, which are to be the products of the interaction of steel and molybdenum wires with oxygen and nitrogen, as well as products of interaction between molybdenum and steel in the process of plasma spraying.



Fig. 1. The microstructure of steel-molybdenum coating, ×115



Fig. 2. The microstructure of steel-molybdenum coating by etching, ×115



Fig. 3 The microstructure of steel-molybdenum coating's surface layer, ×400

The pore size of the coating is $5 \dots 10^{*10^{-6}}$ m, which is optimal for piston ring group operating with significant force and temperature loads.

The porosity of the coating (up to 12 %) provides an increased oil consumption of the rings, which positively affect both the process of runningin of the working pair of the sleeve-the piston ring and the operation of the piston ring group during operation

The control of the adhesion strength of the steel-molybdenum coating to the substrate is carried out on a special device by twisting the piston ring group with simultaneous bending until the coating was peeled off. The angle of twist at which the coatings were peeled off is not less than 35°, which indicates satisfactory adhesion of the coatings.

The measurement of microhardness showed that for molybdenum it is $H_u = 550 \dots 590$, for steel $H_u = 460 \dots 560$ by the thickness of the coating.

The microhardness of molybdenum increased to $H_{\mu} = 720 \dots 760$, and steel - to $H_{\mu} = 520 \dots 580$ After the tests for wearability.

In order to determine the antifriction properties of the received steelmolybdenum coating of piston ring group and the propensity to grasp it with the sleeve the tests were conducted to determine the dependence of the friction coefficient on the load. Samples cut from the chrome and the steel-molybdenum ring group were tested, when rubbing in pair with disc samples from cast iron. The investigations were carried out by using a SMC-2 friction machine under step loading. Lubrication with oil was carried out by dipping, as well as applying it to the working surfaces of the samples before testing. The results of the tests are shown in Table. 2.

Ring		Friction ratio at the load P, kN											
	Grease	0,2	0,4	0,6	0,8	1,0	1,2	1,4	1,6	1,8	2,0		
Chromium.	dipping.	0,079	0,077	0,082	0,077	0,074	scuffle						
steel-molybde- num coating		0,066	0,068	0,072	0,070	0,070	0,072	0,072	0,072	0,072	0,072		
Chromium	lubricants	0,098	0,099	0,103	scuffle								
steel-molybde- num coating		0,068	0,069	0,070	0,070	0,072	0,072	0,062	0,067	0,067	0,065		

The dependence of friction ratio on the load

Table 2

The obtained data indicate that the steel-molybdenum coating does not adhere to the sleeve cast iron in the entire range of loads. And when rubbing under more severe conditions (with a single lubrication before the test), the friction coefficient at high loads is even less than with excessive lubrication. At the same time, samples of chromium-plated rings can withstand less stresses prior to bulging working under more severe conditions.

Thus, the obtained results indicate a higher resistance to corrosion and better antifriction characteristics of piston rings with a steel-molybdenum coating in comparison with electrolytic chromium plating.

The durability tests were carried out in comparison with chrome-plated piston rings in order to determine the wearability and wear resistance of a steel-molybdenum coating, when it was paired with a sleeve. The test was carried out on a SMC-2 machine with reciprocating motion for two hours under load 1 kN and a sliding speed of 1.3 m / h. Lubrication - immersion in oil.

The wear rate by the mass of the disc (liner) and the shoe (ring) treated by the existing technology (electrolytic chromium plating) and after the application of the steel-molybdenum coating are presented for comparison of the histogram in figure 4. The results indicate that the steel-molybdenum coating is more wearresistant than electrolytically chrome plated. The steel-molybdenum coating minimizes the mating material to a lesser extent and has a lower coefficient of friction



Fig. 4 – The histogram of the intensity of wear ability by weight of the pads (rings) «a» and the disc (sleeves), «b»; 1 – chrome plated coating; 2 – steel-molybdenum coating.

r – chrome plated coating; z – steel-molybdenum coating.

In Fig. 5 depicts the dependence of the wearability of the piston ring group, chromed and with a steel-molybdenum coating, on the test time is in the figure 5.

The analysis of the obtained results testifies to faster workability of piston ring group with the steel-molybdenum coating. For a piston ring group with a steel-molybdenum coating, a lower wear rate is also characteristic, which is confirmed by the obtained data on the good antifriction properties of these coatings.

Such a complex of parameters of steel-molybdenum coating can be explained by the specific properties of molybdenum oxides, which can have an additional lubricating effect, acting as a solid lubricant. In addition, the high melting point of molybdenum (2600 $^{\circ}$ C) contributes to a lesser propensity to set (weld) the mating materials.



Fig. 5 – The dependence of wear ability of piston ring group on test time 1 – chrome ring; 2 – ring with steel-molybdenum coating

Such a complex of parameters of steel-molybdenum coating can be explained by the specific properties of molybdenum oxides, which can have an additional lubricating effect, acting as a solid lubricant. In addition, the high melting point of molybdenum (2600° C) contributes to a lesser propensity to grasp (weld) the matched materials.

The difference in the parameters of the crystalline structure of molybdenum and Fe_a, which is the basis of the metallic matrix of cast iron facilitated decrease in setting. Molybdenum crystallizes with the formation of a body-centered cubic lattice with a period a = 3.1474, whereas in Fe_a a = 2.8665 (in chromium, the lattice period is a = 2.8829).

Summary

1. The technology for applying a steel-molybdenum coating is proposed.

2. The investigation of the structure of the steel-molybdenum coating showed that it has a heterophase structure.

3. The porosity of steel-molybdenum coating provides increased oil consumption of the rings, which positively affects the process of runningin of the working pair of the cartridge-piston ring.

4. The coefficient of friction of the steel-molybdenum coating is 20% lower than that of the chrome plated coating for all the studied loads.

5. The wear rate of the chrome ring is 2 times higher than that of the ring with a steel-molybdenum coating.

6. The piston ring group with a steel-molybdenum coating are characterized by faster workability than rings with chrome plated coating. 7. The basis for a higher complex of antifriction properties and wear resistance of piston rings with a steel-molybdenum coating as compared to chrome plated is given.

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MODELING OF THE ABSORBER OF A WIDE FRACTION OF LIGHT HYDROCARBONS FRACTIONATION UNIT

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A model of an absorption column for the separation of ethane-propane fraction of a gas fractionation unit is presented, which is used to optimize technological modes and assess the design parameters of the apparatus. The column model was developed in the UniSim Design modeling software environment.

Keywords: modeling, absorption tower of gas fractionation plant, UniSim Design.

Wide fraction of light hydrocarbons (WFIH), obtained as a result of processing of associated petroleum gas, must be extremely and qualitatively divided into separate commercial hydrocarbons. The interest in this problem is explained by the large tonnage of installations, where even small improvements in the process lead to a significant improvement in the general technical and economic indicators of gas fractionation.

In industrial conditions, certain difficulties are caused by qualitative separation during the concentration of light hydrocarbons (C1-C3), which is associated with deviations from the optimal technological mode of operation of the installation, insufficient efficiency of contact devices, and the accuracy of maintaining the temperature of the irrigation stream.

In works [1], to achieve the limiting concentration of WFIH hydrocarbons up to methane, low-temperature condensation with rectification is used. The effectiveness of this method depends on the potential amount of heavy hydrocarbons that is entrained in the gas streams. Probably, the implementation of this method at the existing production will not allow to recoup the costs of purchasing compressor and refrigeration equipment and covering the operating costs of energy resources in a short time.

In work [2] it is shown that an increase in pressure in the deethanization column makes it possible to improve the degree of recovery of target components (C3H8 +). It should be noted that the operation of industrial columns is regulated by limiting working pressures close to the design ones, which makes it practically impossible to increase the pressure in the column equipment.

To improve the operation of the deethanization column, it is proposed either to reduce the temperature of the reflux stream, or to replace the contact devices with more efficient ones (efficiency not less than 0.7), which, according to the calculated data, will lead to an increase in C_{3+} production up to 28% [3].

In the patent [4], in order to improve the degree of ethane recovery from WFIH, it is proposed to separate the heated WFIH feed stream. Direct one stream as the column feed, and send the second to the separator. After that, the gas stream from the separator is directed to the stripping section of the column, and the liquid part is directed to the reflux of the column. This method improves the recovery of ethane from WFIH.

The efficiency of industrial use of the above methods largely depends on the quality fractionation of C_1 - C_3 hydrocarbons from the rest of the WFIH fractions. At the same time, the ethane-propane fraction (EPF) is used in the pyrolysis unit, where ethylene is obtained as the target intermediate product. Considering that propane in EPF reduces the selectivity of the process, it is practically important to achieve its maximum recovery in a gas fractionation unit. The search for options for the maximum possible reduction of the amount of propane in the EPF is carried out below using the UniSim Design software environment [5].

Fig. 1 shows a schematic diagram of a gas fractionation plant, the feedstock of which is WFIH, obtained at gas and oil refineries. Additionally, stable natural gasoline (SNG) can be involved in the feedstock.

The absorption column I with three circulating refluxes separates the ethane-propane fraction (EPF) from the WFIH. Column II separates the bottom product of column I into light (propane-butane) and heavy (pentane-hexane) fractions. Propane, isobutane and n-butane are isolated from the light fraction in apparatus III and split column V. In apparatus IV and split column VI, a hexane fraction, isopentane and n-pentane are isolated. The hexane cut is used as absorbent in column I.

Fig. 2 shows the diagram of the absorption column I, made in the Uni-Sim Design environment. Modeling and assessment of the adequacy of the model were carried out according to the parameters of the apparatus and analyzes of the concentration composition of raw materials and industrial data products. The components of the mixture included hydrocarbons methane, ethane, propane, i-butane, n-butane, i-pentane, n-pentane, n-hexane, n-heptane, n-octane, n-nonane, n-decane, 1- pentene, cis-2-pentene, trans-2-pentene, 2-methyl-1-butene, 3-methyl-1-butene, 2methyl-2-butene, 1-butene, i-butene, trans-2-butene, cis-2-butene, as well as sulfur and hydrogen sulfide.

Using the model, the influence of various technological and design parameters of the column on the possibility of reducing the amount of propane in the EPF was assessed.

In particular, the influence and parametric sensitivity of the process to the composition, quantity and temperature of the absorbent are considered, the effect of pressure in the apparatus is modeled, the amount of circulating irrigations acceptable for industrial implementation is analyzed and their trays are selected, the design parameters of the absorber are estimated.



Fig. 1 - Schematic diagram of a gas fractionation plant.



Fig. 2 - Diagram of the absorption column I constructed in the UniSim Design simulation software.

Parametric sensitivity of the process to the composition, quantity and temperature of the absorbent. In accordance with the process flow diagram of the WFIH gas fractionation unit (fig. 1), the hexane fraction of column IV is used as the absorbent of apparatus I. Calculations show that when the amount of hexane in the absorbent changes by 5%, the amount of propane in the EPF practically does not change. A decrease in the temperature of the absorbent by 60% of the industrial value has a nonlinear effect on an increase (~ 0.4%) in the amount of propane taken from the bottom of the apparatus. The parametric sensitivity of the process under consideration to a change in the temperature of the absorbent is higher than to a change in the temperature of the feed stream.

Influence of pressure in the apparatus. Fig. 3 shows the profile of the temperature change in the apparatus for industrial operation and with an increase in pressure in the apparatus by 10%. Calculations show that with increasing pressure, the propane yield from the bottom of the apparatus increases (by 1.8%) with a noticeable decrease in the amount of EPF.



Fig. 3 – Profile of temperature change along the height of the apparatus: for industrial mode (a) and with an increase in pressure in the absorber by 10% (b).

Irrigation system selection. During the absorption process, heat is released, leading to heating of the medium and an increase in its temperature. In this case, the values of the distribution coefficients increase and, accordingly, the gas solubility decreases. For industrial conditions of the absorption process, it is of interest to consider possible options for removing the heat of absorption. One of the options for stabilizing temperature changes along the height of the apparatus is the use of circulating irrigation. Below, the options for the hardware design of the absorber using two, three and four irrigation circuits are evaluated.

Fig. 2 shows three circulating irrigation systems, each of which contains a selection from the column, a pump and a heat exchanger. Recycle flows are generated in the UniSim Design environment using recycle logic. Fig. 4 shows the profiles of temperature changes along the height of the apparatus. It can be seen that the optimization of the numbers of the input-output reflux plates leads to a smoothing of the temperature profile along the column height, which made it possible to reduce the estimated amount of propane in the EPF by 2.1÷13.4%, depending on the operating temperature of the column bottom.





The operation of the absorber with a system of four irrigations was simulated in sequence: one more irrigation was added to the three irrigations with industrial modes, the results obtained were compared with the simulation results obtained after optimizing the numbers of the irrigation input-output plates. A decrease in the estimated amount of propane in EPF by $2.2 \div 17.6\%$ was obtained depending on the operating temperature of the bottom of the column.

The use of less than two irrigation systems for industrial conditions is impractical, since in the presence of two systems, one system "carries" the meaning of duplicate (reserve) functioning irrigation. Modeling the operation of an absorber with a system of two irrigations was carried out in sequence: from three irrigations with industrial modes, one irrigation located in the lower part of the apparatus was excluded, since according to the results of modeling the operation of the absorber, the parametric sensitivity of the process is minimal precisely for the lower irrigation. The simulation results of this hardware design of the absorber were compared with the simulation results obtained after optimizing the numbers of the irrigation input-output plates. A decrease in the estimated amount of propane in the EPF by $1.5 \div 11.4\%$ was noted, depending on the temperature of the bottom of the column.

Comparison of the calculated design options for an absorber using two, three or four irrigation circuits gives preference to the option with four irrigation circuits, while for the final decision it is advisable to use the technical and economic criteria for choosing the process instrumentation.

Assessment of the absorber design parameters. Fig. 5 shows the calculated change in the phase flow rate along the height of the apparatus. Three zones of quantitative flows of phases with a decrease in the

load along the height of the apparatus can be noted, therefore, to ensure the required hydrodynamics on the plates, it is advisable to use a structure with a decreasing cross-section along its height.



Fig. 5 – Profile of phase flow rate change along the height of the apparatus.

As an example, the design parameters of an absorber with a power load of about 106 t/h have been calculated: bottom part $D_b = 2,75 \text{ m}$, $H_b = 9 \text{ m}$; middle part $D_m = 1,85 \text{ m}$, H = 10,8 m; top part $D_t = 1,7 \text{ m}$, $H_t = 7,2 \text{ m}$.

Thus, the absorber I model developed in the UniSim Design modeling software environment can be used both to optimize the operating modes of industrial devices and to train technologists in the techniques of qualified process management.

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RECOGNITION OF PLANT OBJECTS WITH A COMPLEX GEOMETRIC SHAPE

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This study are devoted to the problem of recognition of plant objects having a fractal surface. One of the research is to develop inexpensive sensors that can instantaneous identify the specific components of plant material having the uneven surface of the object. Much attention is paid to modeling and mathematical objects recognition methods.

Keywords: recognition, object, plant, geometry, graph, fractal, mathematical modeling.

Introduction

This study is devoted to the problem of recognition of plant objects that have a fractal surface. One of the research directions is to develop inexpensive sensors that can instantly recognize specific components of plant material, having an uneven complex shapes [1]–[7].

In recognition components of plant material that can vary its geometric parameters, are used optical electrical or optical electronic sensor types, with the energy beam (photons, electrons, infrared radiation), which scan the object [1, 8].

1. Recognition of a moving object

1.1 Recognition of a moving object with the passage of the optical lattic

One option is optical sensors, which constitute a planar frame formed by parallel rays. With the passage of the grid source the plant object turns in the contour describing the shadow model of each of the components of plant material. If the original model was a continuous curve, then the image will remain the same.

In article [9] are foundations of the theory of operation of these sensors. The research focuses on a moving object in the plane perpendicular to the direction of optical beams. The original way in the systems of recognition of images of flat energy bars is the shadow model of the object in the plane xOy perpendicular to the directions of the beams of the sensors.

The transformation of the contour of the original object moving with velocity through the optical lattice and its operators is considered in [10], in which the contour is considered as a closed curve: f(x, y) = 0.

Flat energy bars give sufficient information that could provide a solution to the problem of pattern recognition of plant materials and their components. This study allow for the development of automation when performing technological processes of processing of agricultural crops, e.g., sorting fruits and root crops with opto-electronic means in the form, the square, the length of the stem and other morphological characters [11]. The characteristic of the object is adjusted recognition system the technological line of processing plant materials. The study of geometric forms are devoted to a series of work related to mathematical modeling of plant [12].

1.2 Recognition of a moving object with shadow circuit and construction of its envelope

In the technology of cultivation and harvesting of agricultural crops, robotic means of mechanization are used, which require for more efficient work the recognition of the image of that plant object with which they need to work.

In the moving coordinate system, the equation of the sheet surface will have the following form: f(X,Y,Z) = 0.

We direct the scanning flux along the CZ axis and find the shadow contour equation by constructing the envelope of the family of curves (*H*- the parameter of the family, *Z*=*H*). We are define the shadow contour, solving the system of equations and eliminating the parameter *H*: f(X,Y,H) = 0 and $f'_H(X,Y,H) = 0$ [13].

The proposed technique will allow to obtain a shadow contour of a plant object of the plate type. It can be noted that this contour is a closed curve and it is distorted if one considers that the object is moving in space.

The use of the developed models in the recognition of images of plant objects will increase the efficiency of the robotic mechanization means.

2. Recognition of plant objects with theory of graphs

In recognition we can be used, and other sections of mathematics, such as graph theory [14]. In connection with this object can be estimated

formalized description object, such as object structure by plant. We can to consider the graph model that describes the structure of cereal crops (Fig. 1). The edge 8 is the spike of cereal crop.



Fig. 1 – Graph model of cereal crop

Matrices are of the form to representing this plant structure:

								nodes	а	b	С	d	е	g	h	i	j
1	2	3	4	5	6	7	8	а	0	1	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	b	1	0	1	1	0	0	0	0	0
1	0	1	0	0	0	0	0	С	0	1	0	0	0	0	0	0	0
1	1	Ō	1	1	Õ	Õ	Ő	d	0	1	0	0	1	1	0	0	0
0	Ō	1	Ō	1	Õ	Õ	Ő	e	0	0	0	1	0	0	0	0	0
Ŏ	Ő	1	1	0	1	1	Ő	g	0	0	0	1	0	0	1	1	0
0	0	0	0	1	0	1	0	h	0	0	0	0	0	1	0	0	0
0	0	0	0	1	1	0	1	i	0	0	0	0	0	1	0	0	1
0	0	0	0	0	0	1	0	j	0	0	0	0	0	0	0	1	0
	1 0 1 1 0 0 0 0 0 0	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$														

Since get clear mathematical description of the object, such as its geometry, perhaps, but there is a problem of its correlation with the received image. Therefore it is possible to carry out detection of plant does not of the object in general, and on the characteristic elements of the plant, which are peculiar only to this plant. So it is possible to carry out detection of the object in the first two blocks of almost quasi-diagonal matrix of edges and the matrix of nodes of graph-model plant of the object.

In the matrix edges 1 and 2 blocks have the same shape (Fig. 2), only characteristic for this culture. A matrix of points in blocks 1 and 2 are different (Fig. 3), but in subsequent blocks their shape similar to the shape of the block 2. It is for this characteristic can be identified from other cereal crops.
0	1	1	0	1	1
Block 1: 1	0	1	Block 2: 1	0	1
1	1	0	1	1	0

Fig. 2 – The structure of the block in the matrix of the edges

Block 1.	0	1	0	0	Block 2.0	1	1
DIOGR 1.	1	0	1	1	DIOCK 2. 1	0	0
	0	1	0	0	1	ŏ	ŏ
	0	1	0	0	1	0	0

Fig. 3 – The structure of the block in the matrix of the nodes

It is necessary to define the structural regularities that will solve the problem of finding the decisive functions and other recognition task. Thus it is necessary to orient oneself only on the very existence of the structural regularities plant of the object without describing a specific plant. This is the most optimal approach. If it is necessary to take into account the geometric parameters of a particular plant, you need to find out how the described model plant of the object nearly to the real object.

3. Models of plant objects and theory of fractals

There are basic mathematical methods when building models, plant objects. There are methods of analytic and fractal geometry, graph theory [14] – [20]. The choice of mathematical methods are depends on the specific technological process, the research objectives and the capabilities of the software. Possibilities of fractal geometry allow us to construct models of plants with complex geometry.

The properties of fractal found in nature very often, for example, the shore line of the sea, the crone of the tree. There are examples of fractal surface: surface of natural stone slabs, surface of the bark of a tree, stone masonry wall (man-made surface), surface of the stone covered with moss, waterfront, water surface of the fountain (dynamic model), surface of the mountain massif, sharp rocks on the hill (natural surface with a pronounced the fractality).

After analyzing various fractal objects, we can say that there are rough surfaces, which are characterized by bending lines or bulky body, which continuously and dynamically evolve over time, as well as some of the body on the surface or in space, with the shadow loop. That, and the last item discussed in the next section.

4. Recognition of object with shadow contour given that its fractality

Interest in the optical recognition system expanded, which it can be explained by the following reasons:

1. There are provided instant perception, transformation and transmission of information;

2. The non-contact information on a wide range of the object being studied parameters: size, shape, velocity, acceleration;

3. It is ability to operate in work areas without disturbing the process and some of its parameters (configuration of the optical flow, the speed of objects, the direction and velocity of the air, and others;

4. It is good compatibility with on-board software systems;

5. There is compatibility with electromechanical and electrohydraulic control devices;

6. It is the relatively low cost and light weight;

7. There are used laser systems;

8. It is the ability to set in the optical system design.

In the preceding paragraphs we don't take into account the fractal surface. As a sign of recognition, we can be used the variation of the first derivative to the contour of the coordinates.

We show recognition method of on the example of grain heap ingredients. They can be divided into two classes: the seeds and other parts, which include component parts of straw heap.

To recognize the important question of the theory of choice of features that we can be carried out a classification objects. The change in the circuit characterizes the function:

$$\varphi(x) = \frac{dy(x)}{dx} \,. \tag{1}$$

It is exists the contour of the object (a) and curve j (x) (b) in Fig. 4-10.



Fig. 4 – A grain of wheat. Contour functions in the plane Oxy (a) and first derivative (b)

























The shape of the object are studied changes in the contour of the grain heap of components numerically with using function j(x) - function the first derivative of the contour coordinate.

There are several signs of recognition:

1. There are maximum and minimum dimensions of the object;

2. There is the shape of the shadow contour of the object;

3. There is the curve of the first derivative to the contour of the coordinates.

Let us analyze these parameters.

The minimum size of objects b_{\min} to be recognized with the optoelectronic systems. If the system of measurements with the power grid for the unknown object *k* give a minimum size $b_{\min k}$, then at $b_{\min k} < b_{\min}$ the object under study refers to impurities.

If the maximum grain size b_{\max} is in the system when measuring an unknown object obtain the maximum size $b_{\max k}$, then at $b_{\max k} > b_{\max}$ the object under study refers to impurities.

It remains to consider the shadow contour of the object. For unbroken grains circuit it can represented as a continuous monotonic function y = f(x) or y (x, y) = 0. For certain crops monotony can be disrupted, but only at one or more points. In this case, the quantification of the characteristic can be estimated as the jump of the first derivative.

On the contour function j(x), you can determine: what culture is and what impurities exist in the heap.

If we consider the surface, in this case it is necessary to find the derivative of the object function circuit section has two coordinates.

It can be used to recognize and second derivative to the contour of the coordinates of the object. At the points of violation monotony second derivatives traded in infinite.

Conclusion

As a result of this research are ones of the foundations of the theory of optical sensors. It is shown that as feature recognition objects plant can use the variation of the first derivative function circuit by coordinates. It should be noted that the flat lattice energy provide sufficient information that can provide solution to the problem of pattern recognition of plant materials, and components.

One of research is to develop inexpensive sensors that can immediately identify the specific components of plant material having a fractal surface of the object. The fractality of a nature is found not only in plant objects. Such objects are sometimes very difficult to detect, and so we need to pay more attention to the study of fractal geometry.

This study allow to ensure the development of automation equipment in the performance of technological processes of processing of crops.

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ENGINEERING AND TECHNICAL MEASURES DURING CONSTRUCTION IN TIGHT SPACE

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Conceptual solutions for construction in difficult conditions, taking into consideration the tightness of the site and watering of the territory, require special measures of damage protection, as well as the safety of structures during operation. The solution of the problems of the organization of water removal, planning of the territory is achieved by cutting off the top layer of the soil and geotechnical preparation of soil foundations, where the occurrence of hazardous processes will be minimized. The implementation of special measures for the protection and safety of drainage system (bed drainage), their construction and further operation in conditions of complicated terrain and tightness oh the site are the most important tasks during construction.

Keywords: tightness of the site, cluttered urban environments, watering, rugged topography, complicated topography, complicated terrain, bed drainage, drainpipes, retaining wall or structure, vertical slope, water removal, trench drain, soil anchor, bore piles.

Introduction

Vladivostok is known for its rugged topography. Cleves of hills and glens make complexity during construction. Along with the difficult topography, one has to face great difficulties during construction in the conditions of existing housing namely cluttered urban environments or tight space of construction works. Besides of these factors, often during making of construction pits in urban areas, problems arise associated with watering the construction site. Watering the construction site can be caused as presence of groundwater as heavily atmospheric precipitations. In the varied terrain on which the city is located all these factors can act simultaneously.

The problem of structural construction (in particular, a high block building), taking into consideration the tightness of the site, rugged topography and watering with groundwater, is one of the most relevant in the implementation of master plans for the development of cities and countryside. The article discusses options for solutions for the erection of construction objects in these geological conditions.

The purpose of this article is to describe the experience of erecting building structures (a high-rise building, in particular) in difficult geological conditions, taking into consideration the tightness, difficult topography and watering of the territory with ground and atmospheric waters. The article proposes a solution of the complex problems encountered during the construction of this type of projected facilities.

Information about the construction site

The construction site is located on the Northern cleve of the hill, in the slope collar of the glen. The site is bounded above and below by city roads with heavy traffic. On the right, these roads connect, to the left of the site is a high block building. Added to this tightness is the high watering caused by the presence of a significant volume of groundwater and difficult geological conditions. (see the fig. 1).

Geotechnical conditions of the construction site

In the construction zone, there are three underground water horizons can be traced: in the bottom of the fill soils, in the deluvial-proluvial sediments of the buried glen, and in the top of the rocky soils. In the bottom of the fill soils, the groundwater level appears at a depth of 4-6 m from the surface of the earth, and on the slope of St. Shilkinskaya - at a depth of 6-11 m. Here, on the construction site, the entire surface runoff of the glen is concentrated, which is unloaded along the bottom of the fill soils. Temporary perched ground water forms almost a water table, a solid horizon and unload into the channeled conduits stream under the Square and the Third Rabochaya road ring.

The groundwater of the buried glen is drained as along rubble interburden in the mass of loams and rubble soils as along the talweg of the glen. These gravity waters are also drained into a canalized stream bed, which is located above the railway tunnel on the Third Rabochaya ring. These gravity waters are also drained into the channeled conduits stream, which is located above the railway tunnel on the Third Rabochaya road ring.



Figure 1 – Sketch of the construction site

Fissure waters of rocky soils also form a solid horizon. In some cases, a local pressure of water is up to 4 m, this water is unloaded into the glen of the Third Rabochaya, at the mouth of the railway tunnel. The level of fissure waters of rocky soils is marked at a depth of 8-11 m from the surface of the earth, it is below the road level.

Engineering measures

The construction and operation of buildings and structures in difficult geotechnical conditions requires the use of special protection measures, which are reduced to providing the minimum allowable level of damage of construction. Most often, this is a special geotechnical preparation of soil foundations of objects, eliminating the potential causes of hazardous processes in soil or preventing their progressing, as well as adaptation of building structures to work in difficult soil conditions.

To prevent the negative impact of groundwater during the preparation of the construction site, the top layer of soil (inhomogeneous fill soil) was cut off. The second layer – loam, sandy loam, clay from hard-plastic to hard consistency, was partially cut off in some parts of the construction site. The rest of the soil layers were used as the base of construction without changes.

Thus, a pit 200m x 60m in size is formed, bounded on both sides by vertical slopes from 5 to 14 m high. So, the main task was to strengthen the vertical walls and organize the drainage of groundwater coming from the stripping site.

In the process of preparing the pit to strengthen the vertical slope, an enclose structure was proposed from bored reinforced concrete piles with a diameter of 450, 600, 800 mm located with a step of 1000, 800 and 600 mm. The pile length ranges from 5400 mm to 21400 mm. A schematic structural diagram of a retaining wall with soil anchors is shown in Figure 2.



Figure 2 – Schematic structural diagram of a retaining wall

The piles are reinforced with reinforcement cages and combined into a single structure using a monolithic reinforced concrete protecting pressure wall 200 mm thick.

Calculations have shown that anchors are required for retaining walls

of such height. The number and location of the anchors depends on the height of the wall, which varies along the length of the pit. Provided from one to five tiers of soil anchors. On every level of the soil anchors, framing beams of a cross – section are arranged from two identical channel – bars, united by connecting plates. It provides the transfer of forces from the retaining wall to the soil anchor.

To ensure the durability of the structure and protection against corrosion, the framing beams are concreted when concreting the pressure wall. The project is provided using of monolithic reinforced concrete of class B25.

The drainage pipes along the height of the retaining wall are provided for load removal from the pressure of groundwater. For an organized drainage of seepage water along the retaining wall, a trench drain is provided, arranged at the level of the site planning.

The issue of organizing the drainage of rainfall from the construction site is of particular importance, since the city is located in a zone of sufficient moistening, and the projected facility is at the foot of the slope, where rainwater is collected from the surrounding.

One of the solutions in the organization of drainage is the ground leveling of a construction site with a general flat slope towards the road, from where surface water is organized in a storm sewer system in the area of the Third Rabochaya.

Conclusions

Construction in such specified engineering and geological conditions has a complex of difficulties described above. For maintenance of work on the construction site, it is necessary to carry out special preparatory measures. Drainage of water in tight space and difficult topography during construction are the most important tasks, since this factor is of key importance in the safety of construction of the structure, as well as future operation.

Subsequently, during the construction of the facility on this site, as a drainage scheme of the site was proposed a bed drainage system consisting of collecting perforated cement-asbestos pipes. Preparation for drainage pipes is carried out in accordance with the regulatory documents for the installation of drainage systems.

Thus, the work shows the organization of the construction site in conditions of the high watering by ground and surface waters, and also proposes a variant of strengthening the vertical slope with a wall of bore piles of different diameters and lengths depending on the changing relief along the length of the construction site.

NOTES

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