



Conference materials
of the II All-Ukrainian scientific
and practical conference
of young scholars and students

MODERN SCIENTIFIC AND TECHNICAL RESEARCH IN THE CONTEXT OF LINGUISTIC SPACE (IN ENGLISH)

Dnipro
May 11, 2023



Oles Honchar Dnipro National University
Faculty of Ukrainian and Foreign Philology and Study of Arts
Department of English Language for Non-Philological Specialities

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For students, post-graduates, teachers of higher educational establishments and scholars.

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*Iryna Popova,
Doctor of Philological Sciences, Professor,
Dean of the Faculty of Ukrainian
and Foreign Philology and Study of Arts,
Oles Honchar Dnipro National University*

**WELCOMING SPEECH TO THE PARTICIPANTS
OF THE II ALL-UKRAINIAN SCIENTIFIC AND PRACTICAL
CONFERENCE OF YOUNG SCHOLARS AND STUDENTS
“MODERN SCIENTIFIC AND TECHNICAL RESEARCH IN THE
CONTEXT OF LINGUISTIC SPACE (IN ENGLISH)”**



Dear conference participants!

I warmly welcome you with the start of the academic forum! After all, despite the difficult conditions of nowadays, in particular, the military aggression against Ukraine, the staff of the Department of English Language for Non-Philological Specialities has continued the annual established tradition and organized the II All-Ukrainian scientific and practical conference of young scholars and students “Modern Scientific and Technical Research in the Context of Linguistic Space (in English)”.

I am convinced that with regard to Ukraine's acquisition of the status of a candidate for EU membership, learning and teaching foreign languages is relevant and extremely important nowadays, as a new socially significant demand has already been formed in the modern society – fluency in a foreign language for students of any speciality. Knowledge of a foreign language, in particular, English,

contributes to the mobility of Ukrainian students and their direct involvement in the global informational and educational space.

The main aim of the conference is to theoretically substantiate the need for studying foreign languages in the socio-economic, scientific, technical and general cultural spheres of human activity, as well as to present the intellectual achievements of our young scholars and students in English. Thus, the formation of a multilingual personality with creative thinking is a dominant task for the staff of the Department of English Language for Non-Philological Specialities of Oles Honchar Dnipro National University.

The lecturers of this department have considerable experience in teaching foreign languages and must undoubtedly move forward, taking into account current trends and requirements for mastering foreign languages in the conditions of globalisation. This is directly associated with the competitiveness of a modern specialist, which is determined not only by high qualification in the professional sphere, but also by the ability to perform appropriate professional tasks in terms of multilingual communication. And the main thing in teaching English to students of non-philological specialities is taking into account the specific features related to the future professional activity of today's students.

The schedule of II All-Ukrainian scientific and practical conference of young scholars and students “Modern Scientific and Technical Research in the Context of Linguistic Space (in English)” includes the work of four sections focusing on the discussion of the following main issues: 1) the latest studies in the sphere of natural sciences; 2) topical issues of social sciences and humanities; 3) modern research in the sphere of socio-economic sciences and information technologies; 4) actual problems of engineering and technical sciences and modern information technologies.

I sincerely wish the participants and organizers of the conference inspiration, constructive work, peaceful skies and Victory!

PANEL 1

Modern Studies in the Sphere of Natural Sciences

(DNU, Zoom)

M. Bondarenko, S. Kopteva, O. Posudiiievskia

THE USE OF ANABOLIC STEROID DRUGS IN SPORTS AND EVERYDAY LIFE

The problem of steroids is extremely relevant in the modern world, as it is evidenced by the publications of the recent years. For example, in the Web of Science Core Collection database from the beginning of the year 2023 to March 9, 2023, 809 references were found, and during the year 2022, 10,509 records were found. Among them 1,851 publications are review articles. Statistics by fields of research for 2022-2023 are shown in Fig. 1.

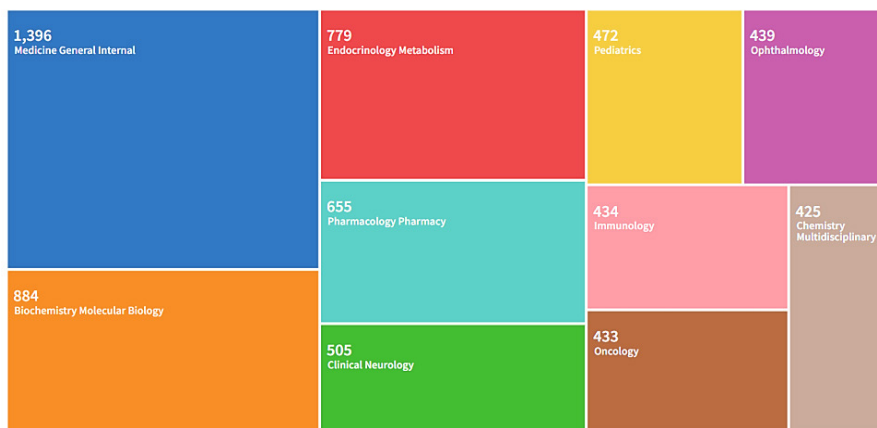


Fig. 1 – Statistics by fields of research for 2022-2023

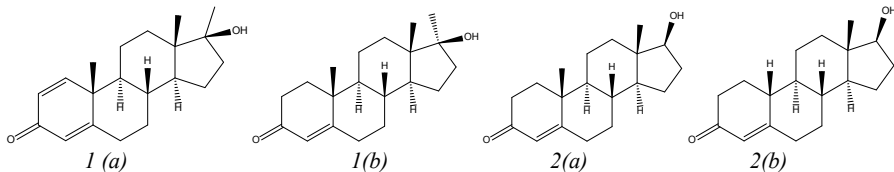
We were interested in the problem of anabolic steroids, which is also widely researched, in particular, in WOS during 2022-2023, 271 papers were devoted to

this problem, which presented research in such fields as analytical chemistry, pharmacology pharmacy, general and internal medicine, biochemical research methods, paying special attention to endocrinology metabolism, biochemistry and molecular biology, sports sciences.

Accurate, simple and rapid determination of anabolic androgenic steroids (AAS) is increasingly appearing at the forefront of scientific and social interest, not only because this group of substances is abused by athletes to gain a competitive advantage, but also because the fact of their abuse is generally accepted [1]. People are always looking for the easiest ways to achieve their goals. AAS consumers are usually united by the desire for an ideal figure, confident behavior and a better social status. However, they often ignore the possible adverse consequences and the seriousness of their actions, and even if they know about them, they are willing to take risks. These include possible behavioral changes, anxiety, increased aggressiveness, hepatotoxicity, cardiotoxicity, abnormalities of the reproductive system etc. It is also worth noting that, on the other hand, AAS have therapeutic potential and cannot be easily replaced by other drugs in a number of conditions, such as wasting syndrome, severe burns, muscle and bone damage, anemia, and hereditary angioedema [1] The problem of the use of doping is gaining more and more scope [3], there is also the problem of the use of anabolic androgenic steroids by manufacturers as undeclared ingredients in dietary supplements. Chemical means that contribute to the growth of muscle mass and rapid recovery of the body are being improved, however, in contrast to this process, the methods of determining AAS in various objects are being upgraded as well. The development of fast, portable and sensitive methods for determining AAS has become the subject-matter of the majority of recent research.

Standard methods, commonly used for the determination of AAS, include liquid and gas chromatography combined with mass spectrometry. Currently the scientific focus has shifted to the development of new, tailored approaches leading to cost-effective, routine and portable methods for the determination of AAS in various matrices, such as biological fluids, food additives, meat, water or other environmental components [1]. Automated online methods of preparing dry blood

samples for screening and quantitative analysis of esters of anabolic steroids and methods of combined analysis are considered in modern studies [2, 5]. The authors [6] optimized the conditions of chromatography and mass spectrometry for the simultaneous detection of 93 anabolic steroids in solid and liquid food supplements.



*Fig. 2 – Common oral and injectable AAS:
1–17-alpha alkylated steroids (a – Methandrostenolon; b – Methyltestosteronum),
2–17-derivatives of beta-esters (a – Testosterone; b – Nandrolon)*

What are the positive effects of steroids on the body?

The positive effects include: anabolic (increase and strengthening of muscle tissue), anti-catabolic (quick recovery of the body due to a decrease in the proportion of lost protein), energetic (alleviation of fatigue due to energy accumulation, influx of strength and wine).

What are the negative effects of steroids on the body?

Anabolic steroids, according to Swedish studies [4], disrupt the action of the pituitary gland and thyroid gland, which is associated with the inhibition of the gonadal regulatory apparatus and the conversion of testosterone into estrogens (aromatization). This leads to hormonal disruptions and is accompanied by mental disorders (aggressiveness and irritability, a decrease in self-control), baldness, or, on the contrary, hairiness, obesity, a decrease in the tone of voice, and the appearance of acne. The use of AAS can cause such psychiatric symptoms as insomnia, anxiety and increased aggressiveness.

Also, anabolic steroids have a hepatotoxic effect, which can lead to the damage of kidneys and the appearance of gastrointestinal disorders.

Thus, anabolic steroid drugs should not be used by athletes, moreover – by people who are not professionals in sports. Only physical labor and strong will of a person can change his athletic performance for the better.

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G. Diadchenko, V. Shchevtsov, N. Kaliberda

PROACTIVE WAYS TO STRUGGLE WITH GLOBAL WARMING

As humanity uses more and more energy in its daily activities, it converts it from active forms to thermal ones, polluting the environment with heat and increasing the average global temperature [4]. Both active and passive measures are used to address the problem of global warming, but most often it is a matter of reducing energy consumption and switching to energy-saving technologies. Such options are reminiscent of the «technology of combating food shortages» by reducing its consumption. In essence, the problem is not to reduce the amount of energy consumed, but to maintain a constant temperature, which is possible in the balance of incoming energy and energy released into outer space [2, p. 426-428]. Therefore, as the supply of energy increases, it is necessary to consider options for its transmission into space. One solution is suggested by nature itself. In a calm atmosphere, heat is transferred by diffusion, and it takes a certain amount of time for

it to be transported from the Earth's surface to the outer layers of the atmosphere [1]. In this case, the temperature of the flow gradually decreases, and the amount of heat is radiated in proportion to the temperature in the fourth stage.

In order to cool the water in the glass faster, we stir it and make it turbulent. The temperature of the outer layers of water gradually increases and they begin to give off their heat. Increasing the power and frequency of the formation of such natural structures as hurricanes, typhoons, and cyclones allows us to move the atmosphere quickly and on a large scale and release excess heat into space [3, p. 3-5]. But this purely natural process, as recent studies have shown, is not enough to maintain the heat balance and is also associated with devastating consequences for human life.

As a result of the analysis of the current situation, it is proposed to «correct and enhance» natural processes to solve the problem of «global warming». One of the active means may be the installation of super-powerful fans in deserts that would generate and direct overheated air into the high atmosphere with the formation of vortex structures to both dissipate heat and draw in more humid air from the seas and oceans, and form clouds that would reflect part of the sun's rays into space. The eco-fans will be powered by solar energy, which will also reduce the temperature of the desert.

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WAYS TO OVERCOME THE RESISTANCE OF MICROBES TO ANTIBIOTICS

Without a doubt, antibiotics made a huge impact on population of people and our health. The risk of being unprotected against microbial diseases rises with each year, the overuse and incorrect use of antibiotics led us here. But what exactly do microbes do to protect themselves? There are 3 major mechanisms they use: β -lactamase inhibitors, efflux pump inhibitors (EPIs) and membrane permeabilizers.

β -lactam antibiotics inhibit proteins involved in peptidoglycan synthesis that is a part of cell wall of gram-positive and gram-negative bacteria. Penicillin and cephalosporin belong to this group of antibiotics, they are also most widely used in the world. Microbes use special enzymes against these antibiotics and were called β -lactamases. The latter divides β -lactamases into four distinct classes, termed A, B, C and D, identified on the basis of specific sequence motifs but also distinguished by fundamental differences in hydrolytic mechanism [1, p.3474]. There is another division in which classes A, C and D use serine as the reaction nucleophile and hydrolyze β -lactams via a covalent acylenzyme intermediate. Class B is in the metalloenzymes group, according to their name they use metal-activated water nucleophile to initiate hydrolytic reaction. To counter these enzymes, we use β -lactamase inhibitors. Currently available β -lactamase inhibitors only work against serine β -lactamases, whereas metallo- β -lactamases continue to spread, evolve, and confer resistance to all β -lactams, including carbapenems [2, p.1].

However, there are some means hospitals can use against classes A, C and D. Clavulanic acid has been shown to be very effective since discovery. Also, penicillin-inhibitor combinations are widely used, but they do not have that big spectrum of activity. *Klebsiella pneumoniae* carbapenemase (KPC) is a microbe with class A enzymes that caused a disaster in USA when it first occurred in hospital in 2011. Fortunately, the disease disappeared as quickly as it appeared, but doctors are still

worried about antibiotic resistance of microbes. Nowadays, we can treat KPC with combinations of antibiotics and inhibitors, but this therapy may do harm to a patient. New group of drugs called diazabicyclooctanones (DBOs) and avibactam was the first β -lactamase inhibitor in this group and the first great success to DBOs. Avibactam is another drug that works on A (including KPC), C and D classes. In addition, there are cases when avibactam was a weak inhibitor for class B. Avibactam is a mechanism-based non- β -lactam β -lactamase inhibitor, based around a bicyclic core structure, that is able to acylate the active site of serine β -lactamases in a reversible manner [1, p. 3489]. The success of DBOs has led to creating and developing alternatives of avibactam. Vaborbactam β -lactamase inhibitor contains boron and has a cyclic structure. In future we might see more boronate-based compounds inhibitors, because vaborbactam with antibiotic meropenem was effective in treatment of urinary tract infections caused by microbes with class A enzymes. They also have a potential to deal with class B for which we do not have strong inhibitors. Also, phosphonate-based compounds have been shown to inhibit some class B enzymes.

Other ways of fighting resistant microbes include strong, antibiotics like colistin, new drugs and absolutely new methods. Colistin is antibiotic that always considered with neurotoxicity and nephrotoxicity but side effects are reversible after cessation of the drug. Some scientists think colistin should become a first-line treatment for carbapenem (commonly used antibiotic) resistant gram-negative microbes such as *Enterobacterales* and *Pseudomonas aeruginosa*. It is hard to detect microbes sensitive to colistin that why antibiotic is used rarely and the second reason is earlier mentioned toxicity. The use of colistin in CR-GNB infections should be patient-specific [3, p.5]. New antibiotics are currently in clinical trials, they are designed for multidrug resistant bacterial strains, especially for *Neisseria gonorrhoeae* and *Clostridium difficile*. They include tetracycline derivatives (eravacycline), fourth generation fluoroquinolones (delafloxacin), new combinations between one β -lactam and one β -lactamase inhibitor (meropenem and vaborbactam), siderophore cephalosporins (cefiderocol), new aminoglycosides (plazomicin), and agents in development for treating drug-resistant TB (pretomanid) [4, p.1]. Without a doubt,

people should have more alternatives and not only in drugs but in approaches to treatment. Nanoparticles are considered for delivering antibiotics without activation of enzymes. In one experiment (2018) there have been constructed rhamnolipid-coated silver and iron oxide nanoparticles, they have shown to be effective against *S. aureus* and *P. aeruginosa* biofilms. Microbes evolve so fast that it's hard to be ahead of them for us, but viruses will remain the fastest to adapt. We can use bacteriophages (viruses of microbe) to target specific pathogen, this way no harm will be caused to patients. There are a lot of documented cases of phage therapy treatment. The main problem of this therapy is delivery of phages to microbes, many factors influence phages before they get to pathogen. Despite the fact that bacteriophage therapies are safe for a patient, none of them are approved by FDA. Microbes and phages are natural rivals, they both compete for existence and microbes developed their own defensive mechanism, one of them is CRISPR-Cas system. CRISPR-Cas systems are able to edit genome, they are used to create genome modified organisms (GMO). A number of CRISPR-Cas systems have been recently investigated as alternative antibiotics by reprogramming them to target bacterial DNA/RNA [5, p. 10]. In several experiments CRISPR-Cas system was delivered to multidrug-resistant bacteria and *Staphylococcus aureus* by bacteriophages and bacterial plasmids, the result was a success in both cases.

To sum up, antimicrobial resistance to antibiotics is a serious problem humanity faces right now. We already understand the mechanisms that give microbes protection from antibiotics like β -lactamase enzymes. They fall into 2 major groups serine- β -lactamases (classes A, C and D) and metallo- β -lactamases (class B). Currently we do not have anything better than avibactam to inhibit class B. However, different combinations of antibiotics and β -lactamase inhibitors are used against classes A, C and D, like clavulanic acid, penicillin-inhibitor, the same avibactam, boronate-based and phosphonate-based compounds. Other methods should be also considered in new era of antibiotics: usage of strong and slightly dangerous antibiotics (colistin), bacteriophages that are safe but hard to deliver and finally CRISPR-Cas systems to modify genome of microbes.

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L. Filins'kyy, O. Drobakhin, O. Hurko

EXPERIMENTAL SETUP FOR THE STUDY OF LIQUID FOAMS

Many new publications in the study of the propagation of electromagnetic waves different ranges in foam structures bring a growing interest for specialists [3]. For example, S. Kharkovsky, F. Hepburn, J. Walker and R. Zoughisolved many problems with foam coatings for modern space shuttle using millimeter waves [6], V. Alekseev, O. Drobakhin and L. Filinsky describe the possibility of using the millimeter ranges in practical study of foam for possible applications [1].

Very important problems of the technique for measuring and calculating the dielectric properties ϵ and $\tan \delta$ in foam plastic samples located in sections of rectangular waveguides the author reviewed in [4].

V. Neagu in his work draws the readers' attention to various issues related to foam that he solved. In particular, he pays a great attention to the equipment and methods of microwave quality control of the used foam [7].

In the microwave range of 8-12 GHz, based on the experimental data were calculated value of the reflection and attenuation of electromagnetic waves in work [5].

The samples of a multilayer structure of foam model were consisted of seven layers with different dielectric characteristics. The layers were of different thickness.

"Foam caps" in work [2] have demonstrated formation of various foam structures on the surface of seas at wind speeds more than 7 meters per second.

It is very important to study the interaction of electromagnetic waves of various ranges with foam formations on the sea surface because it helps to monitor the movement of "foam caps", for weather prediction and control movement of boats, ships, submarines, which create huge traces of foam in case of their moving. These traces are well detected from aircraft and from space.

The aim of our research is to investigate the microwave propagation through the foam structures in the range from 1 to 1250 MHz of the foaming ratio 10–85 units. There are still practically no publications on this very urgent topic.

Foam is a liquid and gas mixture, water foam as usual is a static mixture of air and water. One of the main value of foam is the foaming ratio, which means the ratio volume of the mixture (foam) to the volume of foaming liquid (water).

Since the foam is constantly destroyed at a certain speed, it is necessary to measure the parameters of the foam faster than the structure of the foam changes. To do this, one must use the appropriate devices.

In our case, to study foam structures in the decimeter frequency range, a device was used to measure the frequency characteristics of coaxial devices in the range of 1-1250 MHz, on the basis of the device type R4-11, which is shown in Fig. 1.

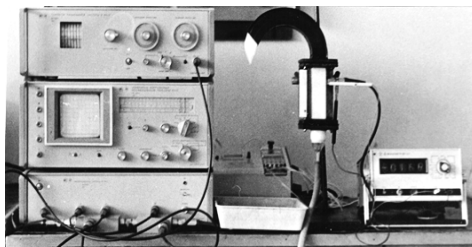


Fig. 1 – Experimental setup for the study of foams

In the operation of that device, the developers laid the principle of selecting reference and measuring signals that carry information about the parameters of

the measurement object. The device for measuring reflection parameters consists of the following main parts: oscillating frequency generator, indicator block, frequency conversion unit and microwave nodes.

The operation of the device when measuring reflection parameters is carried out as follows. The microwave signal from the swept frequency generator is fed to the frequency converter unit, where it is converted into two signals shifted in frequency by 100 kHz relative to each other. One of the signals through the microwave nodes arrives at the measuring cell.

With the help of microwave nodes, signals are selected that are proportional to the voltages of the incident and reflected waves. These signals are fed to the mixers of the reference and measuring signals, where the reference signal is fed, shifted in frequency by 100 kHz.

After the mixers, signals with a frequency of 100 kHz enter the dividing circuit of the indicator unit, where the amplitude ratio is measured, and the phase difference is measured using a phase detector. After the detectors, the constant component of the voltage is fed to the screen of the cathode ray tube, where the characteristics under study are observed.

To determine the frequency at which the measured parameter is counted, a resonant frequency meter is used, which is built into the swept frequency generator, the mark of which is observed on the screen of the cathode ray tube.

When measuring the transmission parameters, in our case, attenuation, the connection scheme of the microwave nodes is modified. In this case, the output signal from the frequency converter unit is divided into two arms using a tee of reference and measuring.

In Fig. 2 is presented the strip line as the basis of the measuring cell for the study of foams, where there is an opportunity for the free movement of the foam flow.

It was designed with the main demand for distance between the bases of the strip line to be less than half of the working wavelength.

The signal from the reference arm goes directly to the frequency converter unit, and the signal in the measuring arm first passes through the measuring cell.

The further path of the signals in the frequency converter block is the same as when measuring the reflection parameters.

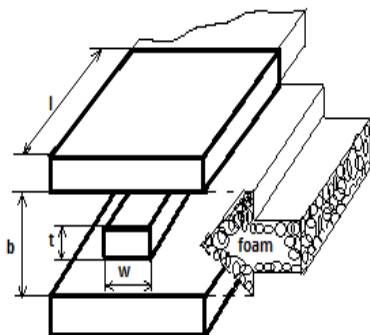


Fig. 2 – The strip line as the basis of the measuring cell for the study of foams

For the foam samples formation in the measuring cell, a foam-forming liquid is supplied inside it by the pump and at the same time air from the compressor. The air that passes through the foam generator's porous filter and foaming liquid layer forms the samples of foam structure.

The resulting foam rises through the cell, half of which goes into a channel with a strip line, and the other half passes through a transparent compartment, where its resistance was photographed and measured. The structure of the resulting foam depends on the change in the flow rate of air and foaming liquid, as well as on the porosity of the foam generator filter.

The image of a quasi-homogeneous foam sample structure is presented in Fig. 3. The diameter of inhomogeneities in the form of bulbs is in the range of 0.2–1 mm, the shape of the bulbs is spherical. This photo was taken at the initial moment after the formation of foam.

In the stationary mode, when the foam generation stops, the structure of the foam changes over time, the diameter of the bulbs increases, the neighboring bulbs combine, the thickness of the wall films decreases, the volume of the foaming liquid in the films, in the Plato-Gibs channels and the joints of the bulbs decreases.

This is due to the process of liquid outflow under the action of gravity from its upper layers to the lower layers of the foam.

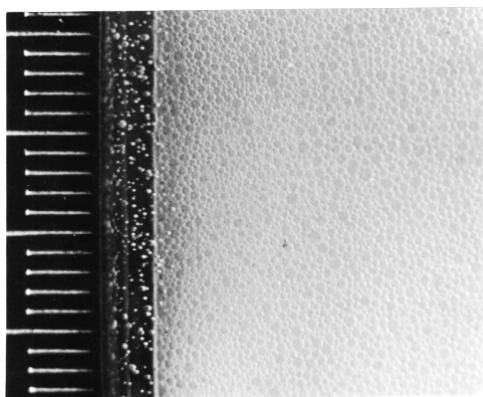


Fig. 3 – Image of the structure of a quasi-homogeneous foam sample

In fact, this is the process of destruction of the initial foam structure. From a spherical shape, the foam turns into a polyhedral one; from a quasi-homogeneous one, it takes a shape with a wider range of bulb sizes. Yes, these are no longer bulbs, but polygonal honeycombs with thin wall films, thin Plateau-Gibbs channels and multifaceted nodes with a small volume of liquid.

If the outflow rate is maximum in the initial period, then the process slows down with time. The destruction process also slows down, the stability of the foam structure increases. This is the period of medium foam destruction. Further, the foam ratio increases, and over time, the foam becomes “dry” and completely disintegrates.

The study of the propagation of electromagnetic waves in such dynamic structures is rather complicated. The issues of reflection, scattering, absorption and transmission require considerable time and the development of acceptable measurement methods.

First of all calibration of the measuring setup and, in particular, the measuring cell, measurements of VSWR values in matched load mode for dry cell, distilled water as a measuring sample and foaming agent as a sample

was carried out. The measuring cell was made with high quality, it is well matched over the entire operating range and has no inhomogeneities, the VSWR is somewhat greater than 1. Both water and foaming agent are similar in characteristics, at a frequency of 20, 470 and 960 MHz. They have resonances of the absorption of the reflected power on the thickness of observed samples. So the range of dielectric permittivity of samples was from 1 to 80 is almost completely available for research.

As far as lifetime of the samples was from 12 to 20 min, it was quite enough to have time to carry out VSWR measurements before the foam is significantly destroyed.

Absorption resonances of the reflected power on the thickness of the samples in the region of 330 -540 MHz were found. It was also found that when the foaming ratio of the foam increases, the resonance absorption frequency also increases. This addition can help in determining the dielectric characteristics of the foams.

It was dependence of VSWR on foam ratio β from agent PO – 4 in short circuit mode with addition of 1%, 4% and 6% salt for ratio ranges from 10 to 15 units, from 30 to 35, and from 50 to 55 units.

The measurement data error was within 10 percent due to the constant destruction of the foam structure. Measurements can be made more accurate for foam life of more than 40 minutes and above.

As a result of the research, a symmetrical stripe cell was developed, which, in combination with a VSWR and attenuation meter, makes it possible to study the reflection characteristics of liquid foam samples with a dielectric constant in the range from 1 to 80 in the frequency range from 1 to 1250 MHz.

The measurement results show that foam structures can significantly reduce the reflections of electromagnetic waves from metal surfaces in the investigated range. So, in combination with salt additives, it is possible to achieve VSWR less than 10 in the range of 400-1250 MHz with a sample thickness of more than 4 centimeters.

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D. Halapsis, T. Khodanen, N. Kaliberda

STABLE ATMOSPHERIC PLASMA OVERVIEW

Plasma stability in a gaseous environment is determined by the time during which its body is able to exist after the power source was disconnected and in the absence of strong external magnetic fields. Hence, the initiation phase, in particular, the methods of initiation play the crucial role in the process. Among the existing technologies, the most popular is perhaps an electric arc, subjected to certain electromagnetic manipulations, aimed at creating favorable magneto dynamics. Other used techniques are foil explosion, capillary plasma injection, etc. Atmospheric pressure, however, alters the experiment significantly, and few descriptions of stable plasma configurations at pressures comparable to atmospheric pressure.

The magnetic component, which causes the plasma body formation, can be either external or produced by the arc itself. An example of the latter was described

in [1] and was created in partial atmosphere of 0.1 to 10 Torr (0.013 to 1.31% of atmospheric pressure). A DC discharge was formed between two metal electrodes, and then the electric current was slowly increased, forming a strong Coulomb force, acting on the outer electrons of the arc.

$$F_{containment} = \frac{e^2}{\epsilon_0 k_0 d_i^2}$$

where e is a particle charge, ϵ_0 is the electric field permeability, k_0 is the spacing between orbits, d_i is the ion distance.

Formula, used in [1] to approximate the magnetic field, created by the arc:

$$B = \frac{\mu_0 eV}{k_0 d_e^2}$$

where V is the electron velocity, d_e is the electron distance, μ_0 is the magnetic permeability.

This effect causes the electron rotation around much slower ions, and the toroid is able to withstand the conditions of the gas medium for a considerable amount of time. The resulting form of the ionized gas was a spinning toroid of a 0.002 m radius, dissipating after a record time of 200 milliseconds. The preferable aspect ratio, according to the paper [1], is 3:1. The research team proposes this model as a potential explanation to the ball lightning phenomenon.

Capillary injection is another widespread plasma source. A coaxial plasma gun, described in [2], relies on a series of radially symmetrical plasma jets, located at the rear end of a coaxial accelerator. This setup also forms a toroid. It operates under the pressure of less than 10^{-5} Torr, and yet the main engineering challenge is the necessity of a sufficient insulation, which causes such deep vacuum. Nonetheless, the plasma density in the article [2] is 10^{17} cm⁻³, which is considered high even for atmospheric conditions [3, p. 2]. Consequently, such calculations rely on the liquid plasma model, which covers the factor of neutral particles collisions. Exploding foils approached was also mentioned in [2] as equally effective, but it is much less practical. The optimal toroid ratio for the conditions, described in this paper, is no more than 2:1. High plasma stability is reached inside the accelerator by passing large currents through the plasma body. Apart from coaxial accelerators, there are other geometries in existence,

for instance, two parallel plates that also hold a great charge and transport it through the plasma, providing its stability and acceleration.

According to [4], a sufficiently ionized and stable plasma (regardless of the medium) must be dominated by magneto dynamic equations, instead of aerodynamic ones, which exist in the atmosphere. The liquid plasma model is an accurate approximation for highly collisional plasmas, however, it is not always applicable, as shown in [1], where the effects of the liquid plasma theory were not significant enough, and a single particle approach was seen as an acceptable approximation.

Finally, there are many methods of improving the qualities of the DC arc, possibly the most notable one is the field emission theory. However, it is not accurate for large electrode areas; in this case, the predicted emission current is much smaller than experiments show [5, p. 31–32]. It is supposed that microscopic topology of the electrode surface (around 1 micron in height) is the reason for this effect, and it can multiply the average electric field by a factor of one hundred or more. Formulas for the field enhancement β for hemispherical electrode and electric field F are also provided in [5]:

$$\beta = \frac{H}{R} + 2$$

$$F = \beta \frac{V}{d}$$

where H is the hemisphere height, R is the hemisphere radius, V is the voltage, and d is the gap length.

The practical application of such geometrical protrusions remains a challenge though, due to their unstable form, subjected to the arc influence.

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O. Inkin, V. Bilozorov, Yu. Honcharova

USING NEURAL NETWORK MODELING FOR THE DIAGNOSIS OF EPILEPSY BASED ON ELECTROENCEPHALOGRAM RHYTHMS

Epilepsy affects about 50 million individuals worldwide and is characterized by sudden seizures caused by abnormal electrical activity in the brain. The electroencephalogram (EEG) technique [1] is used to quantify the increase in brain activity during epileptic seizures, and neurologists analyze EEG recordings to identify different stages of epilepsy. However, this approach can be time-consuming and laborious, necessitating an automated epileptic seizure prediction system.

To address this, a neural network model for epilepsy control using the Long Short-Term Memory (LSTM) method has been developed [2]. The goal of my project is to create an automated seizure prediction and control system that can assist patients and healthcare providers in managing the condition. To ensure the effectiveness and reliability of my model, I am training it on the real patient data, both with healthy EEG readings and those diagnosed with epilepsy.

LSTM is a type of Recurrent Neural Network architecture that has been successful in time-series data analysis. To compare the effectiveness of different LSTM implementations, including LSTM for Regression Using the Window Method, LSTM for Regression with Time Steps, and LSTM with Memory Between Batches, I conducted experiments using data from the Boston University dataset. My findings indicated that LSTM for Regression Using the Window Method achieved the lowest error rate, while LSTM with Memory Between Batches showed the highest

error rate. In contrast, LSTM for Regression with Time Steps yielded moderate results but required the least amount of computational resources.

To demonstrate the effectiveness of my proposed LSTM model, I included an example of a healthy patient's EEG signals in Fig.1, and my model's predictions matched the actual EEG signals, indicating its potential for accurately predicting epileptic seizures. With the increasing incidence of epilepsy worldwide, innovative approaches such as my LSTM model may help manage this condition more effectively.

The further development of the research lies in this field.

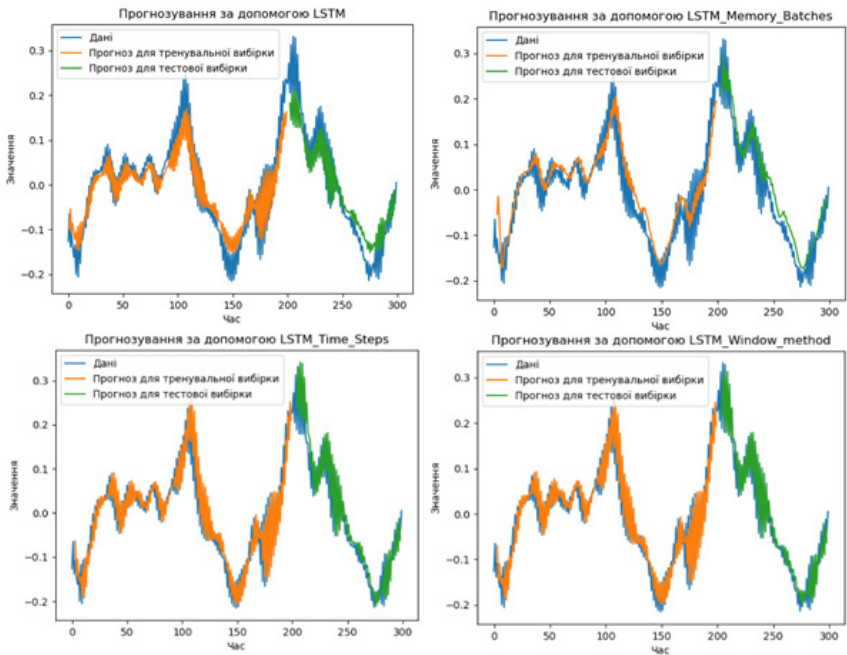


Fig. 1 – Comparative graphs of the performance of different LSTM methods on the same data

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PROCESSUAL FEATURES OF THE DIVORCE PROCEDURE

The formation of Ukraine as a sovereign and independent state is accompanied by the creation of a new legal framework for modern society, which requires not only the systematization of existing legislation, but also the need for in-depth scientific research in the field of family relations and their legislative regulation.

The importance of family relations is determined by the fact that the family affects the development of society, its moral health and is one of the factors of increasing people's social activity. It is worth to emphasize that the foundations of a person's character, his attitude to work, moral, ideological and cultural values are formed in family. Therefore, every society is interested in a strong, spiritually and morally healthy family.

The family as a social entity was the most important element of development in all civilizations. The ideology of family priority, its inevitable value for man and society is enshrined in many normative acts. One of the main provisions of these documents is the strengthening and protection of family institution of the by society, the development of a national family policy.

The importance of proper regulation of the termination of marriage has increased dramatically today with the adoption of the Family Code of Ukraine, which entered into force on January 1, 2004. In this regard, the institution of termination of marriage has undergone significant changes, has been replenished with many novels that require detailed study and in-depth research.

In connection with the increasing number of terminated marriages, many problems related to termination of marriage arise in the practical activity of lawyers. Such a situation requires the systematization of knowledge in this area, the search for new solutions that would allow to approach the solution of issues related to the termination of marriage at the modern level. All this makes it necessary to study the grounds, order and consequences of the termination of marriage, study

the experience of legal regulation of these issues in other countries, as well as determine the conformity of the norms of the current legislation of Ukraine with the urgent needs of practice.

Ideas about the institution of termination of marriage have changed significantly in different eras. In ancient Rome, divorce was considered as a civil act that did not require a special procedure. Ancient legal sources make it possible to conclude that despite the effort to establish specific grounds for divorce in antiquity, it was relatively simple and often depended on the will of the spouses.

In medieval Europe, the termination of marriage according to canonical ideas was either considered completely unacceptable (in Catholic countries), or it was allowed only under strictly limited conditions, and only by the decision of the church authorities. The place of the religious prohibition is taken by the norms of morality, as well as the understanding of the public and legal order.

Despite the significant scientists' attention of to this problem, a lot of questions still remain unexplored, and therefore, the analysed issues are relevant and theoretical from the theoretical and practical points of view, and therefore there are all grounds for studying this problem.

The definition of marriage as a free, monogamous, equal union of a man and a woman, aimed at creating a family, concluded in compliance with the order and conditions stipulated by the law, which creates mutual personal and property rights and obligations between the spouses, seems to be the most successful.

The emergence of a family is based on such a legal fact as marriage, which formalizes the legal ties of the family.

A family is a team united by various ties. Some of them are related to feelings, others to considerations of a moral and even material or business order. The desire to live together usually explains the desire to get married. The absence of such a desire may indicate a fictitious marriage.

Marital and family legal relations arise on the basis of specific legal facts (entry into marriage and its termination, birth of children). Legal facts – states (marriage, consanguinity) acquire special importance in family law. Administrative

and legal acts of state bodies are often elements of a legal structure that gives rise to legal consequences – registration of marriage, its termination, etc.

Marriage as a union of a man and a woman, which has social significance, determines the legal status of children born in this union, property relations between spouses and their inheritance rights. Regarding these rights, marriage is a legal fact, but the conclusion of such a union depends on the will of the future spouse and is a deed.

A special case is the situation when a man and a woman live together for a long time, actually create a family, but do not register their union. Art. 21 of the Civil Code of Ukraine establishes that living in the same family of a man and a woman without marriage is not the basis for their rights and obligations as spouses. However, at the same time, the Code contains a number of articles (for example, Articles 74, 91) that establish the same property rights for persons in a de facto marriage relationship as for spouses (the right to joint ownership of property, the right to maintenance).

Termination of marriage is the termination for the future of legal relations between spouses arising from a registered valid marriage, caused by certain legal facts.

The legislation provides for two procedural solutions for divorce – by applying to the court or to the RACS authorities. In case of dissolution of marriage in the state bodies of the RAC, the marriage is considered terminated from the moment of registration of the dissolution of marriage in the bodies of the RAC, and in the case of dissolution of the marriage by the court – from the date of entry into force of the court's decision.

Grounds for termination of marriage are regulated by the norms of the SC of Ukraine. Depending on the occurrence of a certain legal fact, the following grounds for termination of marriage are distinguished: 1) as a result of the death of one of the spouses or their declaration as deceased; 2) as a result of the dissolution of marriage at the request of one or both of the spouses.

Family legislation nevertheless needs further improvement, and some of its conceptual provisions need additional rethinking in order to ensure the rights and interests of citizens in connection with the termination of marriage.

In the modern concept of family legislation of Ukraine, it is noted that the marriage is terminated due to the death of one of the spouses or due to the dissolution of the marriage. Termination of marriage is placed under the control of the state and can be carried out only by the relevant state bodies: the RATS body or the court in cases directly provided for by the SC of Ukraine. This or that order of divorce is provided for in the Family Code of Ukraine depending on certain circumstances and cannot be determined by the wishes of the parties.

Termination of marriage affects not only the personal, but also the property relations of the former spouse (one of the spouses, if the marriage is terminated not as a result of dissolution, but as a result of death or declaration of his death), as well as other persons.

Termination of marriage is an important process in the lives of many people, therefore, the correct solution of emerging problems and questions regarding its implementation will affect former spouses, their minor children, other persons, property and non-property relations, regardless of how the marriage was terminated.

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INFLUENCE OF BIOGENIC ELEMENTS ON STUDENTS' LIVING PRODUCTIVITY

Most customers in Ukraine consume cheap food products with a low biological value, but high energy intensity. In addition, there is a shortage of vitamins in the food ration of the population. The lack of vitamins is accompanied by disruptions of the body's activity and decrease in immunity. Students with an active lifestyle and sufficient mental workload have the greatest need for vitamins.

Vitamins are not a source of energy or plastic material, however, however, they participate in the enzyme systems as coenzymes or their precursors (niacin, thiamin, riboflavin, biotin, pantothenic acid, vitamin B6, vitamin B12, folate, vitamin K); as the components of the body's antioxidant defense system (ascorbic acid, some carotenoids, vitamin E); as the factors of genetic regulation (vitamins A, D); as the compounds performing specific functions, which, binding to the protein part, immediately carry out the chemical reactions catalyzed by this enzyme. They also take part in the formation and functioning of cell membranes and cell organelles [1; 2],

provide an adequate immune response and support the body's resistance to various infections, radiation and the effects of poisons. Vitamin H is a constituent part of enzymes involved in glucose metabolism – pyruvate dehydrogenase and transketolase. Biotin contributes to the formation of fatty acids; participates in the metabolism of amino acids and carbohydrates; ensures normal functioning of sweat glands, nervous tissue, bone marrow, male seminal glands, skin and hair cells; minimizes symptoms of zinc deficiency [2].

The purpose of the study was to determine the content of water- and fat-soluble vitamins in the diet of students, in order to prevent the development of possible diseases associated with a lack of vitamins. The research was conducted on the basis of Oles Honchar Dnipro National University. 108 respondents were

interviewed (78 females and 30 males, age group – from 18 to 20 years old). When determining the content of vitamins in the diet of students, insufficient daily intake of vitamins D, C, B9 and biotin was found out. The average content of vitamin C in food rations of female students was 1.03 times below the norm, and of males – 1.27 times below the norm. The diet of a significant number of students is unbalanced in terms of vitamin composition, which in turn affects the mental capacity and well-being of young people. As vitamin D takes part in the regulation of metabolism of assimilation of calcium and phosphorus in the body, the formation of the bone system depends on it. Vitamin B9, like vitamin B12, is necessary for hematopoiesis and the construction of coenzymes. Vitamin C participates in the formation of erythrocytes and strengthens the walls of blood vessels; effectively counteracts the destruction of body cells by free radicals; participates in the synthesis of steroid hormones of the adrenal cortex, as well as thyroid hormones; stimulates the function of collagen-synthesizing cells; contributes to strengthening of bone tissue and teeth [3]. The lack of these vitamins in the diet of students affects the body's susceptibility to diseases of skin, heart, the thyroid gland, and a decrease of the immune system. The study showed that the intake of vitamins B2, B6, B12 and B5 in students' diets exceeds the recommended values.

Today, even a varied diet does not guarantee a sufficient intake of vitamins. The deficiency of vitamins can be overcome with the help of short-term use of synthetic vitamins and functional products enriched with water- and fat-soluble vitamins.

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**FINDINGS OF EPILETHOUS LICHENES ON
THE CRYSTALLINE OUTFITS OF THE LOCAL SIGNIFICANCE
BOTANICAL RESERVOIR “BALKA ZMEYINA”
(DNIPROVSK DISTRICT, DNIPROPETROVSK REGION)**

Lichens are pioneer organisms, as they settle on bare rocks, infertile soils, and on the walls of houses. In particular, epilithic lichens live on rock outcrops and artificial stony substrates [7]. The most important role of lichens in terrestrial ecosystems is related to their ability to promote primary succession. Lichens are one of the first organisms to settle on newly formed surfaces – rocks formed after volcanic eruptions or soil surfaces exposed by landslides. The growth and expansion of lichens leads to mechanical and chemical abrasion, which accelerates the natural process of weathering of these surfaces and therefore accelerates the soil formation [1; 2].

Accounting of the researched material was carried out by route method. Lichens were described and photographed on the outcrops of crystalline rocks on the territory of the botanical reserve “Balka Zmiina” in 2022. The identification of species was carried out according to the standard method [6].

The botanical reserve “Balka Zmiina” was created in obedience to the Decision of the Dnipropetrovsk Regional Council dated 20.06.2014 No. 550-26/VI and includes the territories of girde landscapes and a section of the valley landscape of the Mokra Sura River [3]. According to literature data, the territory adjacent to the Dnipro valley is characterized by the spread of crystalline Precambrian rocks, which in some places come to the surface. These are mainly granites and magmatites of Archaean and Proterozoic age [4].

As a result of the survey of the territory, 5 types of epilithic lichens were found (Fig. 1).

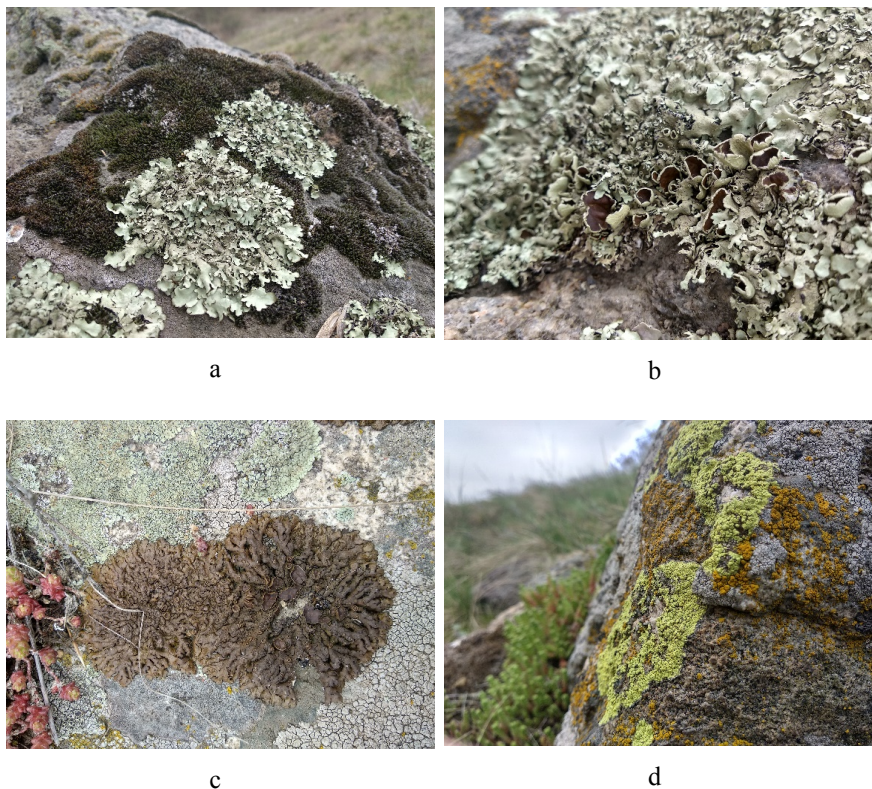


Fig. 1 – Photographs of lichens found on outcrops of crystalline rocks on the territory of the “Balka Zmiina” botanical reserve:

- a) *Parmelia caperata*, b) *Physcia tenella*, c) *Physcia tenella*, *Lecanora rupicola*
 d) *Rhizocarpon geographicum*, *Lecanora rupicola*, *Calloplacca saxicolla*

The study of the taxonomic diversity of the territories and objects of the nature reserve fund of Ukraine is relevant for the formation of lists of species of this territory, registration of species included in the regional red lists and the Red Book of Ukraine, international lists of nature protection.

It is also worth emphasizing that the lichen biota of the Dnieper steppe is one of the least studied components of ecosystems, which also confirms the relevance of the study.

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L. Kondratenko, K. Matorina, O. Posudiiievskia

ELECTRO-ANALYTICAL PROPERTIES OF SENSORS FOR DETERMINATION OF VITAMIN B6

One of the main directions of development of modern electro-analytical chemistry is the development of effective methods of research and analysis of organic compounds, in particular – vitamins. This sector of studies has theoretical and practical significance for the further search of the most effective ways of synthesis and analytical determination of these substances.

Vitamin B6, being in the form of the corresponding aldehyde – pyridoxal (Fig. 1), or as a primary amine – pyridoxamine (Fig. 2), or a primary alcohol – pyridoxine (Fig. 3), or its corresponding forms of 5-phosphate derivatives (Fig. 4) can transform from one form to another in living organisms [4].

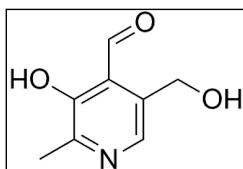


Fig. 1 – Pyridoxal

Vitamin B6 (pyridoxine) is primarily used as a stimulant in metabolism.

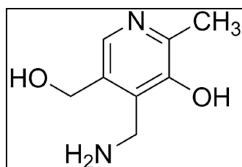


Fig. 2 – Pyridoxamine

Vitamin B6 is a coenzyme of proteins that participate in the conversion of amino acids and regulate the assimilation of proteins.

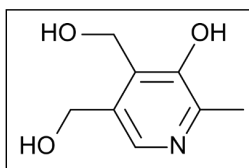


Fig. 3 – Pyridoxine

Pyridoxine participates in the formation of erythrocytes and hemoglobin and ensures a constant supply of glucose to the cell.

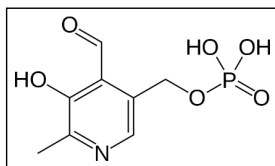


Fig. 4 – Pyridoxine

Without vitamin B6, both normal protein exchange and the exchange of fats and carbohydrates are impossible. Saturation of nerve cells with glucose requires a lot of pyridoxine, so almost half of all pyridoxine in the body is used to release carbohydrates into the blood.

In recent years, the academic literature has described research in the field of voltammetry, aimed at developing methods for the determination of vitamins in various objects using modified electrodes [3].

The working electrodes can be modified in order to improve the analytical signal, detection range, sensitivity and selectivity of the voltammetric method. At the same time, modification of their surface can be carried out both with the help of organic and inorganic substances. Among the latter, hexacyanoferrates of transition metals with catalytic activity are proposed, for example, cuprum hexacyanoferrate (II) [1]. Thus, the application of electrodes made of carbon graphite materials, modified with hexacyanoferrate complexes, can be useful for various vitamins, in particular, for vitamin B6 – pyridoxine [4].

In the academic studies, considerable attention is paid to the voltammetric method of determining vitamin B6 in food and cosmetic industry. This approach can be applied in the determination of vitamin B6 in the extracts of herbal raw materials, food products and biologically active supplements, which, in turn, allows determining the most balanced preparations in terms of vitamins and their dosage, as well as recommending their usage for preventive and therapeutic purposes [5].

The authors [5] describe a voltammetric sensor for the determination of vitamin B6 using a graphite paste electrode, modified with a vanadium salen complex. The limit of detection of vitamin B6 in this way is $3.7 \cdot 10^{-5}$ mol/l. Analytical signal of the vitamin is an anodic peak at a potential of 0.65.

The disadvantage of this method is the error in determining the content of vitamin B6 in the presence of ascorbic acid (vitamin C) and thiamine (vitamin B1) in the sample. An admixture of ascorbic acid in a solution with a concentration of $5 \cdot 10^{-4}$ and $1 \cdot 10^{-3}$ mol/l reduces the signal of vitamin B6 by 3.4% and 27%, respectively, the same concentrations of thiamine reduce the signal by 11% and 29%, respectively. The presence of such interfering effects does not allow the use of this method in the determination of vitamin B6 in biological supplements, as they contain a significant amount of vitamins B1 and C.

The literature also describes [2] a method for the joint determination of vitamins B1 and B6 on a phthalocyanine-modified cobalt carbon-paste electrode. The modified electrode is prepared in the following way. Crushed graphite powder 55% (by mass) is mixed with phthalocyanine (II) 20%, this mixture is homogenized with

the help of mechanical abrasion for 30 minutes. After the mixture has become homogeneous, it is added to 25% paraffin heated to 60-65°C, and the mixture is brought to a homogeneous plastic substance. With the help of vacuuming, air is removed and the plastic tube into which the contact is inserted is filled with mass.

Using differential pulse voltammetry and the above-mentioned modified paste electrode, analytical signals from vitamin B6 and thiamine are obtained at the following potentials of 0.55 V and – 0.13, respectively, during cathodic scanning. Phosphate buffer, pH 7-13, is used as a standard [4].

The disadvantage of the method is the complex scheme of preparation of the modified paste electrode, in particular, mechanical grinding and homogenization of the mixture and subsequent vacuuming, which is impossible without the use of additional equipment.

The reversibility of electrochemical reactions and, therefore, the high sensitivity and reproducibility of voltammetric measurements largely depends on the properties of the indicator electrode. Therefore, much attention is paid to the material of the electrode, the method of its regeneration, the definition of the potential region of polarization, the value of analytical response and the possibility of achieving the specified metrological characteristics [1].

Most often, well-known indicator electrodes made of mercury, carbon materials, gold, silver, platinum metals cannot be used. Electrochemical reactions on such electrodes are often irreversible, complicated by adsorption and high overvoltage.

Therefore, a platinum electrode modified with Co(II) phthalocyanine is used as an indicator electrode. The method of determination consists in taking voltammograms of oxidation of vitamin B6 on a chemically modified electrode. It is important for the determination of pyridoxine to use the differential mode of recording voltammograms [2].

A significant advantage of this type of recording is the possibility of obtaining high peaks, which facilitate the decoding of voltammograms and reduce the error of measuring the signal magnitude [3].

A TA-2 voltammetric analyzer is used with an electrochemical tip connected

to it, consisting of a chemically modified indicator electrode, silver chloride electrodes, comparative and auxiliary electrodes.

Conclusions. The electro-analytical properties of sensors for determining vitamin B6 are usually related to the electrochemical properties of the vitamin itself and the changes that occur on the electrode during interaction with the vitamin. The literature describes the studies in the field of voltammetry aimed at the development of methods for determining vitamins in various objects using modified electrodes. The working electrodes can be modified to improve the analytical signal, detection range, sensitivity and selectivity of the voltammetric method. At the same time, modification of their surface can be carried out both with the help of organic and inorganic substances.

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S. Kondratko, Yu. Matsuk, O. Posudiiievskia

DEVELOPMENT OF PRODUCTION TECHNOLOGY OF CEREAL BARS OF FUNCTIONAL PURPOSE WITH INCREASED CONTENT OF BIOLOGICALLY ACTIVE SUBSTANCES

Nowadays on the way to proper nutrition people encounter such problems as the quick pace of life and lack of time for healthy eating, which leads to replacing a full meal with irregular snacks, buying unhealthy fast food, various sweets etc. This, in turn, leads to various disorders of the digestive system. An effective mechanism of nutritional correction is enrichment of food products with biologically

active substances. Such products are cereal bars, which are a rich source of dietary fiber, vitamins and minerals, have a high nutritional value and are a source of proteins and carbohydrates [2].

The aim of this work was to develop and justify the recipe and technology of a functional cereal bar with an increased content of biologically active substances due to the enrichment of its composition with natural raw materials having functional properties.

The novelty of the work consists in the use of amaranth as the main raw material of the grain crop. Amaranth is a source of vitamins of groups B, C, E, PP, as well as of trace elements Ca, P, Mg, Fe, Se, Cu, Zn, K, Na. Amaranth contains about 14% of protein, which is several times higher than in most cereals. The seeds do not contain gluten, histamine, cholesterol. Instead, they contain alpha-linolenic acid (an omega-3 fatty acid) and linoleic acid (an omega-6 fatty acid). Amaranth contains lecithin, which is an important substance for the nervous and brain functions of the body, as well as amino acids, mainly lysine, methionine, and cysteine. Amaranth can be used as an additional source of pectin, which lowers the level of cholesterol in blood.

The use of amaranth seeds accelerates recovery in case of the lack of vitamins, hypertensive diseases, disruption of the central nervous system, skin diseases, obesity and disturbance of metabolism and endocrine system [1].

Our task was to develop a technology of functional cereal bars with an increased content of biologically active substances and to conduct assessment of organoleptic indicators, using analytical methods of research, as well as methods of mathematical data processing.

An analysis of the chemical composition and nutritional value of the raw materials of existing cereal bars, which are most often used in their production, was performed. The needs of the adolescent body in biologically active substances were analyzed. A review of information on the needs and shortages of basic vitamins and microelements, which can be partially compensated by the developed cereal bar with a functional purpose, was done.

A recipe model of a cereal bar with an optimal composition from the point of view of taste qualities, dietary properties, beneficial effect on the body, as well as the preparation method, was proposed. It should be noted that no baking technique was used in the manufacture of a cereal bar, the beneficial properties of all components were maximally preserved.

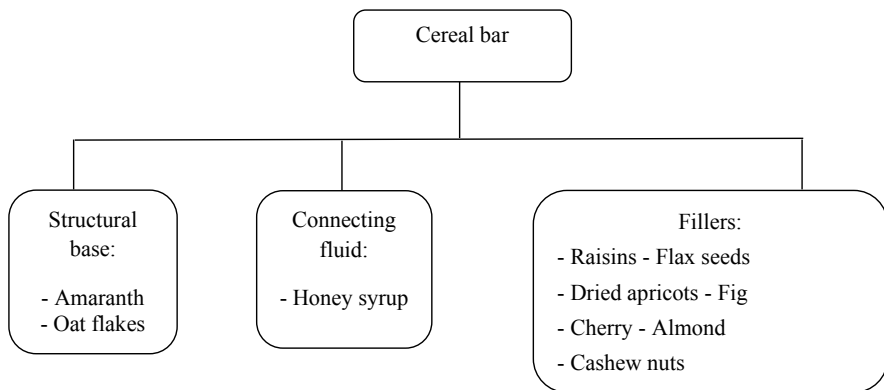


Fig. 1 – The structure of the bar

Table 1

Recipe for a functional cereal bar

Ingredient	X	Component content per 100 gr					Energy value, kcal
		Mass, g	Fats, g	Proteins, g		Water, g	
Amaranth	X ₁	300	7	13.6	58.6	11	1011.45
Oat flakes	X ₂	150	6.2	12.3	61.8	12	505.13
Flax seeds	X ₃	100	42.2	18.3	1.6	7	459.00
Cashew nuts	X ₄	100	48.5	18.5	22.5	5	594.88
Almond	X ₅	100	53.7	18.6	13	4	606.45
Raisins	X ₆	50	0.5	2.3	71.2	18	140.35
Dried apricots	X ₇	50	0.3	5.2	51	20	107.38
Fig	X ₈	50	0.8	3.1	57.9	16	118.36
Cherry	X ₉	50	0.2	0.8	10.6	84	22.38
Honey	X ₁₀	95	0	0.8	80.3	0	289.11
Water		90	0	0	0	100	0.00
Lemon juice		5	0.2	0.6	3.9	90	0.94
Rice paper		X ₁₁	10	0	5.8	77	0
In total, g		1150	159.6	99.9	509.4	367	3886
						100g	335
						40g	135

Optimization of vitamins and minerals in the composition of recipe was carried out – the content of vitamins and minerals in 40 g of the product is 229 mg, the compliance with the norm – 7.9%.

Flavour testing of the manufactured product was conducted using the method of organoleptic evaluation.

The study of organoleptic indicators of the developed products confirmed the high quality of bars with original taste properties, which can be recommended for industrial production and a wide range of consumers.

As a result of the work, a recipe for a cereal bar with a balanced composition of the main nutrients, a sufficient amount of trace elements and vitamins was developed. The proposed bar, when consumed up to three times a day, is able to provide up to 24% of the daily vitamin and mineral needs of adolescents under 17 years of age, and can be recommended as a functional food or healthy snack.

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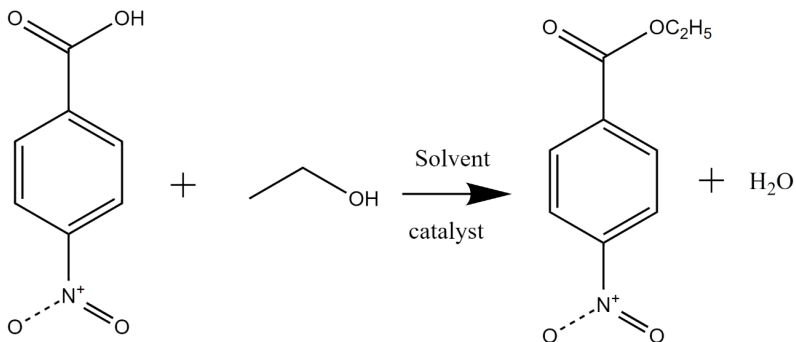
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O. Larionova, S. Kopteva, O. Posudiiivska

COMPARATIVE CHARACTERISTICS OF ETHYL 4-NITROBENZOATE SYNTHESIS METHODS

Benzoic acid esters are widely used in various industries, such as perfumes, flavors, solvents, and plasticizers; in acrylic films, latex coatings, and polysulfide sealants [3]. Ethyl 4-nitrobenzoate is a semi-product in the chemical and pharmaceutical industry for the production of local anesthetics – novocaine (procaine, 2-ethylaminoethyl ester of 4-aminobenzoic acid) and anesthesine (benzocaine, ethyl ester of 4-aminobenzoic acid), which are also contained in pain relievers.

The classic method for synthesis of ethyl 4-nitrobenzoate involves treating nitrobenzoic acid with ethanol in the presence of sulfuric acid (Scheme 1). Disadvantages of the method include the use of large amounts of sulfuric acid, the need for excessive alcohol regeneration, large amounts of wastewater, and large losses of the target product. In addition, the reaction occurs only due to the dehydrating action of sulfuric acid, which simultaneously causes side reactions, such as sulfonation and oxidation.



Scheme 1 – Reaction for synthesis of ethyl 4-nitrobenzoate

Further possibilities of esterification consist in working with dialkyl sulfates as O-alkylating agents in the presence of basic catalysts, such as dicyclohexylamine, or with diazoalkanes. However, due to the extreme toxicity of the alkylating agents used, both methods can only be applied in combination with a very high degree of safety precautions on an industrial scale [1].

The latest methods of synthesis involve esterification of nitrobenzoic acid with ethanol without a solvent in an argon atmosphere, using nanoporous acid catalysts (H-CL, H-MOR, H-HEU-M, H-PHI); with ultradisperse crystallites (290 – 480 nm), as well as in irradiation of the reaction mixture with ultrasound (37 kHz, 330 W, 2 h) or microwaves (2450 MHz, 300 W, 2 h) [2]. Unlike methods using solvents, these are more environmentally friendly. However, although the technique itself is simpler, the catalysts require a preliminary long synthesis from natural zeolites. In addition, the relatively low yield of the product (55%-67%) can be attributed to the disadvantages.

Thus, we believe that the methods that use environmentally aggressive catalysts (sulfuric acid, ammonium sulfate, sulfuric chloride, polyfluoroalkanesulfonic acid) allow obtaining ethyl 4-nitrobenzoate with a higher yield. However, methods using ultrasound, microwaves, and catalysts of ultra-dispersed natural zeolites are environmentally and financially more profitable and easier to perform.

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T. Linko, L. Sydorova, O. Posudiiivska

IDENTIFICATION AND QUANTIFICATION OF THE TOTAL CONTENT OF VITAMIN D (D₂+D₃) BY IMMUNOENZYMATIC METHODS

Immunological analysis for free vitamin D:

The test refers to an immunological assay and to the analysis of a blood sample or blood components for presence of free vitamin D, including vitamin D metabolites, 25-hydroxyvitamin D or 1,25-dihydroxyvitamin D, where free vitamin D is a circulating, unbound fraction of vitamin D [2].

The method includes the following stages:

(a) adding an immobilized binding protein or antibody to 25-(OH)-vitamin D in the sample;

(b) mixing the sample with a diluent, whereby the diluent contains from 0.1% to 0.25% fluoroalkyl surfactant;

- (c) incubating the sample for a period of time sufficient to ensure binding of the required amount of vitamin D to the binding protein;
- (d) removing unbound serum and serum components by washing;
- (e) performing an analysis of immobilized binding proteins or antibodies containing the seized vitamin D, which is associated with them, by the method of competitive binding, using a labeled compound of vitamin D;
- (f) determining the concentration of the labeled compound of vitamin D associated with the binding protein [2].

The study refers to the use of fluoroalkyl surfactants, mostly – of perfluorocarboxylate surfactants, predominantly – of perfluorooctanoic acid as a substance for increasing the solubility of vitamin D in an immunological assay for the determination of free vitamin D [2].

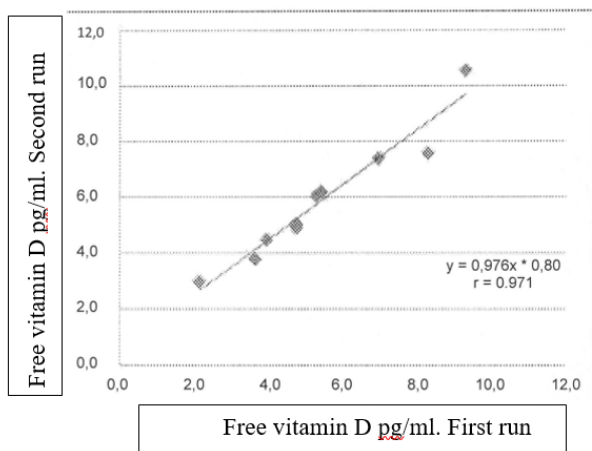


Fig. 1 – Correlation between the concentration of free vitamin D in the first and repeated analysis

The graph shows the correlation between the concentration of free vitamin D in the first and repeated analysis. The line indicates the results of repeated immunoextraction using 0 samples with different levels of free vitamin D. The slope of the regression line is not significantly different from “one”.

This study provides a method for analyzing a fragment of vitamin D in a sample that involves [1]:

a) contact with a sample containing or being suspected of containing a fragment of vitamin D with a buffer capable of dissociating the moiety of vitamin D from its binding protein and/or an acidic pH buffer, and at least two monoclonal antibodies attached, for instance, separately to the surface, wherein one monoclonal antibody, or the first antibody, has a specific binding affinity for the fragment of vitamin D, and the other antibody, or the second antibody, has a specific binding affinity for the complex created between the first antibody and vitamin D;

b) evaluation of the binding between the above-mentioned specific antibodies and the fragment of vitamin D to determine the presence, absence and/or amount of the fragment of vitamin D in the sample.

The advantage of the method for determining free vitamin D (including vitamin D metabolites), according to the proposed method, is that it provides a format of analysis that can be automatized. In this way, the type of analysis performed in the study differs significantly from any previously existing assay of free vitamin D.

A binding protein for 25-OH-vitamin D is added to the assay. Binding proteins, such as antibodies, for vitamin D are known in this field of technology and are widely used in existing immunoassays for vitamin D. These antibodies, as well as other binding proteins, can also be used in this method. For example, instead of an antibody, its fragment can be applied to vitamin D, which was obtained by phage display technology [3].

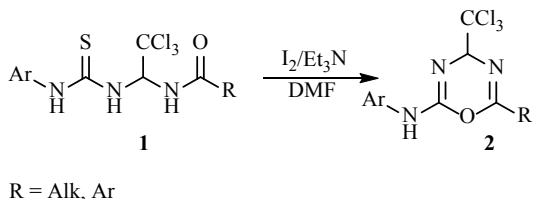
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**DEVELOPMENT OF A NEW SYNTHESIS METHOD OF
4H-1,3,5-OXADIAZINE DERIVATIVES**

Among all medicinal products presented on the pharmaceutical market of Ukraine and the world, a significant share is occupied by drugs of synthetic origin. That is why the issue of improving and optimizing their synthesis is still relevant.

Derivatives of 4H-1,3,5-oxadiazine are widely known as biologically active substances. Mostly, these compounds show antibacterial, antifungal, and antitumor effects [1 p. 456]. In view of this, the development of new or improvement of existing methods [2, p. 370; 3 p. 275; 4 p. 2130] synthesizing compounds of this series is a very important and urgent task.



Scheme 1. Synthesis of 4H-1,3,5-oxadiazine derivatives using a mixture of I₂+Et₃N as a dehydrosulphurization agent

We have developed and proposed a method for the synthesis of 4H-1,3,5-oxadiazine derivatives, which uses a mixture of I₂ and Et₃N for dehydrosulphurization of the original thiourea which allows us to obtain a number of new compounds that have not been synthesized before.

The structures of the synthesized compounds were confirmed by ¹H NMR and ¹³C spectroscopy data.

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D. Lukianenko, I. Zubareva, O. Osadcha

RELEVANCE OF PRODUCTION OF ENZYME PREPARATION "MACEROBACILIN G3X"

Various enzyme preparations are widely used in the most diverse branches of food and light industry, in cosmetics, in the production of detergents, in agriculture, in the medical industry, which is explained by their high catalytic activity, specificity of action, and the ability to carry out biochemical reactions. The term "enzyme preparation" is currently used both to characterize industrial enzymes and to describe pharmacological agents [2, p. 80]. Knowledge of the role of enzymes as biological catalysts for all living things on the Earth served as the basis for the development of the technology of enzyme preparations as a science and for their creation in industrial production. Enzymes play the most important role in all life processes [1, p. 48]. Therefore, it is advisable to use enzymes for carrying out various industrial processes, both from the economic and technological points of view.

Bacteria of the genera *Bacillus*, *Clostridium*, *Erwinia* are used in industry for the production of enzyme preparations. Among them, representatives of the genus *Bacillus*, such as *B. subtilis*, *B. circulans*, are most often used. Their use is explained by the fact that most representatives of this genus are non-pathogenic and can

synthesize enzymes into the culture liquid, which greatly facilitates their isolation and purification. A significant advantage of *Bacillus* bacteria from the economic point of view is their ability to grow on simple nutrient environment, which is advantageous. The advantages of microbial synthesis of enzymes have been confirmed experimentally: a high rate of biomass accumulation, the ability of microbes to be cultivated on cheap nutrient environment; the ability to regulate and scale biotechnological production.

In agriculture, the pectolytic enzyme pectate transeliminase is widely used as an additive to animal feed, which is contained in the enzyme preparation for fodder purpose “Macerobacillin G3X”, which is manufactured at the state enterprise (SE) “Enzym” (Ladyzhyn, Vinnytskaoblast) using *Bacillus circulans*. Cheap feed contains a lot of pectin, which is poorly used by animals, and higher-quality feed has a high cost. Therefore, the addition of the enzyme drug “Macerobacillin G3X” to feed significantly reduces the financial costs of keeping animals, as pectate transeliminase breaks down pectin and makes it available for normal assimilation by animals.

The mechanism of the biotechnological process of obtaining pectate transeliminase consists in increasing the cellular biomass of the producer. Cultivation of enzyme-producing microorganisms is carried out by a deep method in sterile liquid environment with forced aeration and mixing, since this method allows automatic regulation of such parameters as temperature, pH of the environment, concentration of dissolved oxygen, etc.

In connection with the need to implement a more productive technology for the production of pectate transeliminase, material and technical calculations were carried out, according to which, using more advanced equipment, it is possible to obtain 120 tons of “Macerobacillin G3X” per year from raw materials.

SE “Enzym” is the only enterprise for the production of enzyme preparations of biotechnological origin in Ukraine and produces various products: "Protosubtilin", "Alkaline Protease", "Glucoamylase", etc [3]. Considering the production of

the enzyme preparation "Macerobacillin G3X" and the growing needs for its use, it is economically feasible to develop and improve the production project of this enzyme preparation.

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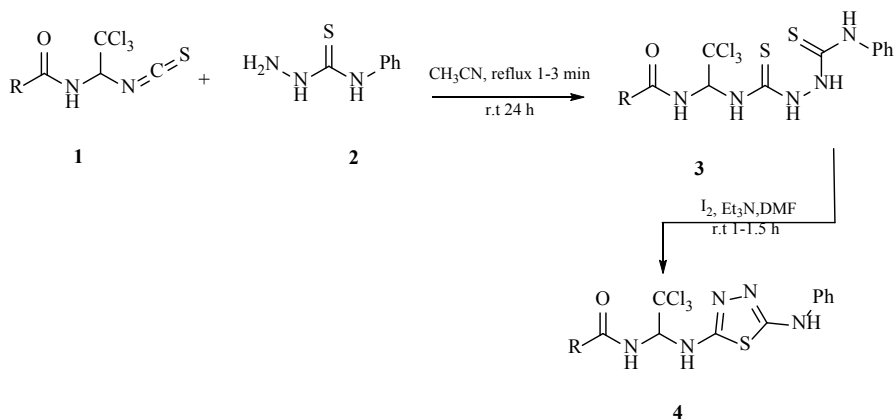
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V. Pavlova, P. Zadorozhnyi, I. Oleshkevich

SYNTHESIS OF *N*-(2,2,2-TRICHLORO-1-((5-(ARYLAMINO)-1,3,4-THIADIAZOL-2-YL)AMINO)ETHYL)CARBOXAMIDES

1,3,4-Thiadiazole derivatives are of great importance for medicinal chemistry and pharmacy. Among them the compounds with antimicrobial [1, 3], antitumor [4], antiviral [5], antifungal, and other activities are known.

To prepare *N*-(2,2,2-trichloro-1-((5-(phenylamino)-1,3,4-thiadiazol-2-yl)amino)ethyl)carboxamides **4** (Scheme 1) we used *N*-(1-isothiocyanato-2,2,2-trichloroethyl)carboxamides **1** and *N*-phenylhydrazinecarboxamides **2** as starting reagents at the first stage of the reaction. The reaction was carried out in acetonitrile at reflux for 1-3 min, which led to the preparation of *N*-(2,2,2-trichloro-1-(2-(phenylcarbamothioyl)hydrazine-1-carbothioamido)ethyl)carboxamides **3**, followed by their cyclization in DMF with iodine and triethylamine. The reaction results in the cleavage of atomic sulfur $\frac{1}{8}$ of S_8 and the formation of the target product **4**. The structures of the starting and target compounds were confirmed by 1H and ^{13}C NMR spectroscopy.



Scheme 1 – Synthesis of N-(2,2,2-trichloro-1-((5-(phenylamino)-1,3,4-thiadiazol-2-yl)amino)ethyl)carboxamides 4

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CORRUPTION AS A SOCIO-LEGAL PHENOMENON

At the end of the 20th century, corruption was recognized as a global problem of humanity. At the same time, in Ukraine it was not just a problem, but the most dangerous threat to national security. Therefore, for an effective fight against corruption, it is necessary to find out the essence of corruption, its signs and characteristics [3, c. 96]. The problem of corruption was studied in the writings of V.O. Hlushkova, O.O. Dudorova, V.P. Korzh, M.I. Melnyka, L.M. Moskvych, I. V. Nazarova, A.I. Radish and others, besides, the prevalence of this problem at all levels of life of the state and society indicates the need to intensify research and combat this phenomenon.

In particular, it can be noted that starting from 2022, the level of corruption in Ukraine is decreasing. This was facilitated by the adopted draft law on the state anti-corruption strategy, which contains a description of the results that Ukraine should achieve in the fight against corruption.

The term «corruption» began to be actively used in the late 1980s and is currently the most common term in science. It is impossible to clearly define the essence of the concept of «corruption». After all, this concept defines both criminal actions, illegal activity, and a system of relations that do not contain specific signs of a crime. Also, corruption is sometimes identified with the concept of bribery.

At the same time, it is safe to say that corruption is inherently evil, because corruption violates the law, it is based on the concealment of actions and relationships, because they are punishable by law, the consequence of which is deception, which is prohibited from a moral point of view, also corruption violates social justice and causes harm public good, as it is aimed at satisfying one's own needs and involves personal gain.

Scholars consider it from different points of view, each focusing on separate aspects of corruption. There are seven main approaches to the interpretation of

the concept of "corruption", which do not contradict, but complement each other: traditional or normative-value; modernist or classical; economic or market-centric; revisionist or functional; behavioral or socio-psychological; institutional or state-administrative; political. It is also advisable to consider the so-called official-legal approach (legislative or legal) to the interpretation of the concept of «corruption», which is based on international documents [1, с. 78].

In conclusion, it can be noted that considering the multifacetedness of such a phenomenon as corruption, it will be advisable to continue the study of this phenomenon.

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S. Pustilnik, V. Polonsky, O. Posudiiievskia

COMPOSITE COPPER–ORGANIC MICROPOWDERS

Previously, we investigated copper micropowders obtained by electrochemical and chemical methods in the presence of acrylic acid [1, p.51–58]. The presence of an organic component in the powders was determined and it has been proved that it is a π -complex Cu^+ with an anionic form of acrylic acid. Microbiological tests [2, p.47–51] confirmed the presence of bactericidal activity in such powders, and it was higher than in the copper powder. According to the results of quantum-chemical modeling [3, p.148–151] it can be stated that complex structures with ions of Cuprum can also be formed by maleic acid. The purpose of this work was to obtain and study the composition, structure and thermal properties of copper micropowders, modified by the compounds of maleic acid. The following experimental techniques were used in

the process of work: preparative synthesis and optical microscopy for the study of microstructure of the powders; complexometry for determining the content of Cuprum; thermal analysis for defining the behavior of samples of the powders during heating, as well as sedimentation analysis in order to determine their granulometric composition.

The first stage of the work was the synthesis of copper-organic micropowders. The procedure of chemical recovery of Cu^{2+} ions by metal zinc powder was used. The course of the process is complex and multi-stage, depending on the ratio of quantities of reagents, temperature and pH. The gradual change in the color of the solution from blue to green indicates the restoration of Cu^{2+} ions to Cu^+ , and the appearance of the precipitate confirms its non-metallic character.

Microscopic studies show that the obtained powders consist of small rounded micro-size particles, which create freeform agglomerates. The results of quantitative analysis of the synthesized micropowders for the content of Cuprum showed that its total content varied within $38 \div 61\%$.

Useful information concerning the composition of synthesized powders and their behavior under conditions of temperature change can be obtained from the results of thermal analysis. The quantitative ratios of fixed thermal effects in the powders depended on the conditions of their synthesis. All samples are characterized by exothermic maximums near 300°C , associated with the destruction of the organic component. Small endothermic minimums in the 200°C zone were also recorded, which can be explained by the presence of water in the composition of the complexes. Dispersion analysis was applied for determining the granulometric composition of the obtained materials. It is shown that depending on the conditions of synthesis, the radius of particles decreases from $8.8\ \mu\text{m}$ ($\text{pH} = 0.7$) to $4.7\ \mu\text{m}$ ($\text{pH} = 2.0$).

Thus, the method of preparative synthesis from the solutions of cuprum (II) sulfate of various acidity in the presence of maleic acid has been used for the synthesis of copper microdisperse powders of composite structure containing bound water and the organic component. The obtained materials are promising for further microbiological studies.

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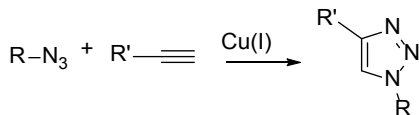
A. Romanovska, S. Kopteva, O. Posudiiivska

CLICK CHEMISTRY

Usually, the process of discovering new drugs based on natural secondary metabolites is very slow and expensive. Even with the appearance of combinatorial chemistry and high-throughput screening, the synthesis of substances depends on the reliability of individual reactions for constructing a new molecular framework. However, at the beginning of the 21st century, a new age of synthesis began, which was click chemistry.

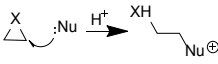
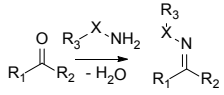
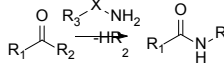
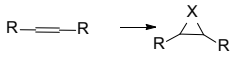
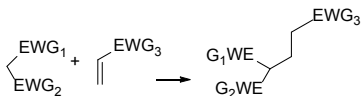
Click chemistry is a set of chemical reactions adapted to produce quickly and reliably a variety of chemicals by combining a few small elements. This is a concept that uses the most efficient and convenient methods in order to create new molecules that are eco-friendly, safe and highly effective. Each click-reaction is carried out with virtually no by-products. All or almost all atoms that were in the original molecules are included in the final molecule that we assemble. Therefore, there is no waste. Barry Sharpless was the first to invent this concept – "He was the founding father" [5]. Sharpless suggested using only the reagents that were easily accessible and insensitive to oxygen and water. The scientist developed several reactions that meet the requirements of this concept [4; 5]. *Using a Cu(I) salt catalyst makes*

the reaction mild and very efficient, does not require protective groups, as well as product purification in many cases.



Click chemistry includes a number of reactions that are easy to perform, do not require preliminary protection steps, run in high yields, and require either no or minimal purification of the products [3, 5].

Apart from the 1,3-dipolar cycloaddition reactions, described above, three more major classifications of click reactions have been identified nowadays:

<p>Nucleophilic Ring-Openings</p>  <p>$\text{X}=\text{O}, \text{NR}, \text{SR}^{\oplus}, \text{NR}_2^{\oplus}$</p>	<p>Non-Adol Carbonyl Chemistry</p> <p><i>Hydrazone/oxime ether formation:</i></p>  <p><i>Amide/isourea formation:</i></p>  <p>$\text{X}=\text{O}, \text{NR}$</p>	<p>Carbon Multiple Bond Additions</p> <p><i>Formation of various three-member rings:</i></p>  <p>$\text{X}=\text{O}, \text{NR}, \text{SR}^{\oplus}, \text{NR}_2^{\oplus}$</p> <p><i>Certain Michael additions:</i></p> 
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Today click chemistry is a very relevant topic. Click chemistry methods are widely used all over the world. For example, in the field of biomedicine, these methods are applied to create new polymer hydrogels, 3D bioprinting of cell cultures, and synthesis of drugs using the principles of green chemistry. A state-of-the-art example is biocatalytic synthesis of islatravir – the possible medicine for HIV treatment [1, 2].

In Ukraine, synthetic chemists are actively working in this field. In Lviv, Kyiv, Kharkiv, Odesa, there are scientific schools that use click chemistry. Several

chemical companies, such as “Enamin”, use the concept of click chemistry to produce new compounds. Therefore, we should also expect a further increase in the use of these methods for the research of living systems and the development of new substances.

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Y. Shevtsova, L. Borshchevych, O. Posudiiivska

ELECTROCHEMICAL DEPOSITION OF COBALT ON COPPER SURFACE FROM PERCHLORATE SOLUTION WITH ADDITION OF METHANOIC ACID

Cobalt is one of the transition metals widely used in various industrial sectors. It is a good construction material, and therefore, wear-resistant coatings based on it are of practical interest. One of the promising methods for obtaining materials with desired properties is electrochemical methods.

However, the kinetic features of cobalt electrodeposition are not well studied, which makes the topic of my research relevant.

The aim of the work was to study the peculiarities of the cobalt electroplating process from perchlorate electrolyte in the presence of methanoic acid on the copper surface.

The object of the study was an electrolyte with the addition of methanoic acid for the electroreduction of cobalt (II) cations and the cathode surface.

The subject of the study is the process of electrochemical deposition of cobalt coatings from perchlorate electrolyte in the presence of methanoic acid on the copper surface.

The following research methods were used in the work:

1. Analysis of literary sources.
2. Voltamperometry.
3. Galvanostatic deposition of cobalt.

A perchlorate working solution with the addition of formic acid was used for the study. Polarization measurements were performed using a PI-50-1 potentiostat with a PR-8 programmer and a three-electrode cell. A USB oscilloscope connected to a computer was used as the recording device.

Copper electrodes were used for the polarization measurements. The so-called factory electrode was made of copper wire inserted into Teflon. A gold plate with a layer of copper from a standard copper plating solution was used as the galvanically deposited electrode. To determine the cobalt current efficiency, electrodeposition was carried out in a Hull cell using a system containing a copper coulometer. Factory copper plates with an area of 8 cm^2 were used as the working electrodes. The quality of the cobalt coating was examined using a MIM-7 microscope.

Our theoretical and experimental studies have shown that formic acid significantly affects the kinetic features of the cobalt (II) cation electroreduction process and changes the conditions for obtaining cobalt deposits on the copper electrode.

The addition of formic acid to perchlorate electrolyte leads to the formation of shiny metallic cobalt at low current densities.

Differences in the kinetic dependencies of the process of electroreduction of Co (II) cations were established between the factory and galvanically deposited copper.

It was shown that formic acid does not affect the current output of cobalt compared to the base electrolyte, but its presence slightly reduces the current output on the galvanically deposited electrode surface.

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L. Simakova, V. Manyuk, O. Posudiiivska

GEOLOGICAL STRUCTURE AND MINERALS OF THE DONBASS FOLDBELT

The Donbass Foldbelt (DF) is a very complex folded system bordering the Dnieper-Donets Basin in the north, which separates it from the Voronezh Crystalline Massif, the deep Black Sea Basin in the south, and the Azov Block of the Ukrainian Shield in the southwest. Thus, the DF was formed at the point of collision of the East European platform with the Hercynian structures. Thus, Donbass is a mixed platform-geosynclinal structure, representing the DF, the geosynclinal development of which continued in the Late Paleozoic (Hercynian) time. So, at the base of the DF is a young (Epihercynian) platform, which is situated on the so-called pre-Carboniferous layer of the Late Proterozoic age and is formed by sedimentary and metamorphic rocks.

The thickness of this layer reaches 12 km, it decreases towards the north and disappears at the latitude of Luhansk. Here, the carbon already lies directly on the Precambrian formations. According to geologists, the discovery of a pre-Carboniferous stratum in the bowels of the Donbass shows that its basin has a very ancient origin.

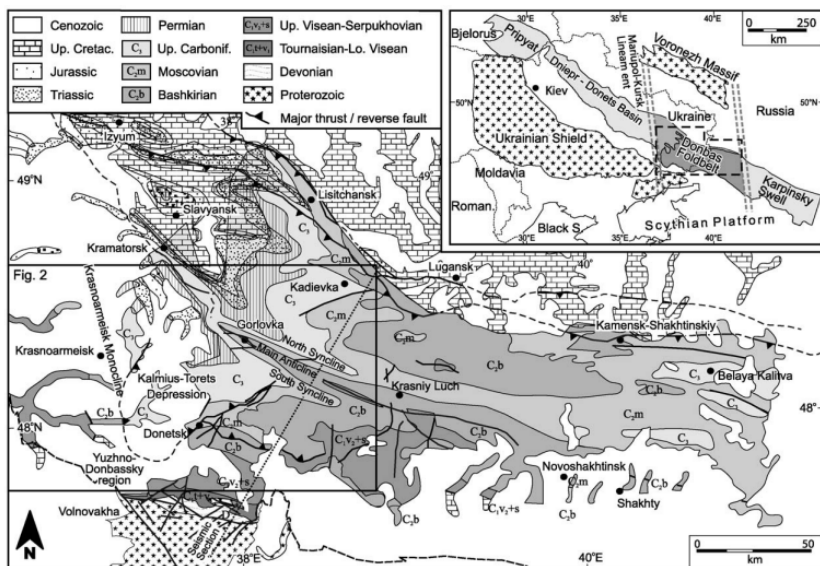


Fig. 1. Geological map of the Donbas Foldbelt and on the inset – the location of Donbas in the regional East European structural framework.

Within the internal structure of the DF, several tectonic elements are distinguished, oriented mainly from west-northwest to east-southeast. This is the Main anticline, to the north of which extends the Central syncline, and further north – the Northern anticline. To the south of the Main anticline are the Southern syncline and the Southern anticline of the Donbas Foldbelt.

Thus, the Main anticline is a long, narrow fold with a steep fall of the wings, which is sometimes complicated by a series of dome-shaped elevations. The core of the anticline is complicated by small folds and thrusts.

As a result of Permian and/or Late Cretaceous/Paleogene inversion of the Donbas Foldbelt, Carboniferous sediments are exposed. The middle Carboniferous is exposed within the axial zone of the Donbas Foldbelt, as well as near the southern margin, where it overlies pre-and syn-rift Devonian to Lower Carboniferous sediments. Sedimentation throughout the middle Carboniferous of the Donbas kept pace with subsidence at high rates of 40 cm/ kyr averaged over the entire 12 Myr time span represented by the stratigraphy.

The main coal reserves are associated with 27 layers of the Middle Carboniferous and 8 layers of the Lower Carboniferous. Coal-bearing areas in Donbass rise in amount to more than 150,000 km², about 98% of Ukraine's hard coal reserves are concentrated there. The geological conditions for the development of coal-bearing layers are too complex: they lie in thin layers, alternating with bare rock, and are crumpled into folds as a result of the Hercynian era of orogeny. Coal deposits contain more than 200 coal seams, of which 120 reach a working capacity of 0.6 m in separate areas. Coal is reserved in seams with a working capacity up to a depth of 1,800 m amount to 109 billion tons. In some mines, development is underway at a depth of up to 1,000–1400 m.

The rock salt layers are composed of halite with seasonal millimeter layers of anhydrite. Their NaCl content is 97.7–99.7%, and the water-insoluble residue is 0.2–0.5%. The tectonics of the deposit is calm, the layers have a north-west dip with angles of 2–5°, however, due to hydrogeological conditions, parts of the mines were operated with drainage. The actual working depth of the deposit is in the range of 150–280 m, the average depth of the deposit development is 260 m, the maximum reaches 320 m, the mineral layers are exposed by vertical mine shafts. The preferred design system is chambered with interchamber sights. The chambers are 17 m wide, 25–36 m high (depending on the thickness of the reservoir), and 1500–1800 m long. The total area of the deposit is 179 km².

The main reserves of mercury in Ukraine are concentrated in the Donetsk mercury province and partially (about 1%) in the Vyshkiv ore field of Transcarpathia. Within the Donetsk region, in the sedimentary complexes of the Donbass Foldbelt, ore manifestations and deposits of mercury, known as the Donetsk mercury province, were discovered. Industrial concentrations of mercury are confined to the Main anticline of Donbass, which was formed in the subgeosynclinal part of the trough. Ore bodies are represented mainly by layer deposits and lenses among porous sandstones or limestones. The mercury deposits of the Mykytiv ore field are the first-born of mercury production in the country and are one of the first places both in terms of reserves and production. Since

the discovery of mineralization (1887) and up to 1990, about 38,000 tons of mercury have been obtained from the deposits of the ore field.

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V. Stoliarchuk, O. Zolotko, O. Posudiiivska

EXPERIMENTAL STUDY OF METHODS OF INCREASING THE EFFICIENCY OF A DIRECT-FLOW AIR-JET DETONATION ENGINE

The subject of the study is the modeling of processes occurring in a direct-current jet engine with detonation conversion of the chemical energy of the working body into the kinetic energy of the jet. The purpose of the work is to obtain the results of the study of gas-dynamic and thermal processes in a direct-flow air-jet detonation chamber with an aerodynamic valve. One of the tools for solving such a problem is the method of a numerical experiment with the complex use of mathematical modeling technologies.

At an extremely high rate of energy release from the detonation combustion of fuel components, the traction and impulse characteristics of the engine are significantly increased; the prerequisites are created for simplifying its design, reducing dimensions and mass, which allows achieving structural perfection of detonation engine installations. The purpose of the work is to obtain the results of studies of the defining characteristics: the development of mathematical models of

the kinetics of gas-dynamic and thermal processes in the detonation combustion chamber with an aerodynamic valve taking into account the composition and properties of the gas in the working environment of the chamber [1], modeling of work processes that take place in the flow part of the engine; study of the mechanism of self-oscillations in the chamber based on kinematic patterns of gas movement, development of methods of experimental measurements of detonation flows for verification of calculation models [2], improvement of the engineering methodology for calculating detonation combustion chambers with an aerodynamic valve of a direct-flow air-jet engine for a given power.

Based on the results of theoretical and experimental studies, an engineering method of chamber calculation is proposed, mathematical models of gas-dynamic and thermal processes in a detonation combustion chamber with an aerodynamic valve are proposed, taking into account the ratio of air and fuel consumption, which will make possible to determine the properties and composition of combustion products [3].

Calculated equations were obtained for determining the frequency of oscillations in the detonation combustion chamber taking into account the aerodynamic valve, a method was developed for calculating the kinetics of gas dynamic and thermal processes in the detonation combustion chamber depending on the coefficient of excess air regulated by the aerodynamic valve. Experimental data are used to validate the two-dimensional model, which in turn provides a basis for evaluating the performance of the reduced one-dimensional model [4]. It was determined that the higher the pressure in the controlled system, the greater the free volume, the faster the adjustment speed of the actuator, and the greater the adjustment of the gas flow. Comparing the changes in the position of the flame front under the conditions of different injection distances, it was determined that under the same injection scheme, but different cavity configurations, the position of the flame front has the same tendency as the change in the equivalence coefficients, where the limit of lean blowing in the combustion chamber is determined, when the short-range injection condition reaches a near-purge state, this is because the ignition in

the cavity is greater than the flame stabilization in the combustion chamber, which is related to the power of the igniter discharge and the flow field environment inside the cavity . Experimental studies of the characteristics of detonation engines are relevant and involve the creation of a specialized laboratory and fire test stands for the rapid introduction of the latest technologies in the rocket and space industry.

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Yu. Tsvietaieva, Yu. Dzuba, O. Tsvietaieva

MODERN CONCEPTS

ON THE PATHOGENESIS OF UTERINE FIBROIDS

Uterine fibroids, also often referred to as leiomyomas, are benign monoclonal tumors that develop from smooth muscle cells in the myometrium. This is the most common neoplasm in women of reproductive age and is diagnosed in 30-35% of patients [1]. In 30% of cases, uterine fibroids become symptomatic, which is manifested by pelvic pain, infertility, poor reproductive prognosis and uterine bleeding, often leading to anemia. The development of symptoms in this pathology depends on the location and size of the tumor, but most often a vivid clinical picture is observed with atypical localizations of large nodes. The most common companion of uterine fibroids is pain syndrome, as a rule, it is manifested by secondary dysmenorrhea, cramping pains with a submucosal location of the node, aching pains with the rapid growth of the node, its large size, also with

the interligamentous location of the tumor, compression of neighboring organs, degenerative changes in the node and concomitant inflammatory diseases of the genitals. As a result of the development of the above symptoms, uterine fibroids, according to various sources, become the number one reason for hysterectomy [2].

Certain factors have been proven to contribute to the formation of uterine fibroids, such as early menarche, no history of pregnancy or childbirth, late reproductive age, menstrual irregularities (chronic anovulation, dysmenorrhea), caffeine and alcohol use, obesity, and high blood pressure.[2].

The widespread prevalence of uterine fibroids in women inevitably raises the question of the pathogenesis of the disease for scientists, but, despite the huge number of works devoted to this topic, there are many unexplored aspects.

M. Wolanska indicates the ability of growth factors to modulate the action of estrogens, which in turn stimulate their synthesis [3]. Thus, constant self-stimulating proliferation and hyperplasia associated with the circulation of sex hormones and the synthesis of growth factors can presumably take place in the uterine myoma.

Blood circulation also plays an important role in the development of fibroids. N. Takahashi et al. investigated the blood flow in the uterine artery in women with and without fibroids, as a result of which an increase in blood flow in the uterine artery in women diagnosed with uterine myoma was revealed. Studies of the ASL (arterial spin labeling) signal determined that the myomatous node is capable of causing an imbalance in the distribution of blood in the myometrium. Increased angiogenesis is associated with increased expression of growth factors such as VEGF, bFGF and PDGF [4].

The question of the role of genetic predisposition to uterine myoma is still open. The presence of familial forms of fibroids, the revealed relationship between the development of pathology and race certainly suggests the presence of certain genetic defects that contribute to the development of the disease. However, various chromosomal aberrations are found in 40% of tumors, which requires further study of this issue [2]. There is also a version that the mutation of the MED12 gene responsible for the activation of the P-cadherin gene plays an important role in

the pathogenesis of uterine fibroids, according to some reports, it leads to the development of uterine fibroids.

Recently, the theory of microRNA involvement in the pathogenesis of uterine fibroids has become increasingly popular. It is assumed that miRNA affects the regulation of the cell cycle, apoptosis, and cell differentiation. It was found that microRNA-21 controls the expression of the transforming growth factor- β type 2 receptor (the key profibrotic cytokine that causes cell hypertrophy, disrupts the exchange of extracellular matrix components and affects angiogenesis). J.B. Fitzgerald et al. proved that an increase in miRNA-21 affects the reduction of apoptosis, since the study was able to detect an increase in the cleavage of caspase-3, which is a marker of apoptosis, with a decrease in the level of miRNA-21 [5].

The primary cell from which uterine fibroids subsequently develop can probably be a mesenchymal cell or a smooth muscle cell of the myometrium.

Mas et al. indicate the presence in the myoma of SP cells (side population, an additional population of stem cells capable of differentiating into myoblasts) with SC (stem cells, stem cells) – characteristics of tumor-forming cells. The proportion of SP in the entire leiomyoma fraction was $0.63 \pm 0.21\%$. It does not depend on the age of the patients, the state of fertility, the location of the fibroid and its size. Molecular characterization of these cells has shown that they are not yet lineage-bound, as they lack typical muscle markers (smutelin and calponin) and hormone receptors (ESR1, estrogen receptor 1 and PR, progesterone receptor). It is hypothesized that tumor growth may be the result of an interaction between cancer stem cells and tumor-initiating cells and their microenvironment. These cells are organized like normal tissues, with a small self-renewing population of stem cells generating a large population of proliferating cells that is distinct from the rest. Thus, they are initiated by a small subset of tumor cells that are ultimately responsible for their formation and growth.[6].

Stem cells, of course, are found not only in pathologically altered fibroid tissue, but also in healthy myometrium. M. Orciani et al. also explains the development

of uterine fibroids by deregulation of mesenchymal stem cells. Thus, the development of fibroids may be the result of impaired function, proliferation and differentiation of undifferentiated myometrial cells, which are under the influence of ovarian hormones. The authors also point out the possible influence of the inflammatory process on the dysregulation of progenitor cells [7].

Despite the abundance of theories and hypotheses on the pathogenesis of uterine fibroids, to date there is no complete understanding of the causes of the development of this pathology. It is worth noting the need for further research in order to study the processes leading to the development of fibroids, since their understanding could largely improve the tactics of treating patients and, possibly, allow the development of preventive measures to prevent the development of fibroids.

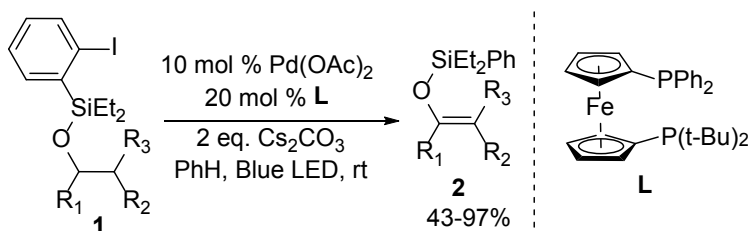
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FERROCENYL COMPOUNDS IN THE PHOTOCHEMICAL REACTIONS

Since its discovery, more than 70 years ago, ferrocene has played a prominent role in nearly all aspects of synthetic chemistry from materials science to medicinal chemistry. Due to the unique properties of ferrocene and its derivatives, ferrocenyl compounds are unsurprisingly considered privileged structures in asymmetric catalysis, synthesis of biologically active compounds and components for organoelectronics. One particularly interesting and practically useful application of ferrocenes is the use as ligands and/or as catalysts in photochemical reactions. Here we provide several examples of such an application.

Work [3] presents a new method that allows the direct oxidation of silyl ethers to silyl enol ethers under mild conditions, with improved selectivity and efficiency compared to the prior art with rhodium or iridium catalysts. The scope of this reaction turned out to be relatively broad, with cyclic, acyclic and complex silyl ethers (**1**) that undergo efficient desaturation to form silyl enol ether products (**2**) with high yields (Scheme 1).

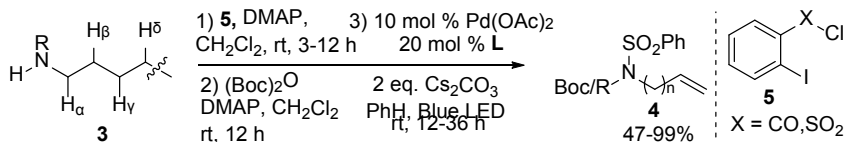


Scheme 1–Desaturation of silyl ethers (1)

Mechanistic studies, including the radical scavengers and the radical clock experiments confirmed the radical mechanism of this transformation. In addition,

isotopic labeling studies have revealed an alternative type of concerted metalation-deprotonation mechanism. The authors [3] showed combined synergism of two unique reactivities – hydrogen atom transfer (HAT) and palladium-involved the β -H-elimination event that turned on the novel remote functionalization of C(sp³)-H bonds.

Next, the same research group discovered the selective desaturation of aliphatic amines [2]. The authors showed that iodobenzamide (X=CO) and iodosulfonamide (X=SO₂) moieties were also suitable donors for the creation of hybrid palladium/aryl radical under visible light irradiation. Interestingly, these two substituents showed marked selectivity for the HAT process: 1,5-HAT for iodobenzamides and 1,7-HAT (also 1,6-HAT) for iodosulfonamides. Enamines were synthesized in good yields when using iodobenzamide. Similarly, iodosulfonamide amines (**3**) gave allylic and homoallylic amines (**4**) in good yields (Scheme 2).

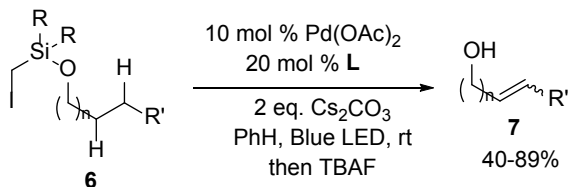


Scheme 2 – Desaturation of amines (**3**)

Notably, unsaturated amines were synthesized simultaneously from aliphatic amines in semi *one-pot* synthesis, without isolation of auxiliary-protected amines. Also, mechanical studies of this work supported the radical mechanism of this transformation. Deuterium-labeling studies have provided evidence for the HAT process. In addition, photophysical studies showed that the palladium complex is the only light-absorbing species among reagents, and its excited state is quenched by aryl iodide. Based on these researches, it was proposed the similar mechanisms for silyl ethers desaturation reactions involving hybrid palladium/aryl radical species.

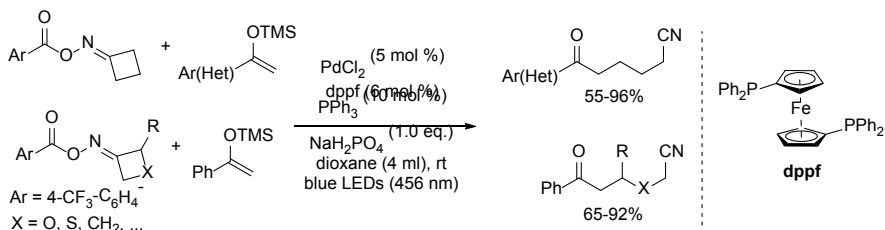
In 2017, Gevorgyan and co-workers [1] showed the ability of a hybrid palladium/alkyl radical species to undergo a HAT process at unactivated C(sp³)-H sites (Scheme 3). The activation of tertiary and secondary C(sp³)-H bonds

proceeded smoothly at room temperature to produce allylic, homoallylic, and bishomoallylic alcohols. Key to all this three transformations is not only the palladium chemistry, but also the use of ferrocenylphosphine ligand **L** (see Scheme 1).



Scheme 3 – Synthesis of allylic alcohols (**7**)

Another example [4] is the palladium catalyzed visible light-activation of cyclobutanone oxime esters to undergo either β -H elimination to deliver (*E*)-4-arylbut-3-enitrile or undergo radical addition with silyl enol ether and enamide to generate δ -cyanoketones. The authors have demonstrated that a dual ligand system composed of two phosphine ligands was essential for the high reactivity, one of the ligands being **dppf**. With optimized reaction conditions there was presented reaction scope with respect to oxime esters for ring opening addition with silyl enol ether and with respect to silyl enol ether for ring-opening addition (Scheme 4).



Scheme 4 – Ring opening addition reactions

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PANEL 2

Topical Issues of Social Sciences and Humanities

(DNU, Zoom)

Z. Bartůška, N. Styrník

HUSSITE REVOLUTION IN HRADEC KRÁLOVÉ

Hradec Králové is known as the regional town in the Czech Republic or the town that was the dowry of Czech queens. It is the town, which grew from a Slavic fortress into a fortified town and became a liaison camp for the Hussite movement.

From archaeological excavations we can observe that in the period of the 14th–15th century Hradec Králové was a prosperous town, where people, crafts and trade thrived. However, not many written sources from this period have survived.

In my paper I would like to focus on the period before the Hussite Revolution, when the inhabitants had to cope with the adversity of the times. The Czech lands were affected by disputes caused by the disagreements between King Wenceslas IV and his brother Sigismund of Luxembourg.

In 1402, Wenceslas IV settled in Hradec Králové with other Luxembourgers and distinguished guests, leaving the de facto rule of the Bohemian Kingdom to the then King of Hungary and his half-brother Sigismund.

In 1415, when Master Jan Hus was burned at the stake in Constance on 6 July, 452 members of the Bohemian and Moravian nobility gathered in Prague in early September for a congress at which the famous Letter of Complaint was written, ending with the words: “We, the preachers of the law of our Lord Jesus Christ, religious, humble, and thalers to the point of bloodshed, want to defend and defend, despising all fear and the findings of manmade in opposition. Given at Prague, in

the year of God, four thousand and sixteen, on the second day of September, in the full council of the lords of the nobility, nobles, and noblewomen of the kingdom of Bohemia and the Margrave of Moravia, under the affixing of our seals” [1]. The actors and co-authors of this Letter of Complaint protested against the burning of Master Jan Hus. With this document, for the first time in history, the Czech and Moravian nobility openly opposed the verdict of an ecclesiastical body. The document is also the first complete list of Czech and Moravian noble families.

We can only assume what attitudes the population of the town of Hradec Kralove, where Germans and Czechs lived, held at this tense time. However, there was probably sympathy for the Reformation in the town, since at the time of the burning, Queen Sophie was residing in Hradec Králové Castle, and unlike the king, she maintained her sympathy for Huss even after his burning. Because of her “pro-Huss” attitudes, the queen came into conflict with the Church in early 1419, when on 20 February 1419 the papal legate summoned her to appear in Hodonín within 30 days for questioning. The legate strongly emphasized her obstinacy and eloquently reminded her of the fact that, with regard to King Sigismund, the Church would not accept harsher punishment. Queen Sophie did not change her attitudes and views and continued to support “heretical delusions” [6].

At the queen’s court, in the council or even among the court officials, we could meet supporters of Hussitism at that time. Among them there was Henry of Vartenberk, who was the Hradec Králové burgrave and regional executioner, uncle of Prague’s burgrave Čeněk of Vartenberk, one of those who signed the Letter of Complaint in 1415.

In 1418, Pope Martin V strongly rejected communion under either method and, in agreement with the Council, urged King Sigismund to organize a Crusade against the Bohemians. However, Wenceslaus IV was dismayed by this and sought to restore the situation to its former state. He ordered that the previously expelled priests who had been expelled by the Hussite preachers be reinstated. He reserved three churches in Prague for communion under both methods. For this reason, supporters of Hussitism went on “pilgrimages to the mountains”. I mentioned this

because one of these pilgrimages led to Mount Oreb, which is located near Třebechovice pod Orebem.

In the second part of my paper I will deal with the question of the distribution of power in East Bohemia.

In eastern Bohemia, the power position of the lords and nobility, who were in favour of the chalice and at the same time belonged to the supporters of the Hussite movement, prevailed. Thus, they were able to provide protection for priests who were willing to preach under both forms and installed them in parish churches on their estates.

When King Wenceslas IV died on Wednesday 16, August 1419 at the New Castle near Kunratic, riots broke out in Prague. Hradec Králové was not spared from the riots and looting, where the people began to plunder the monasteries. Among the first was the Dominican monastery, which was known for its inquisitorial practices, followed by the Minorite monastery and then the monasteries of other orders. It was probably in these days that the priest Ambrož was expelled from the town, who eventually became the spiritual leader of the Hussites in Hradec Králové. Although Queen Sophie was in favour of the Hussite movement, she did not agree with the plundering and destruction of the monasteries and, moreover, after the death of the king she became the responsible ruler of the kingdom, so she quickly returned from Hradec to Prague.

On 17 March 1420, the Pope, through his legate, calls on Sigismund to send a crusade. To strengthen the group, he invited the lords of Wartenberg to join the expedition, most of whom did not sign the letter of complaint. He also received help from Hynek of Černošský of Dubá, who was put in charge of the royal town of Jaroměř.

After the announcement of the Crusade, the priest Ambrose called for a gathering of the supporters of the chalice on Mount Oreb and led them to the aid of Prague. This included the lower nobility, who provided military leadership to the peasantry who were not trained for battle. At the head of the group there were four hetmans, members of the higher nobility Hynek Krušina from Lichtenburg, Diviš Bořek from Miletín, Jakub Kroměšín from Březovice and Hertvík from

Rušínov and Ostružna. On their way to Prague they sacked and burned the Cistercian monastery in Mnichovo Hradiště. This so-called Oreb Brotherhood invaded Prague on 2 May 1420.

The military crowd included residents of three East Bohemian regions – Hradec Králové, Chrudim and Čáslav.

On 30 April 1420, King Sigismund left Svídnice and drove his troops to Prague, apparently taking Hradec Králové on the way without a fight on 3 May 1420, in which the supporters of the Chalice probably did not intend to defend themselves, or what happened was that the weakened Calician part was overwhelmed by the Catholic majority, who then let Sigismund into the bowels of the city and with his support consolidated their place in the city. But the result of Sigismund's stay in Hradec Králové suggests this. It is not recorded anywhere that executions took place, but only that the existing town council was deposed and replaced by townspeople loyal to Sigismund.

The Orebs in Prague, as well as the Calixtinite people in the wider surroundings of Hradec Králové, could not accept the development of events in the town and its occupation by Sigismund's garrison. Therefore, on 25 June 1420, Aleš of Vřešťov, Benes of Mokrovous and Jiří of Chvalkovice called a large assembly of the common people on Kunětická hora near Pardubice. The priest Ambrose and his followers, who were in Prague at the time, also went on this journey to support those present on Kunětická hora by preaching and administering the sacrament of communion. Since Ambrose knew the situation inside the town well, he and the governors devised a ruse to indicate to the scouts from the town that they were planning an attack on the monastery in Podlažice. Whereupon, at dawn on June 26, 1420, they arrived at the walls of Hradec Králové and, with the help of prepared siege ladders, scaled the walls and with minimal resistance took the town back under their rule. Some of the surprised garrison scattered to the towers and the castle, but even they quickly surrendered under the impasse. The followers of Ambrose who remained in Hradec Králové had been in collusion with Ambrose for some time to facilitate his return.

In spring of 1421, however, the entire cash from Hradec Králové, together with the Orebs, undertook one of the greatest joint actions of the entire Hussite Revolution when they went out to meet the armies of the Pragueers, who, under the leadership of Jan Žilevský, marched into eastern Bohemia against the towns that were on the side of King Sigismund.

At the end of June 1421, riots broke out in Prague when the existing constables were deposed and in early July, the priest Jan Žilevský basically took over the rule of the two towns (Old and New). However, in May 1422 he was overthrown by Prince Sigismund Korybutovich upon his arrival in Prague and had him executed. Even before the arrival of Sigismund Korybutovich, Hradec Králové was affected by the fact that Silesians began to attack the border villages and a second crusade was announced, only to invade Bohemia in five directions and Hradec was preparing to defend itself. The target of the attack was Prague, but the main battles took place at the besieged Žatec, where the combined Hussite army defeated the Crusaders.

It seems that the aforementioned Sigismund Korybutovich considered Hradec Králové a good strategic base, because soon after his control of the city at the beginning of his stay in Bohemia, he marched from Hradec against Opočno, the castle and property of the Hussites' long-time enemy Jan Městecký. Opočno, however, like Karlštejn, was not conquered. His position in the Kingdom of Bohemia was already considerably weakened in early 1423, when both Hussite candidates for the throne, Vladislav of Jagiellon and Grand Duke Vitold, reconciled with Sigismund of Luxembourg and made an alliance with him. The hopes for the candidacy of the Hussite Right were thus dashed. At that time Sigismund Korybutovich was probably not residing in the troubled Prague, but probably in the court of Hradec Kralove, from where he was subsequently recalled back to Poland.

At the beginning of September 1424, the warlord Jan Žižka marches with a field army, which was reinforced by troops from other cities on a punitive

expedition against the Prague inhabitants because Žižka and his branch of Hussitism were branded as pests of the country. However, thanks to John's eloquence, Rokycany did not retaliate, on the contrary, the Peace of Libeň was negotiated on 14 September 1424. This peace was confirmed by a joint campaign to Moravia where it is not firmly stated whether the Hradec troops participated in all the actions and more likely yes. This is proved by the documents on the campaign to Moravia, which describe that on 11 October, 1424 at Přebyslava the commander Jan Žižka died in the circle of his close friends. He was subsequently taken to Hradec Králové where he was buried in the Cathedral of the Holy Spirit on the Great Square. However, the place of burial was not accidental, as the Hradec people were closest to him and believed in his protection: “And the Hradec people preached to paint Žižka on a corduroy on a mile horse, in knight's armour with a mace in his hand, as he rode when he was alive. And when the Hradecceans fought under that corduroy, they never lost a battle”.

From this time on, the Hradec hordes will call themselves nothing but Orphans.

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THE INFLUENCE OF FOREIGN FASHION MAGAZINES ON EKATERINOSLAV FASHIONISTAS DURING THE "BELLE EPOQUE"

In the short period of 1885-1914, women's costume underwent drastic changes, demarcating two fundamentally different historical eras. The colossal development of science and technology, the emergence of women's education, social changes, the entry of women into the sphere of publicity, the struggle for their rights resulted in a radical change in women's clothing. Fashion appears as a social phenomenon, acquires signs of independent development. "Beautiful epoch" is a constant expression for describing this era [1, c. 5].

Katernoslav of the late 19th – early 20th centuries most prominently demonstrated European economic changes, outpacing other cities in terms of development rates. The 80s of the 19th century saw a great rise of the city, which was ensured by a number of economically important changes and innovations. The construction of a railway with a permanent bridge became a kind of "point of reference" in the history of Katernoslav. Therefore, influential people from all over the empire and from abroad began to flock to the city, its facade changed noticeably, numerous stores of clothing, jewelry, etc. were opened. The French and Belgians, who founded joint-stock companies here and whose presence changed the image of the city and its inhabitants, stand out in particular [2, c. 14].

Established communication channels opened up new opportunities in the supply of fashion magazines from all over the world. France was the main center of fashion trends, which young ladies followed with bated breath, thus French samples with the latest fashion patterns were the most desired. The editor-in-chief of the fashion magazine "Fashion gazette" N. P. Alovert took advantage of this: he founded the first magazine that introduced readers to French fashion, which is followed by the whole world." During 1885-1918, the magazine transmitted all the fashion news from Paris directly to the readers of Katernoslav, since the editor had appropriate agreements

with the Parisian fashion magazines *Le Moniteur de la Mode*, *La Coquet*, contained different sets (depending on the price) of patterns, had a sufficient circulation and, of course, was widely known in Katerynoslav at the turn of the century. In the libraries and museums of Dnipro, the most copies of this publication have been preserved, which allows us to talk about "Fashion gazette" as the most popular for the residents of Katerynoslav. In the library of the Dmytro Yavornytsky National Historical Museum of Dnipro also has a set of "Housewives Magazine", which was published from 1912 to 1926 and had a "Fashion Department" with relevant comments on the authenticity of French taste. In addition to purely fashionable advice, the magazines also contained recipes for social and family behavior [1, c. 19].

Women who became more visible and active in the European public space (movement for emancipation, suffragists – unknown words for the public space of the empire) became customers of new type and cut of clothes: democratic, comfortable, which allowed women to be active. Katerynoslav made it possible for women to take an active part in education by opening women's educational institutions, which were headed by prominent women, but for a long time young ladies preferred to emphasize their wealth and the possibility of choice, not always using new fashionable silhouettes like Poirot.

To sum up, the women's fashion during the "belle epoque" vividly emphasized the historical time. Katerynoslav with comfortable, paved streets and squares, modern modes of transport (tram, car) gave women the opportunity to demonstrate their taste and their husbands' money [1, c. 35]. Magazines such as "Fashion gazette" with their patterns allowed you to reproduce fashionable dresses, adapting them to your wallet or creating exact copies. Elements of authentic French women's clothing – from dresses and gloves to perfumes and hand fans – could be purchased in local shops.

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PSYCHOLOGICAL FEATURES OF THE TRANSFORMATION OF SPEECH BEHAVIOR NORMS AMONG UKRAINIANS DURING CRISIS EVENTS

One of the most pressing issues today is the problem of speech transformation, which has always been “sensitive” to stressful stimuli and social events. During the war, interpersonal communication of the Ukrainian people underwent significant changes: new lexical trends emerged, the use of verbal aggression in the form of obscene language and slogans with its elements became widespread, and the expressive function of speech was actualized. At this stage, the psychological mechanisms and factors of destructive speech behavior are insufficiently elucidated in the works of scholars, therefore they require detailed analysis and further research.

The legalization and proliferation of destructive patterns of speech behavior can be determined by various factors, including military events. It should be noted that an uncontrolled flow of verbal aggression in the form of the use of non-normative vocabulary during global historical upheavals is a natural phenomenon that serves to discharge psychological tension, a desire to respond to moral and physical violence, and is also a tool for dominating the enemy [3].

According to the Ukrainian researcher H. L. Vusyk, the use of non-standard linguistic constructions has become normalized since the beginning of the Russo-Ukrainian war, but it has an ambiguous character: on the one hand, the use of vulgar language remains taboo, while on the other hand, it occupies a certain place not only in the media resources but also in the Ukrainian culture as a whole [2]. S. A. Buzko asserts that the lifting of censorship in contemporary Ukrainian songs is a certain “extreme” means by which the communicative “attractiveness” of the song increases, and also demonstrates the negative attitude of both the authors of the texts and the Ukrainian society towards the aggressive policies of the Russian Federation towards the Ukrainian people [1].

The boundary between normativity and non-normativity of language use can shift depending on circumstances, situations, context, historical epochs, and so on. As a result, prohibitions on the use of crude and obscene language may disappear. For example, the slogan-invective (invective lexicon – insulting words, indecent gestures) “*Руський воєнний корабель іди на...*” has become a symbol of the struggle of the Ukrainian people against Russian aggression, a rallying cry of spirit and unity against a common enemy [4]. For this reason, this expression is not perceived as inappropriate or indecent.

The expression of one's negative emotions through the use of vulgar language is a natural mechanism that serves as a tool to ease one's tense state caused by the conditions of war. However, some of the “benefits” of using profanity are lost with an increased frequency of its usage, and it can transform into a rather dangerous linguistic-psychological space. It is important to remember that in this space, the speech behavior of children and adolescents is formed, and the acquisition of norms and rules of communication with others takes place. Therefore, it is crucial to minimize the spread of certain attributes with vulgar expressions, to stop transmitting negative patterns of speech behavior from cultural figures and the media, in order to preserve our high cultural heritage.

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SELF-LEARNING STRATEGIES FOR UNIVERSITY STUDENTS

The topic of self-learning and more effective information delivery has been in the field of view of researchers for many decades. University students encounter problems related to these topics while preparing for graduation exams and later on during their studies at university. This research focuses on better assimilation of acquired knowledge and more effective use of it.

Information is primarily a tool for solving problems. For students it is worth asking the question what information as a tool would be the best. Reflecting on this question, we can conclude that the best tool would be the one that can solve the greatest number of different types of problems, in other words, more universal. It is good to have a formula for any question or problem.

However, unfortunately, there is no perfect formula, each question requires its own answer, each task requires its own algorithm of actions. There are such concepts as understanding the essence and understanding the principle. Having an understanding of the topic and logical thinking, it is possible to build algorithms for a large volume of tasks from scratch. For instance, in geometry understanding the principles of creating figures allows you to derive formulas for finding any parameters of different figures in different conditions.

Understanding the subject also allows to assimilate information which is related to the subject better, and use knowledge more effectively. One of the efficient methods of conveying understanding might be to provide analogies but simpler and more accessible examples. The mentioned method allows to explain the principles of some phenomena or to show the relations between some objects.

Many scientific studies suggest that each person has their own individual traits, and the most effective way of learning is through an individual approach [2–4]. This is a relevant topic in the era of digital technologies and has many advantages. Firstly, no one knows you better than yourself, and it will be easier for you to choose

the right and most effective approach to learning. Secondly, obtaining information independently gives a better understanding of the topic. Thirdly, knowledge obtained or derived independently will be valued much more by the student, thus better memorized. The best way for teachers to implement such a method for teaching is to create the environment for students that will require them to have the same knowledge. That is, in order for students to feel comfortable, they will have to learn.

Motivation is the reason for doing something. The method that involves creating an uncomfortable environment is of great importance. This stimulus acts as motivation, but there are other factors where students are driven not by the desire to get rid of something uncomfortable, but to receive something as a reward. Based on this factor, the self-efficacy theory was created by A. Bandura [1, p. 217]. The self-efficacy theory states that a person will be much more successful in learning when they believe in their abilities. The main factor is motivation. Positive experiences of one's own work increase self-belief, thereby improving results, and conversely, negative experiences can undermine this belief. The best way to use this method is to practice with the learnt material so that you can see the results of your efforts, which can boost self-belief. Another way is to associate learning with some kind of reward.

In conclusion, it should be noted that learning themselves can be difficult for students. Therefore, students should find their motivation, set goals, discover their learning styles, implement the variety of modern learning techniques in order to cope with the university curriculum.

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HISTORICAL AND NORMATIVE ANALYSIS OF THE GENESIS OF BODIES IN THE FIELD OF ADMINISTRATIVE AND LEGAL REGULATION OF THE PATENTING PROCEDURE IN UKRAINE

The presence of an internationally recognized system of administrative and legal regulation of patent activity is a key element for achieving high economic and social development of Ukraine. Moreover, this system contributes to the approximation of the national mechanism for the protection of intellectual property rights to EU standards. Thus, conducting a meaningful historical and normative analysis of the system of bodies of administrative and legal regulation of patent activity is aimed at the chronological arrangement and systematization of current international and domestic NPAs that regulate social legal relations in this area, as well as determining the influence, role and functionality of subjects that carry out patent activities.

According to researchers R.V. Zakusylo and T.V. Yaroshevskaya, modern Ukrainian legislation in the field of patent regulation is subject to gradual unification and harmonization with EU intellectual law. It should be noted that this provision was precisely what was provided for in the Partnership and Cooperation Agreement between Ukraine and the European Communities and their member states. We would like to emphasise that Ukraine has joined numerous multilateral conventions in the field of intellectual property protection (Bern Convention for the Protection of Literary and Artistic Works, Protocol to the Madrid Agreement on the International Registration of Trademarks, the German Agreement on the International Classification of Goods and Services for the Purposes of Trademark Registration, the Budapest Treaty on the international recognition of the deposit of microorganisms for the purposes of patent procedures, the International Convention for the Protection of New Varieties of Plants, etc.).

The adoption of the new Code of Ukraine in 2004 was chronologically the first key achievement of legal regulation of relations in the field of intellectual

property protection and patent activity in the national legal dimension. In general, our country has formed an extensive system of regulatory regulation of this type of legal relationship at the level of laws ("On the protection of rights to plant varieties" (1993), "On copyright and related rights" (1994), "On the protection of rights to signs for goods and services" (1994), "On the Protection of Rights to Industrial Designs" (1994), "On the Protection of Rights to Inventions and Utility Models" (1994), "On the Protection of Rights to the Composition of Semiconductor Products" (1998), as well as at the level of sub-legal NPAs (order of the Ministry of Education and Science of Ukraine "On approval of the Rules for drawing up and submitting an application for an invention and application for a utility model" dated 22.01.2001 No. 22, order of the Ministry of Education and Science of Ukraine "On approval of the Rules for drawing up and submitting an application for an industrial design" dated 18.02. 2002 No. 110).

In our opinion, the adoption in 2020 of the Law "On Amendments to Certain Legislative Acts of Ukraine Regarding the Reform of Patent Legislation" No. 816-IX, which improved the protection of intellectual property rights, was a progressive step on the way to reforming administrative and legal relations in the field of patent activity on inventions and utility models. This law, provided for the innovative possibility of submitting applications for patent registration in electronic form, as well as defined an administrative procedure for invalidating the right to an invention or a utility model, which made it possible to block the activity of unscrupulous patent owners ("patent trolls").

It is possible to chronologically order the specified subjects and their legal successors within the framework of the historical-normative analysis of the "transformation" of the bodies that carried out the administrative-legal regulation of patent activity in Ukraine.

Based on the above, the Convention plays an important role, designed to ensure compliance with the rights and fundamental freedoms of the signatory countries. In addition, it defines a certain judicial procedure, which is designed to practically ensure the protection and restoration of the citizens rights and fundamental freedoms of the High Contracting Parties. Thus, the Convention is an extremely

important prerequisite for the establishment of a fair and transparent society in which everyone is equal before the law.

Thus, since the declaration of independence by Ukraine, the first central body of executive power in the field of legal protection of industrial activity was the State Patent Office of the State Committee of Ukraine on Science and Technology (State Patent), which acted on the basis of the provision approved by the Resolution of the Cabinet of Ministers of Ukraine dated 21.07.1992 No. 411. In 2000, the State Patent was reorganized into the State Department of Intellectual Property (hereinafter – DDIV), which functioned as part of the Ministry of Education and Science and acted on the basis of the relevant provision, approved by Resolution No. 997 of the Cabinet of Ministers of Ukraine dated 20.06.2000. DDIV was liquidated on based on the resolution of the Cabinet of Ministers of Ukraine dated 03/28/2011 No. 346 with simultaneous acceptance of its functions by the Ministry of Economy. Subsequently, at the organizational and legislative level, the Ukrainian Institute of Intellectual Property (hereinafter – Ukrpatent) was created – a state enterprise that was part of the Ministry of Economic Development, Trade and Agriculture in Ukraine (modern name – Ministry of Economy). This Ministry was responsible separately, and not exclusively for carrying out formal and qualification examination of applications for objects of industrial property (inventions, utility models, industrial samples, signs for goods and services, topography of integrated microcircuits and indication of the origin of goods) for compliance with the conditions for granting legal protection, made decisions on the issuance of protective documents, ensured implementation of state registration of objects of industrial property and official publication of information about them.

It is important to note that 2020 was marked by the implementation of qualitative changes in the structure of the state system of legal protection of intellectual property. For instance, by the Law of Ukraine "On Amendments to Certain Laws of Ukraine Regarding the Creation of a National Intellectual Property Body" dated June 16, 2020 No. 703-IX, the National Intellectual Property Authority (hereinafter – IPOR) was established, and on October 13, 2020, the Cabinet of Ministers of Ukraine adopted the order "On the National Intellectual Property

Authority", which determined that the functions of the IPOR are performed by Ukrpatent. From 10/15/2020, in accordance with the Law of Ukraine "On Amendments to Certain Laws of Ukraine Regarding the Creation of a National Intellectual Property Authority" dated 06/16/2020 No. 703-IX, the powers of the IPPC were finally defined, in particular in the field of administrative and legal regulation of patent activity.

Summing up the views of above, we conclude about the importance of the correct definition of the actual entity authorized to perform functions in the field of administrative and organizational-legal regulation of patent activity in Ukraine, especially taking into account the previous processes of reorganization of bodies in the field of intellectual property protection, which took place from 1992.

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V. Havshchuk, Yu. Honcharova

MALADAPTIVE DAYDREAMING AND ITS IMPACT ON LIFE

This article provides a brief sketch of such a significant topic in modern psychology as maladaptive daydreaming. Long-vexed discussions and multiple scientific research shed light on the complexity of this psychological phenomenon. Some scientists do not see pathology in this process and believe that dreaming is a natural process for a person. It is obvious that this process is useful because it develops our creativity, motivates us to do something, and even helps us understand

ourselves better. H. Hartman, for example, contends that dreaming is one of the adaptive functions for the organism and does not connect it with behaviour deviations [3]. But there are people who dream too much, replacing their real life with these dreams – people with obsessive dreams.

The term “maladaptive daydreaming” or “obsessive dreams” was introduced by Eli Somer in 2002. He defines this phenomenon as “extensive fantasy activity that replaces human interaction and/or interferes with academic, interpersonal, or vocational functioning” [5, p. 199]. It is noteworthy that this psychological concept is not an official syndrome. The researcher claims that “empirical inquiry is needed for additional clarification on the value of daydreaming analysis in the treatment of fantasy prone individuals” [5, p. 210]. However, the conducted research and testing have already gained a wide public response and attracted the close attention of scientists around the world.

The scientist called obsessive dreams a person's excessive craving for intense mental activity aimed at composing various plots and characters. We are all one way or another prone to fantasizing, but one can speak of maladaptive daydreaming only when dreams begin to crowd out real life and take up most of the time. At the same time, the person is fully aware that these are fantasies and does not accept them as truth, as is the case with hallucinations. It is also conceivable, as Somer asserts, that cultural differences are one of the important elements of the general picture [5, p. 211].

Some researchers (F. D. Barth, S. R. Gold, S. W. Minor, S. J. Lynn, J. W. Rhue) believe that people who have experienced psychological trauma in childhood are mostly subject to maladaptive daydreaming; obsessive dreams help them avoid real-life difficulties and negative emotions. It is also suggested that this phenomenon may develop due to more serious mental disorders: anxiety, obsessive–compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD) and similar [1; 2; 4].

How does maladaptive daydreaming affect life? Firstly, a person, absorbed in his dreams, receives serotonin, which every time the body needs more and more. Therefore, these dreams are called "obsessive". Obviously, these fantasies take up a lot of time and energy, which has a big impact on productivity, socialization, and life satisfaction. Due to the need for serotonin, which a person receives through dreams,

uncontrolled dreams become addictive and turn into a need that overshadows everything. If an ordinary person is sometimes distracted by dreams, then a person with obsessive dreams, on the contrary, is distracted by real life, based on a fictional world.

Because this psychological concept has not been sufficiently explored, there is now only speculation about how it can be cured. Some psychologists advise getting rid of the stimuli that cause these fantasies. People suffering from maladaptive daydreaming advise things that do not fully help them themselves.

In fact, every month on the Internet we can find more and more confessions of people struggling with obsessive dreams and sharing their painful experience. Thus, more and more people are facing this problem and revealing it. It means that investigations in this sphere are relevant and must be continued.

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Ye. Hordiienko, S. Riabovol

FEATURES OF TRANSLATION IN THE SPHERE OF DIPLOMACY

Diplomatic discourse is “a complex communicative phenomenon, covering the entire palette of speech interactions (acts) of diplomats, implemented in oral and written form, regulated by strict frameworks of both general (international) and ethno-specific rules, existing historical traditions, rhetorical and stylistic norms, and also has its own characteristics” [4, p. 31].

As a result of functional analysis, N. Kashchyshyn considers it expedient and logical to divide diplomatic discourse into three conventional parts: 1) diplomatic correspondence (official and semi-official letters, a verbal note, a telegram, a memorandum, a personal note, a memorial note); 2) oral genres of diplomatic discourse (a statement, a speech, etc); 3) diplomatic texts with a high level of standardization: resolutions, protocols, declarations, memoranda, treaties, pacts, communiques, conventions [2, p.74].

Diplomatic translation is one of those areas of translation that is not often researched by linguists, because it touches on the little-known and rather closed world of diplomacy [3, p. 242].

The purpose of translating diplomatic documents is not only to reproduce the semantic and syntactic structures of the original language in the translated language, but also to achieve the same effect that a diplomatic document creates in the original [5, p. 2].

Translation in the field of diplomacy has its own rules and peculiarities. Since it is carried out in embassies, consulates and diplomatic missions, it requires not only impeccable knowledge of terminology, diplomatic tact, deep awareness of events taking place in the international sphere and the political, economic and social spheres of one's own country, but also special methods and professional techniques [3, p. 244].

Diplomatic translation consists of two stages: analytical and synthetic. An important role is given to the analytical stage: clarification and translation of individual components, abbreviated lexical units, terminological phrases, complex terms, unassimilated loan terms [6, p. 302].

It is worth emphasizing the need to understand the structural types of English diplomatic documents during translation. Priority methods of diplomatic translation are translation using an established equivalent, transliteration, transcription, use of descriptive equivalents [3, p. 245].

During the process of translating international legal documents, not only the content should be preserved, but also the structures that are closest to or coincide with the structures in the original text both from the point of view of syntax and from

the point of view of grammatical constructions should be selected. The syntactic content of international documents can be preserved through the use of various types of grammatical transformations [1, p. 140].

We make the conclusion that translation in the sphere of diplomacy requires mastering lexical and grammatical translation transformations, tactfulness, thorough background knowledge, following all necessary rules and stages of translation, taking into account all the peculiarities of the sphere.

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Y. Ihnatenko, E. Berezhnaya, O. Hurko

THE CONVENTION ON THE PROTECTION OF HUMAN RIGHTS AND FUNDAMENTAL FREEDOMS AS THE NORMATIVE AND LEGAL BASIS OF THE ECHR'S ACTIVITIES

The Convention on the Protection of Human Rights and Fundamental Freedoms has become a cornerstone in the protection of human rights and fundamental freedoms, having developed specific mechanisms for judicial protection and guaranteeing public, social, and religious rights of citizens. Thus, the adoption of the Convention eventually was a truly historic and significant event not only for a single country, but for the entire close European family.

The adoption of the convention was related to the Universal Declaration of Human Rights in order to ensure that the signatory countries adhere to their obligations and ensure fundamental human rights and freedoms on the territory of the respective state. Thus, the Universal Declaration of Human Rights became the basis and foundation for the Convention, which in turn was called to build walls, a ceiling and bring order to the house.

Ukraine joined the Council of Europe on November 9, 1995, having undertaken to comply with the norms of the Convention. On April 23, 1998, the Cabinet of Ministers of Ukraine adopted a resolution "On the Commissioner for Compliance with the 1950 Convention "On the Protection of Human Rights and Fundamental Freedoms". The Convention entered into force for Ukraine on September 11, 1997. The Ministry of Foreign Affairs of Ukraine approved the official translation on January 27, 2006. Thus, Ukraine has recognized the norms of the Convention and the ECHR as an authorized court to consider complaints provided for by the ECHR.

The Convention was opened for signature on November 4, 1950, and entered into force on September 3, 1953. The Convention introduced a judicial mechanism for the protection of social, labor, economic, political and cultural citizens' rights of the member countries of the Europe Council. In turn, the European Court of Human Rights assumed these judicial and mentoring functions. Citizens have the right to apply to the ECHR for the protection of rights and fundamental freedoms only in the event that all means of national protection have been exhausted. In addition, the following circumstance is a mandatory condition for the violated right and freedom to be provided for by the Convention. Thus, the ECHR is competent to review only those violations of rights and fundamental freedoms defined by the Convention.

A complaint to the ECHR is submitted in the national judiciary language, and decisions of judges of all instances must be attached to it. As practice shows, the average term of a complaint consideration by the ECHR is several years. There is also a widespread trend that the majority of ECHR complaints are deemed inadmissible, more than 90%.

The Convention protects the following rights:

- Right to life (Article 2).
- Right to liberty and security (Article 5).
- Right to a fair trial (Article 6).
- Right to respect for private and family life (Article 8).
- Freedom of thought, conscience and religion (Article 9).
- Right to marry (Article 12).
- Right to an effective remedy (Article 13) [1, p. 6-13].

At the same time, the Convention prohibits:

- Prohibition of torture and death penalty.
- Prohibition of death penalty.
- Prohibition of slavery and forced labour.
- No punishment without law.
- Prohibition of discrimination.
- Prohibition of abuse of right [1, p. 6-14].

Based on the above, the Convention plays an important role, designed to ensure compliance with the rights and fundamental freedoms of the signatory countries. In addition, it defines a certain judicial procedure, which is designed to practically ensure the protection and restoration of the citizens rights and fundamental freedoms of the High Contracting Parties. Thus, the Convention is an extremely important prerequisite for the establishment of a fair and transparent society in which everyone is equal before the law.

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THE ISSUE OF INTERNATIONAL LEGAL GUARANTEES REGARDING THE IMPLEMENTATION OF HUMAN SOCIAL RIGHTS IN UKRAINE

Adopted on June 28, 1998, the Constitution of Ukraine proclaimed in Art. 1. our social state [1]. This, first of all, means the presence of a state priority in ensuring the social and economic rights of citizens. However, the existing economic situation in Ukraine, the imbalance and underdevelopment of the current system of social protection and social security do not allow turning this declaration into reality. An opaque system of benefits and social payments continues to dominate the sphere of social protection and security. After all, instead of real social services for the population, a cumbersome network of state and communal institutions of social protection and services is maintained. At the same time, along with the support of the most socially vulnerable groups, the system of social protection and social security provides for a significant number of benefits and social guarantees on a professional basis. Such measures of social protection and social security of representatives of certain professions are often completely unjustified, because employment in a certain industry should be stimulated not by providing certain benefits, but by increasing the wages of employees, as is the case in developed countries.

Being a party to a number of international treaties, Ukraine accepted and recognized a complex of basic social rights for its citizens, as well as for foreign citizens and stateless persons legally residing on its territory. Our state's guarantee of these rights, which are universally recognized by the international community, simultaneously gives rise to Ukraine's obligations both to each individual and to the international community. Thus, Ukraine's participation in international treaties obliges our state to establish legislative guarantees and implement mechanisms for the realization of basic human social rights, including: 1) the right to social security and to exercise the rights necessary for maintaining the dignity and free development of

a person in the economic, social and cultural spheres with the help of national efforts and international cooperation in accordance with the structure and resources of each state [2; 3]; 2) the right to an adequate standard of living, i.e. such a standard of living, including food, clothing, housing, medical care and necessary social services, which is necessary to maintain one's health and well-being and that of one's family; 3) the right to social security, which applies to cases of unemployment, illness, disability, widowhood, old age, and other cases of loss of livelihood due to circumstances independent of the individual [4]; 4) the right to use the services of social services, which is disclosed through the obligation to promote the functioning of social services or to create such services, to encourage individuals and voluntary or other organizations to participate in the creation and functioning of social services; 5) the right of disabled persons to independence, social integration and participation in society, supported by obligations to take measures to provide disabled persons with guidance, education and professional training, whenever possible, within general programs or, when this seems impossible, in public or private specialized institutions, as well as promote their access to work, provide assistance in removing obstacles to communication and movement; 6) the right of the family to social, legal and economic protection, conditioned by the obligation of states to provide social assistance and assistance to families with children, including providing housing to families, assistance to newlyweds and other appropriate means; 7) the right of children and adolescents to social, legal and economic protection, which includes providing children and adolescents, taking into account the rights and obligations of their parents, the care, assistance, education and training they need, in particular by creating or ensuring the functioning of institutions and services, as well as providing protection and special assistance from the state to children and adolescents who are temporarily or permanently deprived of assistance from their families; 8) the right of the elderly to social protection, in particular, giving the elderly the opportunity to remain full-fledged members of society as long as possible, to freely choose their lifestyle and to live independently in a familiar environment for as long as they wish and are able (in particular, through

the provision of housing, adapted to their needs and state of health), including guarantees for elderly people living in homes for the elderly, provision of appropriate care with respect for their personal life and ensuring their participation in decision-making regarding their living conditions; 9) the right to protection from poverty and social exclusion, i.e. providing socially vulnerable persons with effective access to work, housing, professional training, education, culture, as well as social and medical assistance.

Summing up, it should be noted that Ukraine has not recognized the norms of the European Social Charter (revised) regarding the right to social security and the right to social assistance as binding. The Verkhovna Rada of Ukraine recognized these rights as goals that Ukraine will strive to achieve by all appropriate means. It must be recognized that a significant feature of the current legislation in the field of social protection and social security is its lack of systematicity and inconsistency. Thus, in the corresponding legislative acts, the influence of fundamentally different concepts and approaches can be traced, among which the Soviet model (the dominance of benefits and social payments, which often replace the appropriate level of wages and material support) and the European model (the dominance of social services and social work aimed at for the support of the most socially vulnerable categories and persons in difficult life circumstances).

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THE MAIN CONCEPTS OF EXISTENTIAL PSYCHOTHERAPY

Existential psychotherapy is a relatively new and heterogeneous school in psychology. The main difference between this approach and other psychotherapeutic directions is that it considers a person as an existence that cannot be completely reduced to biology and in which there is always time for decision-making. There are issues that have emerged recently or have acquired a different interpretation in this area of psychology.

Death. The most obvious, the most easily apprehended human being concern is death. We exist now, but one day we shall cease to be. Death will come, and there is no escape from it. It is a terrible truth, and we respond to it with mortal terror. According to Spinoza, «*Everything endeavors to persist in its own being*» and «*a core existential conflict is the tension between the awareness of the inevitability of death and the wish to continue to be*» [1, p. 85]

Freedom. Another human being concern, a far less accessible one, is freedom. Ordinarily we think of freedom as an unequivocally positive concept. Yet, freedom viewed from the perspective of ultimate ground is riveted to dread. In its existential sense, «freedom» refers to the absence of external structure. Contrary to everyday experience, a human being does not enter (and leave) a well-structured universe that has an inherent design. Rather, an individual is entirely responsible for his or her own world, life design, choices, and actions. «*Freedom in this sense has a terrifying implication: it means that beneath us there is no ground – nothing, a void, an abyss*» [2, p. 18]. A key existential dynamic, then, is the clash between our confrontation with groundlessness and our wish for ground and structure.

Existential isolation. A third ultimate concern is isolation – not interpersonal isolation with its attendant loneliness, or intrapersonal isolation (isolation from parts of oneself), but a fundamental isolation – an isolation both from creatures and from world which cuts beneath other isolation. «No matter how close each of us becomes

to another, there remains a final, unbridgeable gap; each of us enters existence alone and must depart from it alone» [2, p. 21]. The existential conflict is thus the tension between our awareness of our absolute isolation and our wish for contact, for protection, our wish to be part of a larger whole.

Meaninglessness. A fourth ultimate concern or given of existence is meaninglessness. If we must die, if we constitute our own world, if each of us is ultimately alone in an indifferent universe, then what meaning does life have? Why do we live? How shall we live? If there is no pre-ordained design for us, then each of us must construct our own meanings in life. Yet, can a meaning of one's own creation be sturdy enough to bear one's life? This existential dynamic conflict stems from the dilemma of a meaning-seeking creature who is thrown into a universe that has no meaning [3].

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M. Kharharova, O. Besarab

MORAL CULTURE AS AN IMPORTANT ASPECT OF THE PROFESSIONAL ACTIVITY OF A LAWYER

Moral qualities are what fill the concept of moral culture. Moral qualities have always been a valuable characteristic of a person. They play an important role in all spheres of human life, especially in spheres where vital public interest is implemented-economy, politics, law enforcement and education. In addition, with the complication of a specific situation in which one has to fulfill one's professional duty, the role of the moral factor increases significantly, as proved by the examples from the history of our society.

As noted in their work, professors S.D. Husarev and O. D. Tikhomirov: "Moral culture occupies one of the most important places in the professional activity of lawyers" [1, p. 332]. This statement is explained by the scope and nature of the activity of lawyers, in addition to the tasks that appear before them within the limits of professional duty. The work of lawyers is connected with fulfilling the duty to the state and society, ensuring the rights and freedoms of citizens, serving the law, and, therefore, justice, which places high moral demands on all lawyers. This is especially true for law enforcement officers who work in more difficult conditions and solve sometimes very difficult problems. Even in peacetime, the activities of law enforcement officers are often associated with a risk to life and health, which leads to significant moral injuries and psychological stress. That is why the high level of their professional and moral culture is an important factor in the quality solution of the tasks set before the employees. The importance of moral culture in the conditions of the crisis of modern society, in the conditions of reforming the state apparatus, as well as the system of law enforcement bodies, should be especially emphasized. Under such circumstances, there is a growing need to involve the most morally educated and mentally stable workers in law enforcement work. This is due to the fact that in the state of reforming our society, significant hopes are placed precisely on law enforcement agencies, on dedicated professionals who know how to compromise their own interests for the sake of the common good. For employees of legal institutions, knowledge about the principles and ideals of morality is considered necessary, as it allows them to make a moral choice, in other words, to determine their model of behavior in accordance with the social ideal, to make decisions within the limits of the law, which would not contradict public interests and needs. This helps to increase the authority of the law, and, therefore, to strengthen the legal order and the regime of legality. Immoral actions of lawyers cause significant material and spiritual losses.

In his work S. S. Slyvka notes: "The moral culture of a lawyer is the result of the formation of one's own harmony: between the achieved maximum level of higher morality and the active use of moral norms in legal activity" [2, p. 177].

Personal harmony is primarily moral, which the lawyer "constructs" himself, while the creation of harmony has a dynamic and imperative character. Moral culture enables a worker in the legal field to understand his mistakes and work out ways to eliminate them, to feel his moral responsibility to the people, to each client, remembering the "credit of trust" to him and the need to defend the truth. The moral culture of a lawyer focuses on preventing a violation of the harmony between the spiritual and the material aspect in professional activity. Mostly, every crime is aimed at satisfying material needs, thereby devastation of the soul. The task of a lawyer's moral culture is to fill this void with moral values. If the activity of a law enforcement officer is carried out in accordance with the requirements of high morality, then his views have the right to be realized in reality, and this is precisely what contributes to progress in legal regulation. Focusing on the implementation of personal progressive views, a lawyer should not be afraid to be a "white crow", should not give up his own views if he is convinced of his rightness, but act according to the call of conscience, in accordance with moral and spiritual convictions. Sometimes the wrongful actions of a lawyer in the past prevent him from decisively changing his professional behavior in a positive direction. However, an appropriate level of moral culture always enables a legal worker to change his own views for the better, albeit with a delay. And this is the guarantee of a civilized legal order. The complexity of legal activity can sometimes cause a lawyer to wish not to interfere in some legal situations. Overcoming despair will help in each specific case, this or that function of moral culture, thanks to which there is always a chance to get out of any situation. In other words, in general, the functions of moral culture help in the formation of spirit and will, which are extremely necessary for successful professional activity.

The moral culture of a lawyer's professional activity is not only a requirement, but also a sign of competence and professionalism. And these are also qualities that are formed during professional education, and then activities in the legal field. Intellect and reason, which testify to harmony and disharmony in actions, are most evident in a lawyer's decision on a case, because it is the level of moral culture that

is revealed when contacting a client, which boils down to the condition: to protect the interests of the citizen without yielding to the interests of others. And with the help of consciousness, which is realized by making a legal decision, moral feelings are balanced. Also, a very important component of a lawyer's moral culture is the active use of moral standards in legal activity, since the existence of morality lies in its manifestations. In the practice of legal regulation of social relations, morality prompts action and reveals the essence of a lawyer as a person. A lawyer must be aware of the individual uniqueness of each person, creating favorable conditions for the protection of the most precious thing – human life, his rights and freedoms. Moral culture enables a lawyer to realize his own mistakes and think of ways to correct them, to feel his responsibility to the client, to every citizen, remembering the need to defend the truth.

So, we see that moral culture occupies a very important place in the professional activity of a lawyer.

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A. Kondruk

A TACTIC OF DISTRACTING ATTENTION AS ONE OF THE TACTICS OF A HYPOCRITE

Hypocrisy is pretence, discrepancy between the words and deeds of personality and his/her real feelings, beliefs, and intentions. Hypocrisy as a negative moral quality is an impetus for deception, lie, and insincerity, which are its related notions [2, p. 224]. The hypocrite puts on a mask, trying to hide his true feelings and emotions in order to achieve his own goal.

An insincere speaker is able to flexibly use verbal and non-verbal means [1, p.18]. He uses various strategies, tactics and techniques in order to persuade the communicative partner to make the decision he wants. One of such tactics is the tactic of diverting attention.

In order to divert attention from one thing, one needs to draw attention to something else. The ways of attracting attention are well known to magicians. They often take advantage of the fact that surprises and attracts people's attention. In order to divert attention, they can, for no apparent reason, put their right hand on the head of the interlocutor or can raise their left hand. While the attention of the viewer is attracted by one hand, the other hand can do something inconspicuous. It is the tactic that the hypocrite uses. He tries to focus the attention of the addressee on something insignificant in order to imperceptibly realize some of his own goals at the same moment, to carry out an action that is beneficial and necessary for him. E.g.:

Jeff was working in back of the pedestal. The frustrated guide turned to the group. "Now, ladies and gentlemen, as I was saying, over here we have a selection of fine diamonds at bargain prices. We accept credit cards, traveler's checks" – he gave a little chuckle – "and even cash."

*Tracy was standing in front of the counter. **"Do you buy diamonds?" she asked in a loud voice. /.../ "My husband is a prospector. He just returned from South Africa, and he wants me to sell these."***

As she spoke, she opened the briefcase she carried, but she was holding it upside down, and a torrent of flashing diamonds cascaded down and danced all over the floor.

"My diamonds!" Tracy cried. "Help me!"

There was one frozen moment of silence, and then all hell broke loose. The polite crowd became a mob. They scrambled for the diamonds on their hands and knees, knocking one another out of the way. /.../

When the dazed guard finally managed to stagger to his feet, he pushed his way through the bedlam, reached the pedestal, and stood there, staring in disbelief. The Lucullan diamond had disappeared. So had the pregnant lady and the electrician [3, p. 358].

In this example, the speaker, Tracy, who was pretending to be pregnant, and her accomplice, Jeff, visited a diamond show. It is known from the context that they deliberately damaged the alarm system. Jeff pretended to be an electrician and offered his help. While Jeff was “fixing” the system in back of the pedestal, Tracy began to draw attention to herself in order to distract the attention of the security and other exhibition workers from the main Lucullus diamond. Using the insincere speech act of the quesitive, she loudly asked if they bought diamonds (*Do you buy diamonds?*). Tracy made up a story that her husband was a prospector of diamonds, convincingly presenting the information with the help of insincere assertives (*My husband is a prospector. He just returned from South Africa, and he wants me to sell these*). When everyone’s attention was drawn to her, she opened her briefcase, which was upside down, and artificial diamonds fell out of it as if by accident. With the help of expressives (*My diamonds!, Help me!*) Tracy diverted the attention of everyone present from the main diamond of the exhibition. After a few seconds, everyone noticed that the “pregnant” woman, the “electrician” and the main diamond had disappeared (*The Lucullan diamond had disappeared. So had the pregnant lady and the electrician*). As a result, the hypocrites, using the tactic of distracting attention, outsmarted everyone present and stole the precious stone.

The actualization of the tactic of distracting attention proves that according to the situation, an insincere speaker can skillfully combine verbal and nonverbal means to achieve his/her goal.

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CURRENT PROBLEMS OF THE SOCIAL AND HUMANITARIAN SCIENCES

Today, we can observe the active growth of international tension in the world political system, which is the main catalyst for the formation of new military conflicts in various regions of the world, which often lead to human rights violations and humanitarian crises in the war zone. The use of brute force in bilateral relations between various actors of international political and economic relations is also increasing. In the conditions of the modern globalization process, which has significantly accelerated under the conditions of the global economy existence, it is possible to state the expansion of the influence of transnational corporations and other companies on world commodity markets, which actively use the policy of transferring their main production capacities to densely populated, but economically backward countries in comparison with other countries in the world. The result of this process is the loss of jobs by a significant number of people, which leads to the deterioration of the economic situation of the countries, the need for the authorities of certain countries to allocate additional financial grants and subsidies aimed at supporting the population living below the poverty line due to unemployment and lack of demand in the context of the internal personnel market reformation. These phenomena, in turn, lead to the growth of social discontent and protests against existing government policies. In order to prevent the development of a socio-political crisis in the country, it is necessary to study the reaction of the population to structural changes in the countries, as well as to analyze further actions by the world community. All the above-mentioned phenomena and their processing as statistical data are an actual problem of experiments in the field of social and humanitarian sciences.

The social and humanitarian sciences include a number of disciplines that form the theoretical and methodological system of all scientific researches, such as

the economic theory of the human relations functioning, sociology, political science, and jurisprudence. The urgent problems of the social and humanitarian sciences are considered to be the existential need for the formation of the laws that will make it possible to clearly define and explain the conditions for the diversification of old and the formation of new connections between essential and necessary phenomena and processes of social interaction, which are definitely in the stage of integration and are interdependent on each other, especially under the conditions of the globalization processes strengthening and the blurring of socio-cultural systems of different ethnic groups, on the basis of which social and humanitarian sciences are built. In general, the formation of social and humanitarian sciences marked the completion of the scientific sphere formation as a fundamental concept. Scientific research within these sciences was multi-vector and covered a significant area of human activity. Thus, characterizing the main tasks of social and humanitarian sciences, it should be noted that the goal of all experiments is to structure previously acquired knowledge about the conditions of stability of relations between different peoples and social classes of the population. Under these conditions, an important problem of these sciences is to develop the forms of interaction between different groups of society based on mutual respect, trust and leveling of social differentiation. For example, the economic theory of the social and humanitarian sciences is designed to demonstrate the connection, on the one hand, between the sale of products on the domestic market of the country and, as a result, the ratio of supply and demand, and on the other hand, the price of the corresponding group of goods. Sociology, in its turn, has chosen to establish cause-and-effect relationships between demographic processes in different countries of the world and the socio-economic development of countries as the main direction of scientific activity. The contribution of sociology is one of the greatest, since it is with the help of this scientific field that the governments are able to pragmatically build the future socio-economic structure of their own states, which will also necessarily pay more attention to the peculiarities of the demographic indicator. On the basis of sociology research, radically new methods of implementing any reforms are being formed, in

accordance with those systemic changes that occur in the social sphere of countries, since it is with the help of the workforce that the national economy can have certain prospects for further development, as well as diversification of industrial products. In order to ensure its competitiveness on the world commodity markets, which will lead to the attraction of a greater number of foreign investors and, as a result, to the creation of new jobs for citizens of the countries. Turning to political science as a socio-humanitarian science, it is also necessary to highlight its determining importance in the formation of social relations. This science is designed to characterize the genesis of politics and the basis on which it is formed. It determines the influence on the internal and external policy of state entities by the interests of various society strata, nations and other subjects of socio-political relations, since it is precisely these relations that are carried out entirely through human activity, by which this system was created, in order to get out of the state of "the war of all against all", which Thomas Hobbes described in his treatises, and to create a structured system of international relations that is subordinate to the dogmas determined by society. Jurisprudence, as a social and humanitarian science, ensures the functioning of a legal society in which an integrated system of laws functions, which regulates relations between physical and legal entities and global actors of international relations. Jurisprudence limits certain rights of the population and their activities, in order to organize a managed society, the essence of which is that the population delegates part of its rights to the country, in order to eliminate the threat of anarchy, which arises due to the lack of restrictions on human activity. As a result, state authorities, in exchange for some rights of citizens transferred to them, ensure peace, economic and political stability in the country itself, organize the activities of social institutions necessary for life, such as schools, universities, hospitals, courts, communal services, and also create mechanisms for the preventive flow of aggression from other states, protection of sovereignty and territorial integrity through the formation of armed forces. An example of the delegation of population rights to elected authorities in the country can be mandatory service in the army, which de facto limits the movement of citizens of the country, but at

the same time ensures peace and protection of the country. A good example would also be paying taxes. At the expense of financial receipts to the national budget, the government allocates funds to support and provide for all the needs of the population, namely the updating of educational materials and equipment in the field of education, the development of public transport, the carrying out of repair works of the housing stock, the construction of road and logistics infrastructure to provide the citizens of the country with the necessary goods, banking services and creating a favorable background in the states for attracting foreign investments and building additional enterprises that will create jobs for the country's population[1].

Characterizing the current problems of the social and humanitarian sciences in the Ukrainian paradigm, it should be noted that, at the moment, the main systemic dysfunctions in the social and humanitarian sphere of Ukraine are: the lack of a strategic and pragmatic vision of the future reorientation of our country's policy, since, under the conditions of the geopolitical position of Ukraine and Russian military aggression, the protective strategy of the country's development remains dominant, while the disclosure of the social policy potential and ensuring the harmonious functioning of all social institutions of Ukraine, which are designed to provide the population with everything necessary for a stable life, is not in sufficient demand and is not allocated for it necessary volumes of expenditures from the state budget, which will certainly become a problem for further economic, political and cultural integration in the EU, whose member countries are mainly focused on supporting the public sphere. Also, there is no regulated approach in Ukraine, which would be based on the experiments of domestic scientists in the field of social and humanitarian sciences, regarding the formation of social guarantees by the elected government for the citizens of Ukraine. In addition, the problem remains the actual lack of a modern mechanism for selecting priority areas of the future social policy of the Ukraine and means for their professional implementation in all spheres of life, which would be based on the latest trends arising in socio-political, humanitarian and economic relations. It should also be added that due to the significant bureaucratic apparatus and the lack of a sufficient number of

lobbyists on this topic, the implementation of social reforms is slow and untimely. An important problem of the social and humanitarian sciences studying the Ukrainian internal environment is the solution of gradual wages recession of the citizens, due to the acceleration of inflationary processes or in cases of global economic crises. There is an increase in the difference in wages in different regions of our country, including, depending on the profession, which leads to a drop in demand for specialists in a certain profession and an unemployment increasing [2]. It must be noted that the regulatory and legal basis of social protection needs institutional reforms and improvement, due to the adoption of additional legislative acts and increased cooperation between civil society and government, with the aim of their consolidation on issues of social and humanitarian policy. I will also note that the modern Ukrainian politicians often appeal to the need to increase social benefits for certain groups of the population. These processes, as a rule, are connected with the populist activities of certain political actors who seek to expand their electorate, while not having concrete proposals and programs to solve the issues of social security for the citizens of the country. Since the increase in subsidies for the social sphere, which is advocated by some representatives of Ukrainian political circles, is not objective, due to the lack of analysis of the state budget's ability to expand financing of the social sphere in particular. The scientific and methodological obsolescence of the material and technical base, on the basis of which the social and humanitarian policy of the country should be formed, remains an urgent problem, as a result of insignificant state funding for research in this area of internal relations, as well as for the formation of the concept of the development of Ukraine's policy in this field, based on the analysis modern system of social relations [3].

Summing up, it should be noted that the social and humanitarian sciences are a multifaceted system of disciplines, the actual problems of which are the study of all spheres of human interaction of existential importance: politics, economy, culture, education, humanitarian sphere, scientific and technical development and the introduction of innovations in all spheres of life, in order to improve its quality.

Social and humanitarian sciences and research conducted within the scope of their analysis provide an opportunity to diversify the concepts of relationships between various global political and economic actors, and systems of internal political and social relations in countries. That is why these sciences actually represent the cornerstone of all relations that arise in the process of individual groups interaction with each other.

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V. Kozina, V. Isachenko, O. Osadcha

SENSORY EDUCATION AS A MEANS OF CORRECTING VIOLATIONS OF CHILDREN'S SOUND PRONUNCIATION

Speech is a complex and organized mental function, so speech disorders, no matter how serious they may be, always occur in close interaction with other functions of the body. In children with speech disorders, functional or organic changes in the state of the central nervous system are often observed. Preschool children are usually characterized by specific cognitive processes of the psyche with variable expression, motor and sensory spheres, as well as many affective personality traits. The lack of such perceived development of a child can interfere with the normal functioning of a small person in preschool institutions and further successful integration into the school curriculum.

Sensory education of a child is the education of his perception and the formation of ideas about the external properties of objects: their shape, color, size, position in space, as well as smell, taste, etc. On the one hand, it is the basis for the general

mental development of a child, and on the other hand, it has an independent significance since full perception is necessary for successful learning not only in school or kindergarten, but also for many types of work. As a result of sensory development, a child masters perceptual behaviors, in particular he explores objects and distinguishes between their most characteristic properties, as well as assimilates sensory criteria, generally accepted properties and connections between objects. It may be explained by the fact that sensory learning aims to recognize the appropriate form, naming and ability to act.

Recently, the developmental environment for children of preschool and primary school age has been qualitatively enriched with computer game complexes. Due to the introduction of information and communication technologies in the lives of children through the game, it is possible to ensure the mastery of new ways of activity and contribute to the personal development of children.

The program complex “Soroka Biloboka” offers a variety of games and tasks to support various academic subjects, especially the Ukrainian language, art, music, etc. The use of the keyboard significantly improves fine motor skills [1, p. 43]. The use of the educational and software complex “Soroka Biloboka” can become not only a powerful means of correction, but also a thirst for knowledge, the development of independence of thinking. Among the software tools for children of preschool and secondary school age, there are several programs that support the study of mathematics, including: “Logic”, “Zhu-zhu bee”, “Magic numbers”, “Petryk”, “Vacation with grandmother”, “Petryk. Forest adventures”, “Petrik. The Mysterious Island” [2, p.16]. Of course, there are many other different games without a computer, for example: “Magic Bag”, “Find a mistake”, “Name the days of the week”. They are also aimed at developing the sensory and speech abilities of children.

The use of computer technology in teaching children with speech disorders significantly optimizes the process of perception of mathematical materials, since it includes game techniques, facilitates the processes of perception, awareness and memorizing information, creates a positive background for the development of the cognitive sphere of the personality of children with speech disorders. Above all,

it personalizes learning and the educational process, contributes to its full assimilation.

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Ye. Kozyr, O. Hurko

THE SPECIFIC FEATURE OF VERBALIZING THE CONCEPT OF BEAUTY IN LITERARY TEXTS

Beauty is a subjective and culturally-defined concept that refers to the qualities or features that are pleasing to the senses, especially those related to visual appearance. It encompasses a wide range of attributes, such as symmetry, harmony, proportion, balance, and clarity, that are often associated with notions of perfection, elegance, and aesthetic appeal. Beauty can be found in various forms, including natural landscapes, works of art, human beings, and everyday objects, and it has been a source of inspiration and fascination for philosophers, artists, and scholars throughout history.

Verbalizing beauty in literary texts is important because it allows authors to convey their personal and cultural perspectives on what is considered beautiful, as well as to evoke emotional responses and sensory experiences in their readers. By describing the beauty of people, places, objects, or events in their works, writers can create vivid and immersive settings that transport their audience to new and imaginative worlds. They can also use beauty as a tool for character development,

by revealing the inner thoughts, feelings, and values of their protagonists and other characters through their aesthetic preferences and perceptions. Moreover, verbalizing beauty in literary texts can serve as a means of social commentary, by reflecting and challenging dominant beauty standards and ideals that shape our understanding of ourselves and the world around us.

The concept of beauty has been a recurring theme in literature throughout history. It has been depicted in different ways depending on the cultural, social, and historical context of the works. In ancient Greek literature, for instance, beauty was often correlate with physical perfection and was depicted through descriptions of the human body, such as in the works of Homer and Plato. During the Renaissance, beauty was tangent to proportion, harmony, and balance, as seen in the works of Leonardo da Vinci and Michelangelo. Moreover, the concept of beauty became more nuanced and focused on humanistic values such as individuality, creativity, and intellectualism. Beauty was expressed through artistic and scientific achievements, as well as in the form of idealized portraits and landscapes that reflected the harmony and balance of nature.

In Romantic literature, beauty was often was tangent to nature, and was used to express the emotions and passions of the individual, as in the works of Wordsworth and Keats.

The nature of beauty in literature has undergone significant changes over time, reflecting the evolution of cultural, social, and artistic values. In classical literature, beauty was often affiliated with external physical attributes such as symmetry, proportion, and harmony. It was depicted through idealized and mythological figures, such as the Greek goddesses Aphrodite and Helen of Troy.

In modern literature, the concept of beauty has become more complex and multi-faceted. Beauty is often portrayed as a subjective and culturally constructed concept, reflecting the diversity and plurality of aesthetic experiences and preferences. Contemporary writers often challenge traditional beauty norms and ideals, questioning the objectification and stereotyping of individuals based on their physical appearance.

Overall, the changing nature of beauty in literature reflects broader shifts in cultural and artistic values, as well as the ongoing dialogue between artists and society about the nature of beauty and its significance in human experience.

In our research we'd like to emphasize that figurative language is a powerful tool used by writers to convey the beauty of their subjects in literary texts. It involves the use of metaphors, similes, personification, and other literary devices to create vivid and imaginative descriptions that engage the reader's senses and emotions.

For example, a writer may describe the beauty of nature as *"in the shade of a tall laurel bush the sunlight slipped over the polished leaves"* [3]. As we can see the author, Oscar Wilde, points out each detail of the beauty to describe the deepness of it. ***"It keeps eternal whisperings around desolate shores"***, – it is also a nice sample of how the metaphors are used in the description of the nature. [4] The *"mighty swell"* of the sea, this great energy in nature, *"keeps eternal whisperings"* around the barren landscape so carelessly deserted by man – it is the way of how Keats depicts the beauty of the nature around him.

Besides, not only human or subject can be described this sensitively. Here is the description of the music's beauty written by James Thomson: ***"music wakes around, veil'd in a shower of shadowing roses, on our plains descend"*** [5]. In fact, we can not see the music, touch its notes but we can surely feel it reading Thomson's words. That is exactly the sense of figurative language – to make feel.

Authors often use such a literary device as personification to attribute human qualities to non-human objects or ideas. For example, a writer may personify the beauty of a mountain range as *"majestic giants standing tall and proud"* Other literary devices, such as hyperbole, alliteration, and onomatopoeia, can also be used to create powerful and evocative descriptions of beauty in literary texts.

Through the use of figurative language, writers can convey the beauty of their subjects in a way that engages the reader's imagination and emotions, creating a deeper and more meaningful connection between the reader and the text.

Description and visualization are important techniques used by writers to convey the beauty of their subjects in literary texts. Description involves using sensory details to create a vivid and immersive picture of the subject, engaging the reader's senses and imagination. The aim of visualization is to create mental images in the reader's mind that allow them to see and experience the beauty of the subject.

To describe the beauty of a subject, writers may use sensory details such as color, texture, sound, and scent. For example, a writer may describe the beauty of a sunset by saying that the *sky was filled with hues of orange, pink, and purple, and that the warm breeze carried the scent of blooming flowers.*

Visualization is often used in conjunction with description to create a more vivid and immersive picture of the subject. By using words that appeal to the reader's senses, such as "*crystal clear waters,*" "*rippling waves,*" or "*majestic peaks,*" writers can create mental images that allow the reader to experience the beauty of the subject.

Thus, by engaging the reader's senses and imagination, writers can create a deeper and more meaningful connection between the reader and the text, allowing the reader to experience and appreciate the beauty of the subject in a more profound way.

Sensory language is a powerful tool used by writers to convey the beauty of their subjects in literary texts. It involves using descriptive words and phrases that engage the reader's senses, allowing them to imagine and experience the beauty of the subject. For example, a writer describing the beauty of a flower may use sensory language such as "*the velvety texture of the petals*" "*the sweet fragrance of the bloom,*" or "*the vibrant hues of the petals*" for a more detailed reflection of the subject.

Consequently, by using sensory language, writers can create a vivid and immersive picture of the subject, allowing the reader to experience the beauty of the subject through their senses. This can help to create a more emotional and

personal connection between the reader and the text, as the reader is able to imagine and appreciate the beauty of the subject in a more meaningful way.

One of the specific features of verbalizing beauty in literary texts is that beauty is a subjective concept. Beauty is in the eye of the beholder, and what one person finds beautiful may not be the same as what another person finds beautiful. Therefore, writers must consider their audience and their own personal perspectives when verbalizing beauty in their texts.

For example, a writer may describe a sunset as beautiful, but their audience may not agree. Some readers may prefer sunsets with more vibrant colors or more dramatic settings. Therefore, the writer must consider their audience's preferences when describing beauty in their text.

Additionally, beauty is often tied to cultural and societal norms. What is considered beautiful in one culture may not be considered beautiful in another. For example, the ideal body type for women has changed throughout history and varies between cultures. Therefore, writers must also consider cultural and societal norms when verbalizing beauty in their texts.

The subjective nature of beauty means that writers have to take into account their audience's preferences and cultural/societal norms when verbalizing beauty in their literary texts. By understanding and acknowledging the subjective nature of beauty, writers can create descriptions that are more relatable and meaningful to their audience.

However, beauty is not only a subjective concept but also an aesthetic experience that can be felt by an individual. The experience of beauty is often characterized by feelings of pleasure, awe, and admiration. Beauty is not just about physical appearance but also about how an object or subject evokes an emotional response in the viewer or reader.

The experience of beauty can also be influenced by cultural and societal norms. For example, certain beauty standards such as thinness or fair skin may be more valued in some cultures than in others. These cultural norms can shape our perceptions and experiences of beauty. In literature, beauty can be used to convey

meaning beyond the aesthetic experience. It can be used to symbolize deeper themes or ideas, such as the beauty of nature representing the fragility of life or the beauty of love representing the human experience of connection and intimacy.

Overall, beauty is not just a subjective concept but also an aesthetic experience that can evoke an emotional response in the viewer or reader.

In this study, we have explored the specific features of verbalizing beauty in literary texts, and discussed the variability of beauty in literature and influence of a cultural and societal norms on it. The different techniques used to verbalize beauty in literary texts, including figurative language, sensory language, description and visualization are presented. We also considered the subjective nature of beauty and its role as an aesthetic experience.

The study of beauty in literature is significant because it allows us to understand how writers use language to convey the beauty of their subjects and evoke an emotional response in their readers. By understanding the techniques used to verbalize beauty, we can better appreciate and analyze literary works and gain a deeper understanding of the human experience. The prospect of further research is seen, in the impact of technology and social media on beauty standards in literature.

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WINTER CYCLE OF CALENDAR HOLIDAYS AND RITES IN UKRAINE

Calendar holidays and calendar rituals are a very important part of the national identity of the Ukrainians. Thanks to them, we learn more about the mentality and moral values of the Ukrainians of that time. Customs were very closely linked to faith and worldview, which was passed down from generation to generation and in some aspects has survived to this day. It is very important to understand our past and the system of holidays in order not to forget our roots. Many holidays and traditions have come down to us, and it is important to know what these holidays are and why they were important to the Ukrainians in the past.

December, the first month of winter and the last month of the year, is one of the richest in holidays and celebrations. The first feast is the Entrance of the Blessed Virgin Mary, which is celebrated on the 4th of December. On this day, you should not do laundry, sewing or any other household chores. There was a belief that a witch sits on a poker and goes to take milk from a cow. Therefore, on the eve of the 4th of December, the cow was «saved from spoilage» with a mixture of herbs, in which a rag was dipped and crosses were drawn on it. The main feature was that the herbs were collected with a characteristic smell that was supposed to drive away the witch. It was also on the 4th of December that the first carols were sung, so this holiday is called the First Koliada [2, c. 503].

The 19th of December is the well-known as St. Nicholas Day. Nowadays, it is celebrated mainly by children who receive gifts under their pillows, but only for good deeds. And those who misbehaved receive a thin branch of any bush. And in the old days, the hosts would brew beer and invite all the guests to their house. In the afternoon, they would harness their horses and ride around the village singing merry songs [1, c. 29].

The 7th of January is Christmas, which is celebrated during three days. In the morning, as usual, people go to church and then sit down to dinner. The dishes were

prepared the day before, because «...it is a sin to take a knife on a holiday» [3, c. 259]. It was also believed that on Christmas, as well as on Easter, one should not sleep during the day «because the crops will be lost» [2, c. 513].

In the evening, the children would go to their neighbours to sing carols and would be given small pies baked for the occasion, or nuts and apples, or rarely money. The children would be the first to speak, shouting: «Good evening, sir! We wish you a Merry Christmas, and for this news, six sausages, a patch of oats, and a sausage upstairs. There's money in a pot on the stove in the corner. We need to take it and give it to the carolers! Good evening!» [3, c. 260].

The 14th of January is the New Year, or St Basil's Day. On this day, girls wash their faces and throw red beads into the water to make themselves beautiful. And boys go to sow rye or barley, wishing them all the best. Peas, on the other hand, were strictly forbidden because it was believed that they could be used to wish bad things and symbolised tears and evil spirits.

In summary, it is important to note that, unfortunately, the original meaning of the holidays has already been lost, but the Ukrainians understand how important it is to revive our past traditions. For centuries, people have been trying to destroy and assimilate our culture, so we need to know our past and motivate our children not to forget our traditions.

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“ONE BELT ONE ROAD” AS A TOOL OF CHINA’S GEOPOLITICS

China’s One Belt One Road (OBOR) Programme is not just an economic and trade program, it is also a tool to promote China’s interests in terms of geopolitics. This country has a truly global significance and far-reaching geopolitical implications.

China has invested hundreds of billions of dollars in ports, railways and energy projects in Asia, Africa, and Europe to become a major investor in Central Asia and a leading economic power on the African continent. The goal was not only to expand infrastructure, but also to win over local authorities by directing investment, job creation and economic growth in their direction.

As a result, in 2017, China and Africa continued to expand bilateral trade and improve the level of facilitation. In January and December the volume of trade between China and Africa amounted to 170 billion US dollars, up 14% year-on-year. Among them, China’s imports from Africa grew rapidly and amounted to 75.3 billion US dollars, an increase of 33% year-on-year; China’s exports to Africa totaled \$94.7 billion, up 3% year-on-year.

Also this year, the poorest countries will face \$35 billion in debt repayments, with more than 40% of this amount due to China with its mega-projects under the One Belt One Road Initiative. All above-mentioned only increases the influence of China in the African region, dependent on their investments.

China spreads its geopolitical influence not only through trade relations, the financial sector is also an important aspect of Chinese expansion. For instance, in 2017, the People’s Bank of China made settlements in yuan with the central bank of Zambia, Nigeria, South Africa, Mauritania. These countries included the yuan in their foreign exchange reserves, and the yuan can be freely exchanged for local currency in Kenya.

The Johannesburg branch of the Bank of China issued the first African offshore yuan bonds, a 1.5 billion yuan rainbow bond over three years. International investors reacted strongly to this, and the number of subscriptions more than doubled, indicating that the offshore yuan has spread to the African market and is an important milestone for the internationalization of the yuan.

Looking at a historical context, the One Belt One Road program can be compared to the US Marshall Plan after World War II. Remembering the history, the Marshall Plan was to help the Western European countries to restore the economy destroyed after the war, giving them debts and investing money, thereby making them economically dependent on the United States. The main goal of this plan was to prevent the spreading of influence of the USSR, the main rival-hegemonic of the United States at that time.

The situation is almost the same with China. The current confrontation between China and the United States, for the status of hegemon in the current world geopolitical situation, is a hot topic for discussion among politicians. China is also investing in Africa and Asia to expand its economic and political influence. The difference is only in the circumstances and, accordingly, in the number of participants. According to OBOR portal, 71 countries are currently participating in the initiative, which together represent more than a third of the world's GDP and two-thirds of the world's population.

As well as in the Marshall Plan, China is the main initiator and investor in its programme. Funding for One Belt One Road Initiative will be provided through various institutional mechanisms, such as:

1. Strategic banks

- Agricultural Development Bank of China (ADBC)
- China Development Bank (CDB)
- Export-Import Bank of China (CHEXIM)

2. State banks

- Agricultural Bank of China (ABC)

- Bank of China (BOC)
- China Construction Bank (CCB)
- Industrial and Commercial Bank of China (ICBC)

3. State funds (selectively)

- China Investment Corporation (CIC)
- Silk Road Fund (SRF)

4. International financial institutions (selectively)

- Asian Development Bank (ADB)
- Asian Infrastructure Investment Bank (AIIB)
- New Development Bank (NDB)

In conclusion, China still adheres to a more restrained policy in terms of the spread of influence. China is wary of interfering in the internal economic affairs of other countries (unless its core interests are threatened). So, in the long run, the One Belt One Road Initiative can also bring harm to China itself as the country is spending too many resources to implement the plan. Due to the pandemic, COVID-19 has exposed the economic challenges which many projects face with. June survey by the Chinese Ministry of Foreign Affairs found that 20 percent of OBOR Initiative projects have been “severely damaged by the pandemic”, and moreover from 30 to 40 percent have been “negatively affected to some extent”. So, it is still a disputable question whether China will further promote this initiative.

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POSTHUMANIST DISCOURSE IN MODERN HUMANITIES STUDIES

To date, there is a certain definitional uncertainty regarding the concept of the new humanism in the foreign and national scientific discourse of literary critics, philosophers and cultural scientists. Thus, when mentioning the latest trends in humanism of the 21st century, researchers use a number of terms that are supposedly identical and intersect each other, including (but not limited to) terms posthumanism, antihumanism, transhumanism, new humanism, metahumanism.

According to the researcher Francesca Ferrando from Columbia University, USA, the adjective posthuman (as well as its derivative term posthumanism) has become an umbrella term for describing various schools of thought in the field of modern humanism epistemological, scientific and biotechnological discoveries of the late twentieth and twenty-first centuries. It has appeared due to the need for an all-encompassing integral term capable of constructively describing such new changes in the human being [3, p. 26].

In the Western science the concept of posthumanism is interdisciplinary and is widely used by researchers in the fields of literary studies, philosophy, cultural studies, theoretical sociology, and general scientific and technical practice [1, p. 1]. It serves to describe the general concept for a new understanding of the human nature in the modern world, its connection with nature and the environment; the transition from humanism to posthumanism marks fundamental changes in the assumptions of human culture regarding itself [1, p. 1].

The main theoretical foundations of posthumanism which form its central conceptual essence are the rethinking of human nature as a unity that develops together with machines and animals. It also requires a more inclusive definition of life, a greater moral and ethical response, and requires the recognition of

responsibility for non-human forms of life in an era of blurring and mixing of interspecies boundaries [4, p. 4].

The researcher Pramod K. Nayar states that in the modern understanding posthumanism as such is based on two different views on the renewed nature of the human. The first trend is called transhumanism, which is characterized as «pop posthumanism of cinema and pop culture (Terminator, The Matrix, cyberpunk fiction), <...> a hagiography of techno-modifications of the human» [4, p. 6]. As can be conducted from the given definition, the transhumanist approach is in most cases the product of modern pop culture, and is deliberately called «the "cyborg" strand of posthumanism» [7, p. 13].

The second trend that Nayar identifies in modern posthumanism is called critical posthumanism (CPH). As the name implies, this type of posthumanism is generally critical of the idea of traditional humanism and is two-directional – in the criticism of the humanist belief in the uniqueness of a man and in the criticism of human instrumentalism (that is, the belief in man's ability to conquer and control this world).

An important role in the formation of critical posthumanism belongs to antihumanism. Antihumanism usually denies the individual worth and dignity of human beings; often, it denies that humans are the true creators of history, attributing it rather to the will of providence or supra-individual social systems or creatures such as deity, nature or society, and the absolute good is considered the one which exceeds or even opposes human good. Antihumanists are not necessarily against man; they simply claim that the humanistic view of life is incapable of illuminating the whole picture of existence and thus relying on its doctrines may be morally wrong [5, p. 214].

Another classification of the constituent parts of posthumanism was proposed by the researcher Francesca Ferrando in the monograph *Philosophical Posthumanism* (2019). Thus, she divides posthumanism into three branches – critical, cultural and philosophical.

The first, critical posthumanism, is directly connected with the field of literary criticism and is called critical posthumanism by analogy with literary criticism.

According to Ferrando, the work of Katherine Hayles *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (1999), which mostly explores the place of cybernetics and IT-narratives in feminist criticism and other postmodern literary practices, had a decisive influence on the formation of this direction, which, in turn, laid the foundation for the study of the question of the posthuman by literary criticism [2, p. 2].

The second, cultural posthumanism, was formed in the 1980s alongside the critical humanism, also on the basis of literary studies of that time. According to the researcher, one of the founders and popularizers of this direction was Donna Haraway, with the work *A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980* (1985), where she outlined a new «cybernetic» approach to the issue of human modifications and interspecies hybrids, which, in fact, marked the beginning of post- and transhumanist researches in all sciences about the human [2, p. 2].

And, finally, the third variety – philosophical posthumanism – Ferrando calls an integrating «onto-epistemological <...> ethical approach» [2, p. 22], which rejects all conventions in the matter of studying a human being, which serves the needs of a new philosophical view of the current epoch; it is regarded as «philosophy of mediation» [2, p. 3].

The last in the list of the notable schools of humanism of the 21st century which require special attention is metahumanism. In search of its origins most scientific works on the topic refer us to the so-called manifesto of metahumanism by the authors Jaime del Val and Stefan Lorenz Sorgner, who have outlined and systematized the characteristic features of this school. A *Metahumanist Manifesto* (2010) consists of 10 points, each of which touches upon a certain aspect of the phenomenon. So, among other things, it deals with the concept of metabody – metahumanism believes the human body is included in the space of amorphous transformations, in the multiplicity of other bodies that are in an ultra-complex system: from the molecular and bacterial level to the social, planetary and cosmic, each of which is in a mutual relationship with others [6, p. 1-2]. This also includes

postanatomism, which challenges the anthropomorphic view on anatomy of the human body, and metasexuality, which raises the issues of sexual orientation and gender polymorphism [6, p. 1-2].

According to Ferrando, metahumanism must be distinguished from the much more simplistic concept of metahumanity that has emerged in popular culture – imaginative experiments in creating meta-forms of human essence in the form of superheroes and mutants in comics and role-play games, first mentioned under the collective name metahuman in DC Comics (NY) magazines since the 1970s and remaining relevant to this day [3, p. 32].

Summing up, it should be noted that the following trend is currently noted in academic circles: the focus of the humanities on the post-human problem is causing an interdisciplinary shift from humanism to posthumanism, expanding the research area for a question «what is a human being?» in the context of the modern flexible understanding of human nature in all disciplines, especially philosophy and literature, which determines the relevance of further substantive practical research in these fields.

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THE UNCANNY VALLEY EFFECT AND ITS MANIFESTATION IN MODERN CULTURE

The human brain is arguably the most complex organ, a complete study of which is still not possible. Science is still unable to unequivocally answer some questions about brain-related phenomena. For example, modern man is experiencing the “uncanny valley” effect far more often than his predecessors, and this is due to the development of technology. Movies, games and even robots have entered our lives, and they can cause this effect.

The “uncanny valley” hypothesis, which dates back to the 1970s, suggests that almost, but not entirely, human-like artificial characters evoke a profound sense of unease. This hypothesis has been widely accepted both in the popular media and in scientific research [3, p. 99].

The uncanny valley effect is a phenomenon in which something that strongly resembles humans, but is not, automatically arouses fear, disgust, and distrust in us. Thousands of years of evolution have embodied one unsettling feeling: “something is wrong here”.

The roots of the psychological understanding of this phenomenon can be found in the work of Sigmund Freud, who was one of the first to consider such a phenomenon in his article “The Uncanny”. Freud was the first to give his definition: “The uncanny is that which should have been concealed, but has revealed itself. This is how the uncanny is defined as that which we cannot say for certain whether it is alive or dead. To some extent, this can be identified as the cause of a profound sense of rejection in humans” [2, p. 619].

Still, the well-established name for the effect was given by the Japanese roboticist Masahiro Mori. In 1970, his essay “Bukimi No Tani” was published, and translated into English in 1978 as “Uncanny Valley”. Mori put forward the idea that

the more we try to make robots look like humans, the more repulsive they will become [3, p. 100].

In the article, Mori notes that people like his robots the more human-like they are. But this only works up to a certain point. If people see a humanoid robot, but something about it gives it away as unnatural, someone will start to dislike it. Reaching a section of the uncanny valley, robots can cause fear, panic, disgust, and anxiety.

The theory of perception contradicts it. The essence is that not everything non-human will be perceived negatively, everything depends on degree of similarity and distortion. Moreover, characters that periodically display human-like features will be perceived far worse than those that show these qualities continuously [3, p. 100].

The empathy hypothesis indirectly echoes Freud's theory, because according to it, androids cause us stress because something inanimate moves and imitates humans on its own. Though robots often look like humans, due to technical inaccuracies their movements can be slightly distorted (too abrupt or too slow), causing an underlying sense of rejection. The disrupted expectation hypothesis suggests that feelings of dislike arise when people look at a humanoid creature and expect to see typical actions, but what they see does not match their expectations [1, p. 372].

Despite a variety of theories to explain the sources of the “uncanny valley effect,” there is no single correct answer to this question at present. This is due to several factors: first, the varying sensitivity of people to the phenomenon described, and second, the small number of objective studies on the subject.

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SEXUAL EDUCATION OF PRESCHOOL CHILDREN

The topic of sexual education is relevant and extremely important, but this issue causes many contradictions and misunderstandings due to the erroneous interpretation of the term itself. One of the reasons for the controversy is the aspect of age and the content of sexual education, namely, when and what a child should know about. The importance of sex education is explained by its goal – to raise a complete personality, who is adequately aware of his physiological and psychological characteristics, establishes optimal relations with people of his own and the opposite sex.

Sex education is a system of measures of pedagogical influence on children and adolescents with the aim of creating in them the correct ideas about the essence of the relations between the sexes, educating the norms of sexual life behavior and optimizing their personal development in all spheres of life related to the relations of the sexes [3].

The peculiarities of the personal development of preschoolers are awareness and separation of one's own "I", that is, the emergence of personal consciousness, and the formation of self-esteem, which depends on the quality of the child's communication with parents or significant adults. According to Z. Freud, the preschool age coincides with the phallic stage of psychosexual development, which is characterized by a high level of the child's sexuality and an extraordinary interest in the genitals. During this phase, the formation of the personality structure is completed [4, p. 41].

Based on these data, we can say that preschool age is optimal for starting sex education. It is extremely important that the proposed form and content of sexual education meet the actual needs of the child and his/her age. The limits of the child's intimacy are established, they must be taught that if they do not want physical

communication of any kind, they have the right to refuse it (if it is not included in the necessary medical examination). A child should not tolerate hugs or kisses from strangers if they do not want them and they are unpleasant to them. The role of significant adults is also educational. The child expects clear, complete, but not too detailed answers to his questions related to sexuality. It is important for a child that, in a relevant situation, an adult they trust speaks honestly, openly and simply [2, p. 226-227].

The Polish sexologist Kazimir Imelinski singled out four main principles of sexual education of children:

1. Duration: explanations are not limited to one conversation, they should be carried out throughout the child's upbringing. Sexual education of a child begins from the moment of their birth and lasts at least until the age of 16.

2. Truthfulness: the explanation must be truthful, false answers lead to inflaming even greater interest in gender issues, and at the same time, children's mistrust of other information provided by adults.

3. Individuality of explanations: this does not mean that the child should be taken aside and talked to face to face. In this case, one may get the impression that the topic raised is "shameful" and "delicate". Accordingly, other children can also be present, but group discussions should not be specially organized, especially with younger children. If a child accidentally witnessed a conversation between adults discussing sexual issues, do not stop the conversation, it should be adapted to the child's level of development.

4. Correspondence of the explanations to the level of physical and mental development of the child: it is necessary to answer "childish" questions as soon as the question arises, the main thing is not to go beyond the scope of the question [1, p. 20-21].

A child's sexual education begins with an explanation of the structure and phenomena of one's own body. It is important to teach the child the correct names of the genitals, which will help him, in case of problems, pain or discomfort, to describe their localization and nature, as well as to prevent sexual violence.

The child will have the same calm attitude to the genitals as to other parts of the body, which contributes to the development of adequate self-esteem. It is important to remember that many things in a person's life depend on the first childhood impressions. The key to the success of sex education is the creation of such an atmosphere in the family, when the child can freely ask questions to his parents, without fear of hearing an instructive lecture instead of an answer. Usually, children are satisfied with short and truthful answers, because their interest in sexual problems is purely theoretical. A special role is played by the parents' relationship with each other, the emotional atmosphere in which the child grows up [5].

So, we can say that sex education occupies an important place in the upbringing of a preschool child, contributes to the positive formation of self-esteem and the formation of one's own "I". It depends on the closeness of the relationship between the child and adults, honesty and trust are important aspects of harmonious communication.

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GAMING SLANG WORDS OF ENGLISH ORIGIN

Slang is a multifaceted phenomenon. It represents a special peripheral lexical layer that lies both outside the boundaries of the literary colloquial language and outside the boundaries of the dialects of the national language, which includes, on the one hand, a layer of specific vocabulary and phraseology of professional speech, social slang and slang of the criminal world, and, on the other hand, a layer of widespread and generally understood emotional and expressive vocabulary and phraseology of non-literary speech [2].

The culture of online games has been developing for over forty years. And during this time, it grew its own folklore. Slang phrases of gamers began to enter the common language, because a whole generation grew up on them. We are going to explain some of them in this paper.

Bot. The word has several historical meanings. In the Middle Ages, they denoted parasitic worms, and in the Australian dialect during the First World War, this was the name for a stuffy and boring person who causes a lot of trouble. In the 1950s, a new meaning arose. The word *bot* began to be used as an abbreviation of *robot*. They meant the humanoid androids described by science fiction writers.

The growing popularity of multiplayer games has slightly changed the meaning of the word. It is used to name the character of the player, who, with the help of additional scripts, is configured to automatically extract resources or kill enemies in the area. There are also auction bots that buy a certain type of resource if it appears on the market at an acceptable price [1]. It is interesting that the formal meaning of the word has changed. It all also means a program or part of a program that automatically performs some task. Now we already have various chat bots, bots for sales, search bots etc.

Loot. The historical meaning of the word is *looting*. There are two separate words for looting in English. The first is *pillage* – a robbery during hostilities, when

soldiers of one army capture settlements and take everything, they like. The second word is *looting*. But it means robbery in peacetime, mainly after natural disasters, man-made disasters or civil riots. However, in gaming communities, the word *loot* does not have negative connotations. These are items dropped after killing monsters, or rewards obtained as a result of completing quests [2].

Noob. Probably the most common word because it can now be heard far beyond the gaming sphere. The word noob is a transliterated lexeme of *newbie* or its outdated counterpart *newie*. There is no single opinion about the spelling. It was fixed in the dictionary only as *newbies*, but there were variants *newbee*, *newie*, *newb*, *noob*, *nub* and even *n00b*. So it turned out that two variants of the same lexeme – *newbie* and *noob* – just after a dozen years of parallel use, became independent words with different meanings.

Frag. In modern English, this is the name given to fragmentation mines and grenades, as well as various injuries caused by the explosion. But in shooters, the meaning changed and *frags* is used to call the points of killing opponents. Nowadays the word is becoming increasingly popular in startups to denote goals and tasks to be accomplished. In this way, many entrepreneurs try to turn the routine work on the project into something interesting, and add the spirit of competition familiar to employees from classic games [2].

In conclusion, it should be emphasized that the slang borrowed from the English language harmoniously fit into the Ukrainian-speaking Internet space, merged into the life of a modern person and became a convenient means of everyday communication.

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CONFLICT PROBLEM: THE REASONS FOR ITS OCCURRENCE AND THE WAYS OF ITS PREVENTION DURING COMMUNICATION

An integral part of our lives is communication with people around us. They are all very different and see this world in their own way. And quite often it can happen that our views do not coincide with the views of the interlocutor, which causes conflict. But does it really arise from different visions of the same things? Can the reason be possibly found in something else?

To start moving further, you need to understand what a conflict is.

Conflict is the lack of agreement between two or more parties [1]. In many sources you can further see the following words: «Each side does everything to ensure that its point of view and goal are accepted and prevents the other side from doing the same». This allows us to conclude that a conflict arises when two people talk about something of their own, without hearing the interlocutor and not giving him the opportunity to express his opinion. The main thing is to learn to respect it.

It is important to understand the difference between the cause of a conflict and the reason for it. The cause of a conflict and the reason for it can be completely different. Consider the example: a woman says that a man after work does not help at all with children. This is a pretext. But the fact that the woman is tired and just wants to rest is the very cause of the conflict. You need to talk about your desires immediately and directly. People can't read minds and you need to know that.

Cause and pretext. It is very important to understand the reason why right now you want to start a conflict. First of all, understand yourself. There are different techniques to prevent a conflict:

– after a person expresses his opinion, ask him again what he said, but in his own words. For example: «Did I understand correctly what you mean?» or «Do you want to say that ...?». This will enable the interlocutor to understand how his words were accepted by you. In case something is wrong, the interlocutor will be able to

immediately explain everything to you and you will understand the idea that he wanted to convey;

– if you feel that the topic is painful for you, it is better to say it right away, and not to tolerate it. For example: «I'm sorry, but I'm not ready to talk about it yet»;

– it is better to avoid phrases that carry the sense that “you are bad”. Instead of shaming a person for his opinion, it is better to talk about your feelings. For example: «It was unpleasant for me to hear this, because ...». It may turn out that a person did not correctly explain his opinion correctly and you misunderstood it.

Conflicts can also emerge in students' environment. They can be caused by misunderstanding or distorted understanding of a situation, attitudes to each other, behavior, incorrect perception of intentions [3, p. 360]. To prevent them, various methods of psychotherapy, group therapy, training technologies, gaming techniques are used.

Particular characteristics of conflict and theoretical aspects of its development have been thoroughly studied and discussed in different areas of science. Each branch of scientific knowledge developed its own approaches and terminology, considering all aspects of social life. It still remains relevant and causes a lot of interest and debates of scientists.

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FOREIGN LANGUAGE IN PROFESSIONAL TRAINING OF POLICE OFFICERS

The importance of learning English in the modern world is difficult to overestimate. After all, the choice of more than 1 billion people who use it cannot be ignored. And if for half of them it is a mother tongue, then about 600 million chose it as a second language. Thus, English remains to be the most popular language in the world [4, c. 81]. And as a result, the importance of being able to communicate in English in the modern world is so great that knowledge of it is no longer a privilege and a luxury. It means that any educated person is simply obliged to speak English, because it is a key to further self-education and self-improvement.

Studying English is extremely urgent for Ukrainian police officers as well. Daily activities of police officers are also often associated with establishing contact with English-speaking tourists, checking documents, navigating the city, emergency calls, public order violations, including those with the participation of foreign citizens. In these circumstances, ability to speak English is essential. What is more, police officers often take part in carrying out operative-search activities, investigative actions with the participation of foreigners, work in joint international operations on law enforcement and security during various mass events, implementation of anti-drug and anti-terrorist programmes, exchange of information, extradition of criminals, seizure and return of stolen vehicles, antiques etc., actions in UN peacekeeping missions and other international organizations [3, c. 72].

Therefore, a foreign language course at universities of internal affairs should be professionally oriented, aiming not only to develop future police officers' skills to communicate in a foreign language, but also to acquire special knowledge in their chosen specialty, i.e. increase their professional competence. The study of a foreign language should also be designed to broaden the general horizons,

develop a culture of communication, critical thinking of cadets, intercultural competence, taking into account the acquisition of special terminology and international vocabulary [2, c. 104].

A foreign language has a rich set of methodological tools that contribute to the formation of general intellectual skills and abilities required of a police officer in his professional activity: analytical and synthetic skills, development of logical inference based on mental operations, such as induction and deduction, ability to model and predict, i.e. skills that determine the creative activity of the specialist [1, c.93].

Thus, languages in the modern world today are not only a tool of communication, but also a means of professional activity. Since all the above qualities are important and necessary in the training of police officers, there is a reason to believe that knowledge of foreign languages is not only a necessity, but also a contribution to the intellectual development and improvement of individual and professional qualities of police officers.

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THE INFLUENCE OF MASS MEDIA ON THE HEALTH AND PSYCHE OF CHILDREN

Mass media is the assistant of every modern person. Thanks to mass media, we are able to continue working and learning in the conditions of pandemic and war, so now the media is so firmly rooted in our everyday life that we cannot even imagine our existence without it. Their influence begins at an early age and continues throughout a person's life. Children and adolescents are the most vulnerable category under this influence. In search of popular scientific information, they turn to the Internet more often than adults and spend more time in front of televisions than adults. Young people take an example from the behavior of people in advertisements or in films, where the main characters lead an antisocial lifestyle, but are presented as positive. This has a negative effect on the mental state of teenagers.

The influence of mass media on children's lives is increasing due to parents' being busy and their reluctance to monitor the quality of information, which leads to weakening of parental influence on children. In the absence of parental control over the content and time of watching film productions, television will negatively affect the child's development. The negative consequences may include:

1. A decrease in physical, intellectual and social activity. When a child watches TV he loses interest in other activities.
2. Aggressive behavior: the cruelty and aggressiveness of TV characters increase the child's aggressiveness in life.
3. Appearance of fears: children's minds tend to take everything literally. The screen has the same power as the real events. Even if a child is not afraid of "scary" characters while watching, he can remember what he saw later and get scared in sleep. Children begin to understand the difference between reality and fiction only at school age.
4. Depreciation of social values.

5. Inability to overcome problems. A child who is completely devoted to the TV later has a harder time making decisions, it is not easy to overcome difficulties.
6. Delay in intellectual development and social adaptation.
7. Poor development of imagination and creative abilities. Visual information is easier to perceive and leaves little room for reasoning and creative ideas.
8. Weakening of ties between the family and the outside world [3].

There is another aspect of the influence of media and television on a child. It is important that they watch TV shows with their parents. In this case, television becomes a useful methodical aid in learning, as well as a reason for discussions on various issues, but under the conditions of correct use of all the material of the telecast. You can reduce the negative effect of the TV carefully adjusting the program vie–wing by:

- establishing boundaries. Up to 18 months, children can generally do without TV. From 18 months, half an hour is quite enough, from 2 years – no more than one hour.
- compliance with restrictions. Planning the child’s activities after watching TV.
- joint viewing of programs that allows correcting what was watched.
- using a creative approach manifested in retelling or drawing.
- active opposition to negative information from the TV screen.
- avoiding the use of television as a reward or punishment.
- formation of positive values with the help of explaining the negative actions of the heroes of TV programs [2].

All things considered, parents should not neglect the rules of media use and should protect their children and their mental and physical health.

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PREVENTION OF CHILD SEXUAL ABUSE AS A TOPICAL AREA OF SOCIAL WORK

Today, the importance of ensuring a safe childhood occupies one of the leading places not only in Ukraine, but also in the USA and European countries. That is why social services should make efforts and create a favorable environment for the safe and harmonious development of the future generation. One of these areas should be the prevention of sexual violence against children.

According to the statistics of the General Prosecutor's Office of Ukraine, only in January – March 2021, 288 criminal offenses were registered in our country under articles 155 of the Criminal Code “Commitment of sexual acts with a person who has not reached the age of sixteen” and 156 of the Criminal Code “Depravation of minors” [1].

The Internet Watch Foundation 2021 Annual Report shows that sexual abuse imagery of girls is increasingly being shared online with almost all (97%) child sexual abuse material identified in 2021 showing female children. Sexual abuse imagery of children aged 11 – 13 is most prevalent, accounting for almost seven in 10 instances identified last year. Whilst just 1% of the sexual abuse imagery shows boys, this accounts for 2,641 instances. In more than half of these cases (53%) the boy was suffering category A sexual abuse which is penetrative sexual activity, sexual activity with an animal or sadism. By comparison, 17% of the sexual abuse imagery of girls shows category A activities [3].

According to the presented statistical data, we believe that for effective planning and development of preventive measures against sexual violence against children, it is important for social work specialists to be able to identify children who are at risk. Strelchenko O. defines the following risk groups for children who are most often exposed to sexual violence [2, c.308]:

- a) children of women who are abused at home;

b) children of women who themselves were victims of cruel physical and/or sexual abuse in childhood;

c) grandchildren of grandparents who sexually assaulted their own or other people's children;

d) children from families with unclear age boundaries between generations and from families where parents are strongly dependent on each other;

e) brothers/sisters of a child who is already sexually abused;

f) disabled children with developmental disorders or otherwise different from other children;

g) children who have experienced sexual trauma.

Thus, the topic of prevention of sexual violence against children needs significant attention from social services and public organizations, which will be able to ensure the development, implementation and control of the necessary measures in institutions that interact with children and youth – directly or indirectly.

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S. Novikova, Yu. Honcharova

STATE ANXIETY AND TRAIT ANXIETY AS ACUTE PROBLEMS OF CONTEMPORANEITY

The paper focuses on the problem of anxiety because this state can be caused by both external circumstances, and internal psychological problems of the individual. Each individual has his/her own level of anxiety, which is detected with the help of special testing or consultation with a psychologist. It is important to

differentiate *state-anxiety* that researchers define as “a transitory emotional response involving unpleasant feelings of tension and apprehensive thoughts” and *trait-anxiety* as “a personality trait referring to individual differences in the likelihood that a person would experience state anxiety in a stressful situation” [4].

The ancestors of modern approaches to the study of anxiety are Z. Freud, W. Reich, E. Fromm, and A. Adler. It is noteworthy that Freud’s psychodynamic theory continues playing a prominent role and serves as a basis for different modern approaches to investigation of anxiety problem, including a neurobiological aspect and neuropsychological findings. “Man, as Freud recognized, is neither "organic" or "functional." He is both, and our commitment to psychological knowledge must entail a search for unities”, L. Miller explains [5]. Freud, as known, singled out three types of anxiety: realistic, neurotic and moral. He believed that anxiety plays the role of a signal that warns the Ego about the presence of danger arising from instinctual impulses. In response, the ego uses a number of defense mechanisms that include displacement, substitution, projection, rationalization, regression, sublimation, and denial. Defense mechanisms operate unconsciously and distort the individual's perception of reality. Freud’s ideas determined the direction of anxiety research not only for his followers, but also for his opponents.

At the first stages of the study of anxiety, its connection with various aspects of self-regard was revealed: the inability to control the situation causes a decrease in self-esteem, as a result, avoiding anxiety contributes to the development of adequate self-esteem, the experience of some types of anxiety is accompanied by self-blame. In his writings V. Reich expanded Z. Freud's psychodynamic theory, including not only libido, but also all basic biological and psychological processes. Reich considered pleasure as the free movement of energy from the core of the body to the periphery and to the outside world. The scientist interpreted the phenomenon of anxiety as an obstacle to the interaction of this energy with the outside world, its return inside, which caused "muscle clamps", distorting and destroying the natural feeling. Thus, Reich, describing the *phenomenology of anxiety*, introduced an important aspect – muscle stiffness, refusal to perform actions by blocking body organs.

Social aspects of anxiety were revealed by E. Fromm and A. Adler. Adler's individual theory, the central category of which is the inferiority complex that allow considering anxiety as an individual feature that arises in connection due to the need to restore the lost social feeling (a sense of unity with society). When the social environment sets a task for the individual, even if the task is very simple, it is perceived by him/her as a test of completeness, and it can lead to an excessive emotional response or excessive tension. [3] Fromm who emphasized that the main source of anxiety and internal excitement is the experience of alienation associated with a person's idea of him/herself as a separate personality that feels helplessness before the forces of nature and society.

Nowadays the approaches to study this complex phenomenon are continue to be different. Thus, Pawluski, Lonstein and Fleming emphasise the significance of neurobiological factors [6], G. M. Goodwin advances the idea that the anxiety disorders include generalized anxiety disorder, specific phobia, social phobia, agoraphobia, and panic disorder and connected with a shared genetic predisposition [3]. However, researchers agree on one thing – the importance of anxiety measurement. For example, Endler & Kocovski propose to discuss the problem of anxiety in a dimensional versus a categorical conceptualization [1], others highlight the effectiveness of the Endler Multidimensional Anxiety Scales (EMAS), derived from an interactional model of personality [2]. It is obvious that the topic is relevant and needs further elucidation and research.

Neurobiology of human anxiety. The study of the neurochemical prerequisites for the formation of anxious states is one of the key questions of the modern physiology of emotions. One of the most popular theories is the serotonergic theory, which is based on the data from scientific studies on the disruption of the functioning of the serotonin system due to various signs of anxiety. It was established that high anxiety is positively correlated with the altered state of the gene encoding the serotonin transporter protein, as well as with the speed of its synthesis. Individuals with a high level of depression and anxiety show the increased production of the transporter protein, due to which serotonin as a mediator is

absorbed by the neuron from which it is thrown out and does not have time to bind to the receptors of the next neuron.

At the same time, other researchers claim that the activity of serotonin neurons during anxiety symptoms can be both reduced and increased. For example, a high level of serotonin in the amygdala is manifested by a panic state, and a low level of this neurotransmitter in neurons of the cortico-striatal-thalamic-cortical loop, where normally serotonin activity is necessary to inhibit anxiety, is associated with persistent phobias and avoidance behaviour. According to the catecholaminergic hypothesis, changes in the level of hormones that are synthesized in the medulla of the adrenal glands are important for the development of anxiety. Furthermore, it is believed that the catecholaminergic component plays a decisive role in the emergence of anxiety disorders associated with chronic emotional stress, post-traumatic stress disorders and generalized anxiety.

In the article “Clinical practice. Generalized Anxiety Disorder” M. Stein et al. (2015) found that patients with anxiety and panic disorders have higher concentrations of norepinephrine in blood plasma compared to individuals without such disorders. The results of modern biochemical studies with the participation of persons whose professions are associated with risk to life also demonstrate high levels of norepinephrine in their blood. Data from individual studies indicate a relationship between anxiety and dopamine synthesis in the body limbic system. The release of dopamine in the neurons of this area of the brain provides a good feeling of well-being, and its decrease can provoke depression and anxiety [7]. This aspect of anxiety investigation is very popular today and can be the starting point for carrying out further research.

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P. Olifirova, N. Hrysenko, O. Osadcha

THE INFLUENCE OF SOCIETY ON THE DEVELOPMENT OF EATING DISORDER IN ADOLESCENCE

The problem of food culture and personal behavior is quite relevant today, which is why a large number of specialists from various fields of science increasingly choose it as the subject of their research. In the pursuit of society's imposed standards of beauty and standards of a successful person, teenagers mostly risk their own health and well-being, and become victims of the manipulative influences of the environment. They tend to attribute difficulties and failures in social interaction and communication to their "imperfect" appearance [3].

Eating disorders (ED) are behavioral conditions characterized by severe and persistent disturbance in eating behaviors and associated distressing thoughts and emotions. They can be very serious conditions affecting physical, psychological and social function. Types of eating disorders include anorexia nervosa, bulimia nervosa, binge eating disorder, avoidant restrictive food intake disorder, other specified feeding and eating disorder, pica and rumination disorder [2].

Historically, negative family dynamics has been indicated as a key element in the development and maintenance of eating disorders [1]. It has been proven that a child who grows up in a family where the mother or an older child has an eating disorder has a greater chance of developing an ED. This is caused by the fact that the mother/sister constantly pays attention to what she eats and how much she weighs. An eating disorder can also be caused by the fact that the mother restricts the child's diet, imposes her ideas of "proper nutrition" and focuses on the child's weight.

An eating disorder can manifest itself through body dysmorphia. Body dysmorphia disorder (BDD) or body dysmorphia is a mental health condition where a person spends a lot of time worrying about flaws in their appearance. These flaws are often unnoticeable to others. Signs of body dysmorphia: constantly/obsessively body checking in the mirror; hiding your body in baggy/oversized clothing; avoiding mirrors or others taking pictures of you; fear of other people judging your body; frequently needing reassurance/validation around how you look; body checking in reflective surfaces whilst outdoors such as shop windows; frequently comparing your body to others; avoiding social events because of feelings of insecurity and intense fear of judgement; feeling as if your body defines who you are and your worth; feeling as if your body is the only thing people notice about you, fearing that if it changes people may like/dislike you more.

According to Malinovska I.ED can be associated with an increased need for personal control and a desire for perfectionism, which often leads to anorexia. It is believed that perfectionism and eating behavior have long gone hand in hand. Those who are suffering from anorexia punish themselves by creating a caloric deficit, and killing themselves in gym trying to burn off the calories. It's as if they have an inner voice that drives them into perfectionism, they feel guilty after eating something, trying to fill themselves with water instead of having a proper meal, monitor their weight by weighing themselves every day. Adolescents have a high tendency to be ashamed of their body, fear of gaining extra weight, fear of being too thin or too fat [4].

The effects of having an eating disorder cannot be isolated, they show up in their daily life, influencing their studies-work life, romantic relationships and friendships. People with EDs might:

- engage in diet talk all the time, but also feel ashamed that all they talk about is their diet and that it is the same cycle every week.

- feel like they are different from their friends both physically ('My body is different from theirs') but also as a person ("They don't understand me, I am just different").

- constantly compare themselves to the people around them, even though the comparison feels wrong and they feel guilty over it.

- monitor what their friends are eating carefully: What are they eating? When? How much? How frequently?

- seem indecisive – especially about where to go and eat.

- experience sudden changes in their mood, as their mood and their self-image depend completely on how their relationship with food is that day.

- be absent from gatherings, which may cause an unintentional distance between them and their friends.

Eating disorder is a complex mental disorder that requires a lot of attention from specialists. In turn, people should stop paying attention to the appearance of others and who eats what.

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CONSTITUTIONAL MECHANISM OF SEPARATION OF POWERS IN UKRAINE

The idea of separating the functions of the state mechanism originated in antiquity, developed in the Middle Ages and in the Renaissance transformed into the idea of dividing a single state power into separate branches, and in modern times turned into the theory of separation of powers. Since the end of the 18th century, the principle of separation of powers has been constitutionally enshrined in the United States and France. Today, this principle is the main pillar of the state system of all developed democratic countries, including Ukraine.

The principle of separation of powers provides for

- distribution of functions and competence between state bodies;
- enshrining a certain degree of independence of each government body in the exercise of its powers;
- giving each body the opportunity to oppose the decision of another body, thus controlling its actions to a certain extent.

The principle of the separation of powers in Ukraine has its own peculiarities of implementation. Currently, this principle is formally enshrined in the Constitution of Ukraine. This primarily is caused by the uncertainty of the place and role of the President of Ukraine in the state mechanism and the lack of real power of the Cabinet of Ministers of Ukraine. According to the Constitution of Ukraine, the President of Ukraine occupies a special place in the system of state institutions. Article 102 of the Constitution of Ukraine defines that the President of Ukraine is the head of state and acts on its behalf [1]. The President of Ukraine has broad powers of authority.

The President of Ukraine has a special legal position – he is the head of state, and his attribution to one or another branch of government is a subject of debate among many scholars. Most often in the world practice, the head of state heads

the executive branch (formally or actually). According to the Constitution of Ukraine, the President of Ukraine has very broad powers to influence each of the branches of state power, but at the same time, he does not formally belong to any of them and is not responsible for this activity results.

At the same time, the President of Ukraine, although not formally part of the branches of state power, is functionally closer to the executive branch and has the broadest possible influence on its activities. This ambiguity of the legal status of the head of state leads to significant misunderstandings in the functioning of the institutional system as a whole. On the one hand, the head of state is formally distanced from the executive branch. On the other hand, he is actually organically intertwined with the executive branch.

Analysing the system of checks and balances enshrined in the Constitution of Ukraine, it should also be noted that the Verkhovna Rada of Ukraine has quite significant levers of influence on the Cabinet of Ministers of Ukraine and other executive authorities. In particular, the Cabinet of Ministers of Ukraine is controlled and accountable to the Verkhovna Rada of Ukraine. The Parliament of Ukraine considers and decides on the approval of the Programme of Activities of the Cabinet of Ministers of Ukraine, appoints the Prime Minister of Ukraine etc. (Article 85(11-13) of the Constitution of Ukraine).

The Verkhovna Rada of Ukraine, upon the proposal of the President of Ukraine or at least one third of the people's deputies of Ukraine from its constitutional composition, may consider the issue of responsibility of the Cabinet of Ministers of Ukraine and adopt a resolution of no confidence in it by a majority of the constitutional composition of the Verkhovna Rada of Ukraine (part 1 of Article 87 of the Constitution of Ukraine).

At the same time, it is quite obvious that under the Constitution of Ukraine, the President of Ukraine has more levers of influence on the activities of the Ukrainian Parliament than the Cabinet of Ministers of Ukraine.

Thus, the President of Ukraine, as the head of state (part 1 of Article 102 of the Constitution of Ukraine), plays an important role in the functioning of the entire

institutional system of state power in accordance with the provisions of the Constitution of Ukraine. This means that he or she is called upon to consolidate all branches of state power, ensure their mutually coordinated activities to optimize the functioning of the state mechanism of Ukraine as a whole.

In its turn, according to the Constitution of Ukraine, the Cabinet of Ministers of Ukraine does not have any effective state powers that would allow it to act as a deterrent in relations with the legislature and judiciary, although according to Article 6 of the Constitution of Ukraine, the Cabinet of Ministers is actually recognized as one of the three equal branches of state power.

Relatively recent events in the field of constitutional reform, namely, the return of the Parliament of Ukraine to the parliamentary-presidential form of government of 2004 and further changes in the system of institutionalisation of the branches of state power (development and submission by the President of Ukraine of the draft Law of Ukraine on Amendments to the Constitution of Ukraine, appointment by the President of Ukraine of early elections to the Verkhovna Rada of Ukraine for 26 October 2014), show that Ukraine is implementing reforms of the mechanism of state power.

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SOME ASPECTS OF THE PROBLEM OF PSYCHOLOGICAL EFFECTS OF SLEEP DEPRIVATION

The problem of sleep deprivation is one of the topical subjects of psychology today because it is widespread all over the world and can result in negative effects not only on the life of individuals but also on the social and economic situation in the society. The problem of sleep deprivation is known to be the object of research by a great number of scientists in different countries. Among those who have studied this problem are Bjørn Bjorvatn, Frances Chung, Mariusz Sieminski and others.

Scientists define sleep deprivation as a continued or chronic lack of sleep. While sleep requirements vary from person to person, experts generally agree that most adults need seven to nine hours of sleep a night. Regularly short-changing yourself of sleep can impact the functioning of every system in the body, especially cognitive, emotional, and psychological health [2]. Also, when an individual has multiple consecutive days of sleep deprivation, they enter “sleep debt,” which is a cumulative effect of insufficient sleep for any period of time [3].

It should be noted that sleep deprivation can be caused by different reasons. For example, many individuals, guided by the belief that sleep is a waste of time, consciously deprive themselves of sleep to prioritise work obligations, socialising, or entertainment. Others may become sleep deprived due to various family or professional responsibilities, like raising a newborn or shift work. Hormonal changes, chronic illnesses, sleep disorders, and mental health challenges can lead to sleep deprivation as well [2].

It is supposed that the main symptoms of sleep deprivation include excessive daytime tiredness and daytime impairment. This all-consuming fatigue can make it harder to stay awake when you need to. In some instances, this may lead to microsleeps where you fall asleep momentarily, increasing the risk of unintentional accidents and errors [2].

Being critical to both physical and mental health of the people, sleep deprivation can cause some negative psychological effects. Poor or insufficient sleep increases negative emotional responses to stressors and decreases positive emotions. Sleep is known to be important to a number of brain and body functions engaged in processing daily events and regulating behaviors. It helps maintain cognitive skills, such as attention, learning, and memory [1]. Chronic sleep deprivation is considered to have serious consequences such as depression, anxiety, and suicidal ideation. Recent research suggests sleep-deprived individuals are angrier, more distressed, more exasperated, and less able to adapt to frustrating situations than those who get sufficient sleep [3].

In conclusion, sleep deprivation is a burning issue nowadays. Caused by different reasons and varying from person to person sleep deprivation results in worsening the quality of life of individuals as well as decreasing their productivity and effectiveness of their work, which in the end, having mass character and involving more and more people, can lead to some negative influence on the social and economic life filling the society with the atmosphere of tiredness, anxiety, stress, depression and creating threats to health and risks in the workplace.

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NORMS OF MARRIAGE IN THE PERIOD OF KYIVAN RUS'

Marriage is a formal union between two people, usually registered in accordance with the laws of the country where it is present. It often includes various rights and obligations for the partners, depending on the specific terms of the marriage contract. Marriage issues remain relevant to this day. The traditions and rituals of marriage that we can observe today date back to the times of Kyivan Rus'.

East Slavic society shaped the internal structure of the family and the norms of family life based on local cultural traditions. Marriage and family relations were regulated by legal customs developed by family groups and public authorities. Although bride «kidnapping» was a common form of the marriage, these marriage rites were no longer in use by the time Kyivan Rus' was formed, and were attached to various amusements and religious ceremonies. Most marriages were based on a conspiracy of the couple. Starting in the tenth and eleventh centuries, chronicles did not record cases where a bought or kidnapped woman was killed on her husband's grave, as it had been before. Instead, «a woman was left on her own to kill herself whenever she wanted, as a proof of her loyalty to her husband» [1, p. 43].

After the adoption of Christianity in 988, the process of forming marriage law began, which took place in two ways: through the transformation of ancient wedding rites into legal customs and through the legalization of decisions of church bodies based on Byzantine marriage law. These processes were stated in the legislative code of Prince Yaroslav the Wise. Rus' monuments of the tenth and eleventh centuries testify the influence of ancient marriage traditions on the norms of family law.

Engagement ceremonies were common, which included a festive dinner at the bride's parents' house, where cheese was served, brought to the table by a bridegroom. This rite of «kraiania», which consisted of cutting the cheese and the loaf into pieces, was a symbol of the marriage agreement between the newlyweds.

If the groom did not comply with this agreement, it was seen as a manifestation of disrespect for the girl and was punished by a monetary fine [2, p. 136].

The society was interested in the girl's marriage, since according to old Rus' law, she had no right to inheritance after the death of her parents. This explains why the law provided for the responsibility of parents if their daughter did not marry, which made them worry about the fate of their children in advance. At the engagement stage, the parents of the newlyweds agreed on the amount of the dowry and set the date of the wedding, taking into account the consent of the groom and, importantly, the bride's consent. Since the marriage agreement was a property transaction, the final decision was made by the bride's parents or relatives. At the end of the thirteenth century, the consent to marriage began to be recorded in a marriage contract, which was concluded by matchmakers or relatives [2, p. 134].

Although there were unforeseen circumstances, the church was extremely thorough in enforcing marriage arrangements. After the engagement, the young man had to marry the bride, even if it was forced or for other reasons. Even if the bride was seduced by another man, this did not change the future prospects of marriage between the betrothed.

The marriage engagement usually ended with a church wedding in the fourteenth and fifteenth centuries, but initially this rite was popular only among the ruling class [3, p. 107]. Polygamy, i.e. the practice of having more than one wife, was not popular in Rus', but sometimes covered only the upper strata of the ruling class, primarily the princely environment. However, this phenomenon was condemned by the church. A free peasant could not marry a slave without the prior consent of her master. By marrying her, he also had to become a slave. A slave woman gained her freedom if her master seduced her and she gave birth to a child [2, p. 136].

According to the church legal norms existing in Kyivan Rus', it was not allowed to marry more than twice. Priests were forbidden to bless such a union. In accordance with the existing requirements of the church, it was forbidden to marry people who were close in kinship. In addition, two brothers or sisters were not

allowed to marry persons who were children of the same parents. These requirements were obviously borrowed from Byzantium [2, p. 134-137].

Summarizing, we can say that the church aimed to strengthen the old Slavonic family. The norms helped to establish monogamy, the strength of marriage, and the fidelity of spouses. Due to the dependence of the population, the church helped the state control the people even in love affairs.

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M. Sharudina, O. Prikhodko, O. Osadcha

THE PROCESS OF INTEGRATION OF UKRAINIAN REFUGEES (PRACTICES OF SWITZERLAND)

To date, there is a problem of mass emigration of the population in Ukraine due to military actions on the territory of our state. During the development of the military conflict between Ukraine and the Russian Federation, most of the countries of Western Europe and the countries of Scandinavia opened their borders and provided the opportunity to receive the protection of the host country. In this thesis, we will analyze the process of integration of Ukrainian emigrants in Switzerland in the canton of Genève. According to the federal law on the provision of asylum of June 26, 1998 (LAsi) Hospice général, the provision of social and financial assistance is governed by cantonal law [1].

According to official data of the State Secretariat for Migration (SEM), as of 2022, a total of 62,142 Ukrainian emigrants with S status live in Switzerland. In the French-speaking part of Switzerland, the canton of Genève ranks second and hosts 3,538 Ukrainians.

The main goal of the Hospice général is: to provide decent living conditions and recovery, to promote the development or maintenance of skills, to increase the ability to integrate and be independent, which will be useful in the future during a possible return to the territory of the country of origin, as well as to ensure harmonious coexistence in reception structures and with society. But the problem of adaptation of Ukrainians to a new foreign-language environment is still relevant and requires further study and application of new methods.

Consider the process of integration of Ukrainian refugees in the canton of Genève. A person in need of protection and located in Switzerland has the right to receive S status, which is valid for one year; further extension depends on the decision of the SEM. The difficult process is waiting for the distribution to the canton and the subsequent search for housing. This process can last from one month to five or six months of waiting. Currently, various categories of the population (women with children, persons with disabilities, the elderly, etc.) live in special institutions – refugee camps. [2]

After the distribution of the cantons, each representative with S status has the right to gainful employment, certain health insurance and the right to housing. If a person living in the territory of the canton of Geneva is unable to support himself, he has the right to receive social assistance. Currently, there are several types of social assistance: in-kind (housing, food, hygiene products, etc.) and monthly financial assistance. Social benefits in turn cover the basic needs of everyday life in Switzerland.

Undoubtedly, the main problem of the integration of Ukrainians is the language barrier (due to the fact that officially there are four languages in Switzerland – German, Italian, French and Romansh). Each canton, local community and university organizations offer specific courses or programs that are oriented towards supporting migrants and are aimed specifically at solving this problem.

Therefore, the process of integration of Ukrainian immigrants in the canton of Genève is a rather difficult process, both for the refugees and for the municipality, as the local communities were not ready for a significant number of migrants, so

currently we can more often see changes in the legislative processes of the canton, which are aimed at improving the process adaptation.

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A. Shpachynska, Y. Riabchemko, O. Osadcha

PROBLEMS OF MASS MEDIA REGULATION

During the years of Ukraine's independence, an extraordinary number of laws and orders were adopted, which contributed to the development of legislation specifically in the field of mass media. Article 34 of the Constitution of Ukraine regulates the right of every citizen to freely search, receive, transmit, process and distribute information in any legal way [1]. The relevance of this work lies in the fact that an increase in the use of information technologies gave rise to a greater process of using them in political, economic and other spheres of society. That is, the sphere of activity of the mass media in Ukraine is expanding, while the methods by means of which this regulation will be carried out are too few or they do not cover all elements of this sphere.

Analyzing the legislative regulation of the mass media, a voluminous definition of the legislative framework is displayed. The Law of Ukraine "On the National Council of Ukraine on Television and Radio Broadcasting" defines the legal basis for the activity of the National Council of Ukraine as a constitutional, permanent, collegial, supervisory and regulatory state body in the field of television and radio broadcasting. The activity of the National Council consists in the supervision of compliance with the laws of Ukraine in these field, as well as the exercise of regulatory powers.

The first problem concerns part 1 of article 3 of the above-mentioned law, which states the principles of the collegial body's activity: legality, independence, transparency, accessibility to the public and consideration of cultural, ideological and political diversity. The latter contradicts Part 1 of Art. 15, namely, the authority of the National Council, whose activity consists in the development and implementation of state policy in the field of radio broadcasting [2]. That is, the opinion about what is relevant and necessary is accepted by the state, not by the citizens of Ukraine. The need for the auxiliary apparatus of the People's Council in relation to coverage and observance of public opinion is growing.

Another legal act that regulates the activity of state bodies in the field of mass media is the Law of Ukraine "On Printed Mass Media (Press) in Ukraine" [3]. Administrative regulation of activity consists in the state's guarantee of economic stability, provision of economic support, prevention of abuse of monopoly position by publishers.

According to part 2 of Art. 5 of the above-mentioned law, there is another problem of legislative regulation of mass media activity. This article states that the law applies to printed mass media of other countries that are distributed in Ukraine. It is precisely in this that the need for administrative and legal methods of regulation is observed, because the information of other countries may not be tracked, may be aimed at undermining the national security of Ukraine. Therefore, the legislative framework should have a more detailed legal regulation of everything that is disseminated in the field of mass information, in particular, regarding the administrative responsibility of state authorities for the admission of illegal information from other countries into the information circulation of Ukraine.

In general, it can be stated that the legislation of our country in this field meets all the needs of international standards in the legal field. But, unfortunately, compliance of our legislation with international standards does not yet mean guaranteeing real protection of information and ensuring a high-quality mechanism of activity of state authorities. Therefore, the problem is that it is necessary to

eliminate the gaps in the legislative regulation of the mass media with the help of administrative and legal regulations and a single normative legal act.

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P. Shylo, O. Lahova, O. Novikova

ENGLISH AS A CONSTITUENT OF THE HUMANITARIAN AND PROFESSIONAL EDUCATION OF LAW STUDENT

Today our country is developing dynamically and Ukrainian legislation is constantly changing. Jurisprudence does not stand still and tries to keep up with the trends of society and the world. The English language plays an important role in this process.

One of the most important elements of the professional competence for future lawyers is knowledge of a foreign language at sufficiently high level that is accessible for perception. That is why learning a foreign language as a means of communication in the process of future professional activity is a priority task for the teacher. So, the formation of foreign language professional and communicative competence of future lawyers, using and possessing information in a foreign language is relevant today.

Conditions for professionally oriented training of foreign language for students of law faculties are the following: to acquaint them with the general and legal terminology of law, reading authentic texts, formation of independent work skills in creating an individual dictionary, mastering oral professional communication skills using examples of the most common situations of everyday communication.

The leading methods are the use of films, books, flashcards and learning grammar by reading the text. Also, the main emphasis is on communicative competence [1]. The language of a lawyer is distinguished by an analytical component and argumentation, that is, to prove one's legal position and clearly formulate a legal opinion in the court.

The written form is also important in studying a foreign language with a professional aim. Moreover, the English language is the most common in jurisprudence. Because it is in contracts, correspondence and documentation. In the process of creating written messages, law students have time to think over sentences, select adequate words, grammatical forms.

The communicative orientation of the English language course in a higher educational institution is determined by the ultimate goal of education: the formation of future professionals' ability and readiness for intercultural communication, which involves the achievement of a certain level of competence – the ability to correlate language means with specific goals, tasks, situations and conditions of communication. A special difficulty in the learning process is the correct use of legal terms, as well as the presence of a large number of terms that students must master.

So, it can be stated that professional-oriented studying of the English language of law students allows to organize active interaction of all participants in the communication process, during which effective exchange of authentic, professional information, acquisition of the professional communication skills take place.

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SPECIFICITY OF RESEARCHING INDIAN LANGUAGES MEDICAL VOCABULARY

Medicine, like every science, has its own specifics of using terms, that is, its own space for the use of specialized and general terminology. This space has a tendency to further expansion due to the constant development of human thought, scientific and technical discoveries.

In accordance with the appearance of an increasingly large range of concepts, there is a need for a clear, “evolutionary” nomination of them. In this work, we would like to analyze the space of Indian medical vocabulary precisely from the angle of Indian concepts. This is necessary to rethink the English medical vocabulary. The scientific tradition there developed in several directions, so it is important to follow every direction of thought, because language is a mirror of the people soul.

For a complete picture, we will consider, first of all, the Hindi language vocabulary of Indian traditional medicine, which is the result of a long layering of different eras, starting from ancient times and up to the present day [11, p. 97].

Many linguists have studied the etymological composition of the modern literary language Hindi. Among them: T. Grahame Bailey “Studies in north Indian languages” [4], S. K. Chatterji “The Origin and Development of the Bengali Language” [10], J. Bloch “La formation de la langue Marathe” [5].

The vocabulary of Indian traditional medicine includes medical terms, medical sociolect vocabulary, as well as non-terminological (everyday) medical vocabulary, which functions not only in scientific, but also in other subsystems of the Hindi language.

It mostly functions in scientific and popular science literature and is interpreted as scientific and does not have the status of colloquialism. In terms of its structure, the identified layer of vocabulary is extremely diverse: these are both

complex words-terms and simple lexemes in structure. The basis of Indian traditional medicine is folk terminology, which was developed over many centuries [11, p. 98].

It can be used such sources as Dravyaguna, the treatise "Bhavprakash Nighantu", the main texts of Indian traditional medicine: "Agnivesha Tantra", "Charaka Samhita", "Sushruta Samhita", "Kashyapa Samhita"[3, p. 18].

Yu. O. Rybalkina's distinguishes three groups of lexemes according to their origin: vocabulary of *tatsama* consists of Sanskrit words used in the Hindi language, and neo-Sanskritisms (neologisms based on Sanskrit lexemes); *tad bhava* vocabulary is ancient Indian vocabulary of Indo-Aryan languages various stages of the development (Prakrit, Apabgransha, New Indian languages), which over time changed its phonetic form in accordance with pronunciation norms and entered the Hindi language, undergoing phonetic and semantic changes; borrowings from European languages and Arabic-Persian borrowings.

The vast majority of *tatsama* lexemes name the basic categories and principles of Ayurvedic medicine, the philosophical categories used to describe them, for example: *vāta*, *pitta*, *kāpha*. This group includes general medical vocabulary and terminology (*rakt* "blood", *asthi* "bone"), names of diseases (*jwar* "fever"), names of medicinal plants (*ela* "cardamom").

Separately, a group of neologisms or neo-Sanskritisms is singled out, which are lexemes that have developed from the words *tatsama* in connection with the processes of development and globalization in medicine. They denote phenomena and processes inherent in modern science: *kitanunāshak* "anti-bactericidal", *aparvātan* "muscle withdrawal".

Tadbhava vocabulary is a general medical vocabulary that denotes parts of the human body (*ankh* "eyes", *pav* "leg"), names of inorganic substances (*sona* "gold"), names of common plants (*tar* "palm tree").

Borrowings (*penisilin* "penicillin", *skringing* "examination", *paudar* "powder") belong to two language groups: Indo-European (English and others) and Semitic (Persian and Arabic) [11, p. 104]. In the layer of borrowed words, it is

necessary to highlight the Arabic-Persian vocabulary, which is not usually divided into Arabic and Persian. This is because some of the borrowed Persian words were themselves borrowed from Arabic. It should be noted the Arabic-Persian elements presence in the language of traditional medicine caused by spread of Islam.

This group includes such lexemes *assehat*, *tabīyat* “health”, *akhlāt* “liquid”, *dām* “blood” [11, p. 106]. As for modern Hindi vocabulary of Indian traditional medicine, there is characterized by the greatest degree of internationalization, compared to the lexical systems of other scientific fields, due to the influence of the English language, which in turn borrowed from two classical languages – ancient Greek and Latin [11, p.102].

Neo-Sanskritisms are a separate group among tatsama lexemes which are an etymological layer of vocabulary that arises when the Sanskrit tatsama is transferred to the Hindi language with a change of the initial meaning for the name of a phenomenon previously unknown to Indian medical science.

A feature of the vocabulary of Indian traditional medicine is the presence of synonymous pairs of words that differ in origin: *zabān* (P) – *jībh* (H) “tongue”, *yāsmīn* (P) – *yāsamūn* (A), *camelī* (H) “jasmine”. Hybrid lexemes formed by combining morphemes of different origins are also extremely common: *raktchap* (S+H) “blood pressure”, *belgirī* (H+P) “cellulose” [11, p. 106].

As for the actual Sanskrit language, one of the key problems is the translatability of Sanskrit terms into European languages. It should be noted that the ayurvedic lexicon was originally a local production meant for local use [2, p. 1].

Sanskrit medical vocabulary can be extracted from the works that represent the medicine vision system from the Indian point of view. We are talking about the context of the use of some words in Ayurveda. Today, among the foundational works of Ayurveda are the *Sūsruta* and the *Caraka*, which are great encyclopedias of medicine compiled from various sources from the mid-first millennium BCE to about 500 CE.

Among the examples of vocabulary related to medicine, several terms-elements can be cited:

“5elements” (Pancha maha booth) that compose the universe, including the human body	
Prithvi-	Earth
Jala	water
Agni	fire
Vāyu	air
Ākāśa	space/sky
are held to be the 7 primary constituent elements (saptadhātu) of the body	
rasa	chyle or plasma
raktadhātu	blood
māṃsadhātu	flesh
medhadhātu	fat/adipose tissue
asthidhātu	bone
majjadhātu	marrow
śukradhātu	semen or female reproductive tissue

Ayurvedic literature deals elaborately with measures of healthy living during the entire span of life and its various phases. Ayurveda asserts a balance of three elemental energies or humors: *vāta*, *pitta* “fire” and *kapha* “material”. According to Ayurvedic medical theory, these three substances – *doṣas* (literally that which deteriorates) – are important for health because the body is healthy when they exist in equilibrium and unhealthy when they exist in disequilibrium [6, p. 14].

Due to the fact that the experience of healing can be subjective, we can state the importance of minimizing the ambiguity of terms on the example of such vocabulary [2, p. 1].

It can treat such a system of medicine as Ayurveda in different ways, but the lexical fund from some of the treatises that represent it can be used to describe and analyze the medical vocabulary of Sanskrit and modern Indian languages.

Preventive and curative measures are the key components of the Ayurvedic system. Major treatment approaches include the use of *auśhadhi* “drugs”, *anna*

“diet” and *vihara*, which includes exercises and a healthy mode of life. Charak Samhita and Sushrut Samhita (100–500 BC) describe over 700 plants, along with their detailed classification, pharmacological, and therapeutic characteristics [8, p. 34].

Ayurveda uses many words regarding medicines. among them we can mention some plants that are used in traditional medicines: आमलक (*āmalaka*) “amla” and its doublet that came into English language (*emblic*) from Medieval Latin *emblicus*, from Arabic أَمْلَج (*ʔamlaj*)[1]

As an example of use in medicine we can cite “*tarika*”. A short-term clinical trial demonstrated that “*tarika*”, an Ayurvedic pimple remover herbal powder (containing

T. chebula fruit, T. bellerica fruit, Santalum album heartwood powder, Curcuma aromatica rhizome, Embelia ribes fruit, Berberis aristata dried stem, Acorus calamus rhizome, Embelia officinalis fruit, Taxus baccata leaf, Myristica officinalis fruit endosperm, and Cyperus rotundus rhizome) has good effect in patients suffering from moderate to severe degrees of acne vulgaris [8, p. 37].

The use of such concepts is important not only in the narrow context of studying vocabulary, but also in practical application in the modern world. This also applies to the serious issue of patents. In the work "Indian medicinal plants: advancement in the traditional medicine, sustainable utilization and conservation " it is said that traditionally, turmeric, neem, tulsi, etc. cannot be patented. If someone produces any traditional plant based medication, the unique process can be applied for patenting. As India and other historical civilizations have massive knowledge systems of such process and plants with years of trial and confirmation. It is interesting that *amla*, *gulmendi*, *dudhi*, *karela*, etc. which are traditionally used by many communities, still all those have US patents [9, p. 262].

As an example of a biological product, let's take the word ‘honey’ that in Sanskrit is मधु (*mádhu*). This word comes from Proto-Indo-European **médhu* “honey, wine, mead” [7]. For a Slavic speaker, the corresponding word in Sanskrit will be very familiar due to the common Indo-European root. We can compare the Slavic words that mean honey: Old Church Slavonic медъ (*medŭ*), from which modern

Ukrainian *med* (*med*) and dialectal variant *mid* (*mid*), Slovenian *med* come from. We can see that in this case Sanskrit and the modern Slavic languages show a remnant of a common single lexical representation of the concept.

The role of honey has been important since ancient times. Honey is said to be a substance that is to be licked (Lehyam). Usage of honey as food and medicine has been advocated since the Vedic period, that is, mid-second millennium or mid-first millennium [6, p. 14].

Thus, we can state a centuries-old Indo-linguistic tradition, which can be traced to the presence of its own medical system, where special terms are used to denote specific concepts, both those that are currently used by official medicine and those that are specific to Indian traditional philosophy. This state is provoked by the historical development of medical science on the territory of India, as well as by the significant influence of the Ayurvedic system.

The medical vocabulary of Indian languages consists of two main cores: a vocabulary based on the Sanskrit tradition and borrowed words, mainly Arabic-Persian and Greek-Latin-English. The study of Sanskrit vocabulary itself can help in inventing medicines for diseases, other medical-philosophical thinking to solve today's problems.

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V. Vorobyov, O. Sokolenko, O. Hurko

PECULIARITIES OF THE IMPLEMENTATION OF ACTIVITIES OF STATE AUTHORITIES DURING THE INTRODUCTION OF MARTIAL LAW

Our life became completely different after February 24 2022. The changes, which the full-scale aggression of Russia had brought, had the impact on all spheres of life in Ukraine. The range of rights and responsibilities of Ukrainian citizens was limited and new rules for the functioning of the state authorities were established. First of all, this concerns changes in the functioning of state authorities.

The President of Ukraine by Decree No. 64/2022 of February 24, 2022 "On the introduction of martial law in Ukraine" introduced martial law in Ukraine from 05:30 on February 24, 2022 for a period of 30 days [4] for the implementation of the rules according to p. 20 article 106 of The Constitution of Ukraine – The President of Ukraine adopts a decision, in accordance with law on the introduction of martial law in Ukrainian the event of a threat of aggression or danger to the independence of Ukraine [2].

Organization of state authorities work and local self-government in the conditions of martial law comes down to assisting to authorized bodies in solving the tasks of state defence.

In order to characterize the changes in the implementation of the activities of state authorities, it is necessary to analyze the concept of martial law, which is

contained in Art. 1 of the Law of Ukraine "On the Legal Regime of Martial Law". The martial law is a special legal regime that introduced in Ukraine or in some parts in event of armed aggression or threat of attack, danger to the state independence of Ukraine, its territorial integrity and provides for the provision of appropriate state authorities, military command, military administrations and local self-government bodies powers necessary to avert the threat, repulse armed aggression and ensure national security, eliminate the threat of danger to the state independence of Ukraine, its territorial integrity, as well as the temporary, threat-induced, restriction of the constitutional rights and freedoms of a person and citizen and the rights and legitimate interests of legal entities with the indication period of validity of these restrictions [5]. The definition of martial law provides the peculiarities of the functioning and authority of state bodies, which also affects their name.

The introduction of martial law primarily affects the organization of work of all branches of government. The legislative branch, which introduced by the Verkhovna Rada of Ukraine, works in session mode. The main issues of its work during martial law are defence capability, economy support, protection of the population and punishment for treason, collaborationism, looting.

In particular Cabinet of Ministers of Ukraine and relevant ministries the central bodies of the executive branch of power issue acts, which regulate certain spheres of life under martial law.

The judicial branch of power in the most cases works as usual, but there are several restrictions, which applied only to places of active hostilities, where only urgent cases are considered, under conditions of occupation may be transferred to other places. In particular, the list of courts that have been temporarily transferred to other places can be found on the official website of the Judiciary of Ukraine.

The President of Ukraine implements general management of the state, but also is the Commander-in-Chief of the Armed Forces of Ukraine. One of his main duty during the martial law is a diplomatic one, which is manifested in the coverage

of events in Ukraine, drawing the world's attention to Russia's military aggression and attracting international support.

Regional military administrations begin to act instead of regional state administration. According to p. 1 Art. 4 of Law in Ukraine «On the legal regime of martial law» in the territories where martial law has been introduced, to ensure the action of the Constitution and laws of Ukraine, to ensure, together with the military command, the introduction and implementation of measures of the legal regime of martial law, defence, civil protection, public safety and order, protection of critical infrastructure, protection of rights, freedoms and legitimate interests of citizens, temporary state bodies – military administrations can be formed [5]. The main term of creation of military administrations is introduction of martial law in the territory of Ukraine or in the certain part of the state. It is mentioned in the legislation that in case of adoption the decision of creation the district and regional administrations their status is acquired by district, regional state administrations, respectively [1, c. 219]. The decision on formation military administration is adopted by the President of Ukraine at the request of regional state administrations or military command.

However, the difference between the regional state administration and the regional military administration is not only in the title of authorized body, but also in the additional power of these authorities, in particular restrictive. For example, military administrations can restrict free movement of the population, the sale of goods, check the personal belongings and housing of citizens, ban certain political parties, rallies, interfere with the work of enterprises, carry out the evacuation of the population, provide humanitarian aid, etc. [3, c. 30].

The changes also concern the activities of local self-government. The local self-government bodies function in cooperation with military administrations, which play a leading role at the level of local government, make the most important decisions for the stabilization and defence of the regional territory. Their responsibilities contain new sphere of activity – solving social problems of internally displaced persons. Also the sphere of competence of local self-government is narrowed, due to the transfer of part of their responsibilities to military administrations [1, c. 100].

Legal regime of martial law restricts human rights, which carried out and controlled by the state authorities. This mostly concerns the restriction, it is concerned the restrictions of movement freedom and free access to any information. However, martial law «mobilizes» state regime to prompt adoption of important decisions for society designed to increase the effectiveness of the state's defence capabilities and ensure the safety of the civilian population by implementing the necessary restrictions [3, c. 31].

Hence, legal regime of martial law made changes not only in Ukrainian people`s and citizens` everyday life. Foremost, this concerns the activity of state authorities. Responsibilities and competence of the state body have changed since the first days of full-scale russian invasion of Ukraine. The primary function of state authorities and local self-governments was to resolve challenges related to defence capability and internally displaced persons, there was a need to regulate various spheres of state functioning during martial law, which led to the issuance of acts and orders by central executive authorities. In addition, the foreign policy of the President of Ukraine is also important for attracting international support. It is important that the local state authorities also underwent changes, which turned into regional military administrations with broader responsibilities.

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SEX BUSINESS REGULATION MODELS: WORLD EXPERIENCE

During the last decades, scientific directions focused on the study of key aspects of prostitution, as a unique social phenomenon, are rapidly developing, enriched with new approaches and models aimed at the comprehensive development of the outlined concept. In view of this, the statement that prostitution, as a multidimensional phenomenon, can be considered from polar points of view, that is, cover a wide range of methodologies, becomes logical. The world experience of regulating sex business can be conditionally divided into three main approaches: the concept of complete criminalization (experience of Sweden), the approach of partial criminalization (experience of Israel), the model of decriminalization (experience of Holland) [1, p. 18]. We offer to study in more detail the conceptual features of each of them.

As already noted, the concept of complete decriminalization formed the basis of the Dutch model of regulation of prostitution. A key element of the regime regulating commercial sex within a given country is a clear distinction between forced prostitution/trafficking, which, in accordance with the country's legislative framework, is illegal, and voluntary prostitution, which is fully regulated by the current legal framework. The regulation of sex business is delegated to municipal and regional authorities. The main means of regulation within this approach is the licensing system. In addition, the country's legislative framework provides sex workers with a full range of social support elements inherent in all employed citizens: access to pension programs, health insurance, social security schemes. Important is the right of prostitutes to defend their own honor and dignity within the legal system, which is ensured by the presence of legally valid licenses and employment contracts [3, p. 12].

Nevertheless, it is worth noting that the concept of decriminalization has a certain system of shortcomings, which caused strong criticism among supporters

of the structuralist direction. Thus, critics point out that the Dutch model of regulation of prostitution in practice does not contribute to the reduction of human trafficking and exacerbates the issue of exploitation of representatives of commercial sex, since the legislative framework endangers sex workers from non-European countries, turning them, in fact, into «second-rate and cheap» labor. In addition, a significant disadvantage is the problem of social normalization of sex work, which can lead to negative social and cultural consequences, such as aggravation of the problem of objectification of women and perpetuation of gender inequality [2, p. 204].

In our opinion, the liberalized approach of the Dutch to regulating sex work is a more favorable concept than the approach of the Swedes. Thus, the adherents of the model note that within the framework of this approach there are positive changes, such as: reducing the manifestation of social stigmatization, minimizing the violent and exploitative approach in this direction, providing prostitutes with access to the basic rights of employed citizens – medical and pension provision, social and legal protection, etc.

In contrast to the Dutch model, a diametrically opposite approach is opposed – the Swedish one, characterized by the complete criminalization of the sex industry. Thus, this model is based on the feminist structuralist concept, which, in turn, implies the perception of sex workers not as offenders, but as victims of the industry. In the Swedish approach, prostitution and human trafficking are identical in their meaning, and, therefore, implies a full-scale closure. The Swedish model is positioned as an effective means of overcoming prostitution. Within the framework of the current legislation of the country, considerable funds were allocated for the implementation of public clarification on the illegality of prostitution as a social phenomenon; financing programs to support social workers within the framework of social and medical security; development of criminal provisions aimed at protecting foreigners in the sex industry. Thus, the main advantages of the Swedish model are the criminalization of the purchase of sex, which reduces the threat of exploitation of prostitutes; protects sex workers by involving them in assistance programs, minimizing the possibility of harassment and arrest [1, p. 20].

However, critics of this approach identify a significant number of shortcomings of the model. Thus, it is noted that the orientation towards the law enforcement system in the regulation of prostitution provokes a number of complications, such as difficulties in distinguishing between consensual and non-consensual prostitution [2, p. 207]. In our opinion, the criminalization of sex work can provoke the emergence of hidden elements of prostitution, which will greatly complicate the process of regulating the activities and protecting workers from possible risks. No less significant drawback, in the system of our views, is the spread within the functioning of the model of a stigmatizing view of prostitution as an activity that is exclusively immoral and unacceptable.

A unique model of regulation of prostitution is presented by Israel. This approach is based on the concept of a dichotomized feminist discourse: on the one hand, Israeli law adheres to an abolitionist approach that criminalizes pimps spreading the prostitution sector; on the other hand, prostitution in Israel is mostly practiced openly, with a certain degree of institutional recognition and in a wide zone of tolerance on the part of the authorities [3, p. 11].

Thus, the regulation of prostitution within the framework of the partial decriminalization approach is implemented by criminalizing the purchase of sex services, imposing sanctions on offenders in the form of fines and criminal liability; it is worth noting that the process of selling sexual services is not criminalized. Decriminalization of the sale of sexual services aims to minimize stigmatization of their processes in society aimed at the sex industry. The legislative framework of Israel provides for the introduction of a system of measures aimed at social support for sex workers, such as: free access to health care, legal and legal support, social support, material and financial support for persons seeking to leave the field of commercial sex and engage in other activities. The Israeli system duplicates the Dutch approach – the country strictly regulates the activities of brothels, introducing a system of compulsory licensing, which implies compliance with the standards of normal working conditions [2, p. 218].

Thus, a comprehensive study of the multidimensional complex of consequences of feminist models of regulation introduced in the Netherlands and Sweden, as

the embodiment of diametrically opposed feminist concepts, clearly demonstrates that these legal approaches have a significant system of disadvantages for sex workers. The legal regime proposed by Israel, compiling the basic provisions of both models, seems to offer an optimal approach to solving the stated shortcomings, covering a sufficiently dichotomous system that implies recognition of both the violence and exploitation that sometimes characterize labor relations in the sex industry and the focus on the needs of sex workers and their own choice. Thus, this approach is effective only in theory, since its implementation in practice demonstrates the imperfection of the legal system and requires correction.

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A. Yablunovskyi, O. Khodus, O. Hurko

THE LINGUISTIC FACTOR OF UKRAINIAN NATIONAL IDENTITY: FEATURES OF TRANSFORMATION

The language factor is often one of the key factors in the construction of national identity. An individual's awareness that he speaks the same language with a person who lives a thousand kilometres away from him becomes an important prerequisite for the formation of a common consciousness.

Ernest Gellner considered that the spread of standardized national languages is the main reason for the emergence of modern nations. They replace many local dialects, whose speakers did not understand each other well. Modernization processes require the creation of a standardized communication space, the necessary prerequisite

of which is a common language. Gellner explained nationalism by the need to create separate national states for the spread of modern cultures and languages [1].

The factor of the Ukrainian language played a fundamental role in the Ukrainian national movement from the 19th century. Repressive laws against the Ukrainian language made it a symbol of the existence of a separate nation.

After gaining independence, Ukrainian national identity became divided on the language issue. Although most Ukrainians considered Ukrainian their native language, Russian dominated the mass media and public sphere.

Russian aggression in 2014 caused significant changes in the linguistic identity of Ukrainians. The start of a full-scale war in 2022 strengthened them. The propagandistic rhetoric of the Russian authorities about the "protection of Russian speakers" caused mass disgust among Ukrainians. Also, the closure of pro-Russian mass media and the complete media hegemony of the nationalist narrative contributed to the change in views and practices.

Thus, according to a survey by the Democratic Initiatives Foundation [3], in December 2021, 77.4% of respondents considered the Ukrainian language their native language, and 19.7% Russian. In December 2022, 87.7% chose Ukrainian as their native language, and 9.9% Russian.

The use of the Ukrainian language in everyday practices has also increased significantly. Thus, according to KMIS data [2], in 2017, 51% of respondents communicated exclusively or mainly in Ukrainian at home. In 2022, their quantity increased to 62%. The number of those who communicate in Ukrainian at work, while studying and on the Internet has also increased.

Important thing is the increase in the number of supporters of the Ukrainization of public space. In 2017, 60% believed that Ukrainian should be the main medium of communication in all spheres. In 2022, they became 80%. The number of supporters of Ukraine as a bilingual country fell from 33% to 15%.

These polls show a change in public attitudes towards the dominance of a consistently Ukrainian-speaking identity. However, it is worth considering the limitations of the survey method in this context. Military actions affected,

foremost, regions with a significant share of Russian-speaking people. Some of them cannot be surveyed due to the occupation, someone due to ongoing hostilities. Also, the largest number of refugees abroad left these regions.

The "Spiral of silence" phenomenon should also be taken into account. In conditions of patriotic upsurge, people may not be inclined to give "unpatriotic" answers. To obtain more objective data, it is necessary to compare survey data with the results of qualitative research.

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S. Yakovliev, L. Mudryevska, O. Hurko

RESTRICTIONS OF HUMAN AND CITIZEN RIGHTS AND FREEDOMS UNDER THE CONDITIONS OF MARITAL STATE

One of the fundamental axioms of legal theory is the axiom regarding the application of legal norms in time, space, and among individuals. Article 3 of the Constitution of Ukraine enshrines that "a person, their life and health, honour and dignity, inviolability, and safety are recognized as the highest social value in Ukraine" [1, p. 3].

Article 64 of the Constitution of Ukraine establishes that constitutional rights and freedoms of an individual and citizen cannot be restricted except in cases provided for by the Constitution of Ukraine. However, in the conditions of the imposition of martial law or state of emergency, certain limitations on rights and freedoms may be established, indicating the duration of these restrictions [1, p. 3].

The constitutional norms of Ukraine correspond to the principles set out in the Universal Declaration of Human Rights, which states that every person must exercise their rights and freedoms only within the limits established by law to ensure due recognition and respect for the rights and freedoms of others and satisfy the just requirements of morality, public order, and the general welfare in a democratic society [5, p. 3].

Thus, the Law of Ukraine "On the Legal Regime of Martial Law" provides for a number of such restrictions, including the right to freedom of expression, assembly, and association, the right to personal inviolability, private property, and freedom of movement [4, p. 3].

However, these limitations must be justified and proportional to the aim pursued. The protection of an individual and citizen's rights during martial law must be ensured in accordance with international humanitarian law, including the Geneva Conventions on the protection of war's victims.

But what is the limitation of human and citizen rights? By temporarily suspending such rights until the end of martial law or by suspending the norms of law establishing such rights and freedoms? If the restriction of rights means the narrowing of the scope of human rights, then in what part?

The legal analysis of the Basic Law and the Law of Ukraine "On the Legal Regime of Martial Law" provides reasons to believe that the national legislation recognizes the suspension itself as a limitation of the rights and freedoms of a person and a citizen.

So, for example, Clause 6, Part 1, Art. 6 of the Law of Ukraine "On the Legal Regime of Martial Law" defines that an exhaustive list of the constitutional rights and freedoms of a person and a citizen, which are temporarily limited in connection with the introduction of martial law with an indication validity period of these restrictions, as well as temporary restrictions on the rights and legitimate interests of legal persons with an indication validity period of these restrictions. Article 13 of the same Law enshrines a temporary ban on the application of normative legal acts of the Verkhovna Rada of the Autonomous Republic of Crimea, decisions of

the Council of Ministers of the Autonomous Republic of Crimea, decisions of local executive bodies and local self-government bodies, which concern the rights and freedoms of a person and a citizen, which are limited to in connection with the introduction of martial law. And part 1 of Art. 8 of the Law establishes a direct ban on certain constitutional rights and freedoms [4, p. 3].

If we analyse paragraph 3 of the Decree of the President of Ukraine "On the introduction of martial law in Ukraine", which lists specific articles of the Constitution of Ukraine, which establish certain constitutional rights and freedoms of a person and a citizen, which are limited, we can be sure that what is meant is the suspension of the norms of law [3, p. 3].

How expedient is it to suspend the effect of such rights in full, in particular, on the territory of the entire state, and not in individual areas where hostilities are taking place, and in general for the entire period of martial law?

Since there is a lack of stable principles for the implementation of human rights during war, which would be effective, it is necessary to continue researching this issue at different levels of regulation.

In any case, the protection of human rights is an integral part of international humanitarian law, and legal measures for their protection must be fully implemented even in the most difficult conditions of military conflict.

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PANEL 3

Modern Research in the Sphere of Socio-Economic Sciences and Information Technologies

(DNU, Zoom)

A. Albatova, N. Krasnikova, H. Mudrenko

THE PSYCHOLOGICAL IMPACT OF COLORS IN MARKETING

The Psychology of color is a discipline that studies how human emotional state, behavior, mood and decision-making are affected by colors. The use of color in marketing communication is a powerful tool that has a direct impact on our subconscious, by deciding how we think and feel about a certain product, advertisement, campaign etc. Studies showed that as much as 60% of a decision to purchase a particular product is based on the appropriate choice of color.

Colors influence and cause a range of reactions. Well-chosen color attracts attention, calms, satisfies, while the same color used in different context may have the opposite, negative effect. As in every segment of life, likewise in marketing the first impression is often very important, so the choice of color becomes a crucial factor in communicating with a consumer.

It is believed that colors are utilized to shape an image or personality and encourage an impulsive purchasing behavior. For instance, male consumers tend to perceive bigger cost savings when products' prices are presented in red, rather than black, which influences their purchase intention. Also, buyers prefer to buy products that are colored to match their intended use or purpose. For example, when buying a product that is associated with water, consumers prefer items in blue, while red is for luxury products or items that are associated with status, such as sports cars.

Moreover, Beneke, Mathews, Munthree and Pillay (2015) in their study revealed that income level has a notable influence on color preferences for bottled water. Lower income groups of people tend to prefer cold and warm colors in design, while higher income groups prefer neutral colors.

When talking about restaurants, red is a popular color to use among fast-food places, because it stimulates appetite and affects our metabolism. Yellow is also used in the places where food is, because yellow gains customers' attention, increases their appetite, and encourages them to eat. On the contrary, formal and more luxury restaurants use blue to create a calming and soothing atmosphere for their customers and encourage people to stay longer and as a result, a consumption of food and drinks is increasing.

Rightly chosen color is one of the key elements of the whole marketing strategy and plays a pivotal role in marketing communication. It is important for marketing experts to be well acquainted with psychological meaning of colors and how they influence consumers, because the wrong color can have a negative impact on the product's image, sales and company overall. By understanding the psychological impact of colors and meticulously choosing colors for product design, advertising, and marketing communication overall, companies receive a desired feedback from their consumers, increasing their sales and creating trustworthy, long-term relationships with the clients.

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DISTRIBUTION OF INCOME IN CANADA

The returns to labour depend on supply and demand in the labour market; and the demand derives from the demand for all of the goods and services produced in the economy [1]. There are imperfections in the labour market. One is the immobility of labour, which affects the returns to workers. In an industry where there is a strong demand for the product, wages may have to be raised to attract more workers, and the incomes of all workers in the industry are likely to be increased.

At the same time, as some workers move out of an industry to a higher-paying one, the quantity supplied to the industry that is not expanding decreases, and the analysis of supply and demand suggests that as long as other conditions do not change, this will result in an upward pressure on the price (wages) of those who remain in the industry. However, if workers are not aware of the existence of higher-paying jobs, or if they know but cannot afford to move, or are not properly trained, then this immobility can result in their earning a smaller share of the income pie.

Canada's manpower policies are administered by the Department of Manpower and Immigration. Through its large network of manpower centres, the Department works on both the demand and supply sides to try to improve the operation of the labour market. It offers job information and testing and counselling services; it helps students find summer jobs and refers people for full- and part-time courses under the Canada Manpower Training Program. The Canada Manpower Mobility Program helps workers move to areas where there are job opportunities.

To talk about the market for labour is to oversimplify greatly: labour is by no means a homogeneous product. Members of the labour force include managers and professionals, labourers and unskilled workers. There are great differences in the type of market that exists for the various kinds of labour. Two thirds of the total labour force in Canada do not belong to unions. Even in the industrial sector, where most unions are concentrated, there are many firms whose workers are not

unionized. In such cases, it is the market that largely determines the returns to non-unionized workers, although its power is limited to some extent by certain provisions of protective labour legislation. Such returns can be very high. Workers in some non-unionized companies get returns higher than those in unionized companies, because management is sometimes willing to pay a premium to keep the unions out.

In addition to forming unions, workers have responded to the power of employers by pressing strongly for government legislation that would protect them and their share of income; and they have been successful. Through the process of judicial interpretation of the constitution, labour legislation has come to be regarded as a matter of civil rights, and hence primarily a matter of provincial jurisdiction. The fair employment section, for example, prohibits discrimination by employers and unions on the grounds of race, colour, religion, or national origin. Another section specifies equal pay for equal work for men and women.

Provincial governments have also enacted legislation relating to all of these matters for industries under their jurisdiction. There are minimum wage laws throughout the country, and the same wage rates are established for both sexes in the majority of provinces. Most provinces have anti-discrimination laws, general hours-of-work laws, annual vacation legislation, as well as factory or industrial safety acts. All provinces have workmen's compensation laws that provide for payments to employees for accidents suffered while on the job [2].

The effect of many of these laws is to increase the income level of workers and to increase employers' costs. The minimum wage laws make the lower range of the supply curve for workers irrelevant in some markets. Some workers who might be willing to work for less are prevented from doing so; employers are similarly constrained in their hiring. The result is that fewer people may be hired in some markets, but some may earn more than would be the case if the law did not exist.

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**REASONS FOR THE UPDATING AND HISTORICAL ORIGINS
OF THE COMPETITIVENESS ISSUE OF THE COUNTRIES ALL
OVER THE WORLD**

The search for the reasons for the wealth of nations is the driving force of economic science throughout almost its entire history. Within the framework of modern economic theory, the study of the international competitiveness of countries and its factors allows us to consider and analyze these reasons. A detailed analysis of the factors of national competitiveness, which has been conducted for the past 35-40 years, is an attempt to discover the root foundations of the prosperity of some countries and the backwardness of others, as well as to explain the constant changes in the relative positions of national economies on the international arena. Taking into account the strengthening of mutual influence and interdependence of countries, which is taking place against the background of globalization processes, the relative positions of countries, which are most clearly expressed in competitiveness ratings, come to the fore.

Before proceeding to the presentation of modern approaches to the international competitiveness of countries, it is necessary to investigate the origins of this concept. The theory of international competitiveness can be considered as a continuation of the principles of two branches of economic theory: the theories of international trade and the international division of labor, as well as the theory of economic growth. The theory of competition, institutional and evolutionary approaches in economics also had a direct impact on this phenomenon. In the early stages of the formation of political economy, the main research was carried out within the framework of mercantilism – an economic doctrine of the 16th-18th centuries, which emphasizes the role of international trade as a source of economic growth. Foreign trade was considered as the main source of replenishment of the treasury, being the only channel for the inflow of monetary metal in most European countries. National

wealth, one of the central concepts of mercantilism, was associated exclusively with the amount of gold a nation had. According to this approach, the accumulation of gold was the main goal of the state and a means of increasing welfare. Trade policy was based on stimulating exports, often through subsidies, and reducing imports of finished products through quotas and high tariffs. Among the mercantilists, there was a theory of the static nature of world resources, as a result of which the accumulation of wealth by one nation occurred at the expense of its reduction in another (trade as a "zero-sum game"), which led to a policy of aggressive exports and active protectionism, but modern protection tools were developed against this over many centuries [1].

Another important aspect of competitiveness, according to mercantilism, was the low production costs of exported products due to low wages. This approach does not fully correspond to modern concepts, but similar approaches are still used by developing countries to achieve success in global competition. However, within the limits of mercantilism, one can find the origins of modern views on the importance of the human factor. The views of mercantilists on the competitiveness of the national economy formed the basis for further research according to the causes of the growth of national welfare, revealed the importance of foreign trade for economic development, determined the role of the state in foreign trade and described the trade balance.

Further analysis of the role of foreign trade for economic growth followed the search for advantages of countries over trading partners in the world market. The development of the theory moved from absolute advantages to relative ones, then to the concept of factor advantages, and from them to the competitive advantages of countries. Models of international competition, built in the 18th and early 19th centuries by the founders of classical economic theory, Adam Smith and David Ricardo, are the basis of modern understanding of these processes. In Smith's scientific works, the leading place in the regulation of production and exchange is occupied by competition, which he calls the "invisible hand" of the market. His concept provides a new perspective on the sources of economic growth. The priority is not the accumulation of gold (as in mercantilism), but the increase in production potential and labor productivity.

According to Smith, the benefit of foreign trade activity comes from the absolute advantages of countries in the production of certain goods. The country that produces a certain product with the lowest labor costs per unit of production, i.e. cheaper for itself, has an absolute advantage. Thus, trade turns out to be mutually beneficial due to the ability of each trading partner to purchase a good at lower costs than if he had produced it independently. This approach is to some extent accepted by the modern theorist of international competition – Michael Porter, who recognizes productivity as the basis of competitiveness.

David Ricardo significantly developed the idea of mutual benefit of free international trade, showing that trade can take place even if a certain country does not have an absolute advantage in accordance with any of the goods. The nature of production in this model is determined by comparative advantages. Countries export those goods in the production of which local labor is used relatively efficiently, and import those products for which the costs of this labor are relatively inefficient. Trade between countries is recognized as mutually beneficial, as it expands the possibilities of national consumption, and is also an indirect method of production, that is, it allows exchanging exports for imported goods, which would be produced at high costs without trade [1].

David Ricardo's model occupies a more important place in the modern analysis of foreign trade relations, but it has a number of shortcomings. For example, foreign scientists Maurice Obstfeld and Paul Krugman note a number of factors that the Ricardian model does not take into account: the significant impact of trade on the distribution of income within the country in practice (it is assumed that the countries that participate in trade will fully benefit), differences in the resource potential of countries as reasons for trade between them and saving of scale of production. In addition, this model assumes an extreme degree of specialization, which does not occur in practice. Despite the aforementioned shortcomings, which were solved by theorists of the international economy of the 20th century, the validity of Ricardo's model that countries export goods which they have relatively higher productivity for is confirmed by a number of studies.

Some of the listed shortcomings are explained by the Heckscher-Ohlin theorem (the theory of factor proportions), which was developed in the first half of the 20th century, which explains the reasons for differences in labor productivity, which is the main international trade according to Ricardo. According to the authors of the theorem, interstate differences in relative costs are explained mainly by the fact that factors are used in different ratios in the production of different goods and, in addition, there is an unequal relative supply of production factors between countries. Each country will more efficiently produce goods for the production of which a factor that it has in abundance is used intensively. Accordingly, the same goods will be offered on the world market in exchange for products produced using a factor that is scarce for it.

In the second half of the 20th century, the world market acquired new features: most of the countries entering into trade had similar factor proportions, and the exchange of goods most often took place within the same industries. English drilling rigs were shipped abroad, and Norwegian ones were bought in return, German cars were exported and Japanese ones were exchanged, Italian washing machines were delivered to France and French ones were imported from there, etc. To explain these processes, in the 1960s and 70s, alternative theories of international trade were proposed, being built on fundamentally new premises, which recognized the presence of suboptimal use of production factors and varying degrees of market monopolization. Trade between countries with similar factor proportions is explained in the framework of the "new theory of international trade" created by Paul Krugman, Calvin Lancaster and other economists. The specialization of countries on certain goods does not occur due to comparative advantages, but on the basis of economies of scale, which is the development of production in conditions where an increase in factor costs per unit entails an increase in output that exceeds one unit. It is international trade, providing greater opportunities for the sale of products, that gives greater potential for using the effect of scale. The implementation of the effect of scale within one company (internal effect of scale), as a rule, leads to the violation of perfect competition, as it entails an increase in the concentration of production and consolidation of companies that become monopolies.

This explanation of trade is valid under conditions of monopolistic competition. The external effect of scale implies that the number of enterprises that produce the same goods increases, and while the volume of each of them is changing, this effect leads to the emergence of perfect competition. Thus, the model explains the reasons for international trade in differentiated products of the same industries, that is, intra-industry trade, the share of which is constantly growing. Nevertheless, this approach should still be considered not as a denial, but as an addition to classical theories explaining inter-industry trade [1].

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V. Bovkunov, V. Makedon, T. Vorova

THE INFLUENCE OF INTEGRATION PROCESSES ON THE COMPETITIVENESS OF THE COUNTRY'S NATIONAL ECONOMY

Competitiveness and integration are interrelated processes. When integrating a country into one or another regional grouping, the aim is to obtain a certain positive effect, which should raise the competitiveness of the national economy, its industries and enterprises. However, this goal can be realized only under certain

conditions. In general, the impact of integration on the competitiveness of the national economy can be expressed in the realization of comparative advantages, economic interests, reduction of production costs due to economies of scale of production, improvement of economic performance of enterprises and industries mainly at the regional level.

However, economic integration affects the competitiveness of national economies in different ways: towards dynamism and strengthening, or by exacerbating contradictions and reducing competitiveness. Everything depends on a correctly chosen economic policy, a correct assessment of the economic and political situation in the country, the presence or absence of economic resources. The lack of real prerequisites for the effective practical implementation of economic integration, the immaturity of socio-economic relations, the primitiveness and structural undifferentiation of national economies, the underdevelopment of the market and financial infrastructure can doom a country that joined the union to failure or complete failure. However, in general, the integration process is a powerful tool for accelerating the development of regional economies and increasing competitiveness on the world market of countries that are members of integration groups.

A well-founded theory of the influence of integration on national economies was created by the American scientist of Canadian origin J. Viner. He identified two main types of effects arising from economic integration: the trade creation effect and the trade reorientation effect. The effect of creating trade is to expand trade within the integration association. There is an effect of scale in this: two or more countries together can form a fairly large market, which allows for a reduction in specific production costs. The effect of trade reorientation consists of such economic benefits when a partner country increases the export of its goods to another country, although before the creation of the union these goods were imported from the third countries with lower costs. Thus, the effect of reorientation contributes to the growth of production in the partner exporting country.

J. Meade, a British economist who was awarded the Nobel Prize in Economics in 1977, after critically analyzing the works of J. Viner, supplemented the theory of

the effects of economic integration. The scientist distinguishes the following effects of economic integration: the effect of trade reorientation and the trade-forming effect. Based on the analysis of the steel market in a number of European countries, J. Meade came to the conclusion that as a result of integration, a reorientation of production from low-cost to high-cost, which is uneconomical and inefficient, may occur. As a result, the world production is reduced and in some places there is a drop in the general standard of living. In addition, J. Meade notes that the customs union leads to the diversion of international trade from the rest of the countries in favor of one of the partners, which now, from the point of view of customs barriers, occupies a privileged position in the market of the importing country, it is an uneconomic innovation. However, J. Meade does not deny that the customs union is able to lead to the formation of new directions of international trade, since one of the partners can export to the market of another partner now and beat the prices set by the existing industry. Such an innovation leads to the transfer of resources to a more efficient and economical production system.

Taking into account the trade-forming effect, J. Meade considers it necessary to balance economic benefits from some elements of trade formation with economic losses from other elements of trade distraction. Thus, as a result of the removal of tariffs between countries within the framework of the association, trade expansion in other sectors of the economy may occur, which will lead to a decrease in costs and economic gain. The scientist made his analysis basing on the following research method: multiplying the value of each element of abstract trade increases costs per unit of this type of trade and multiplying the value of each element of newly created trade reduces costs per unit of this created trade. J. Meade believes that the expansion of trade compensates for losses from the distraction of existing trade from low-cost to high-cost trade.

Among the disadvantages of economic integration, J. Meade also refers to the fact that the creation of a customs union for the countries forming this union means a reduction in the revenues received at the expense of customs duties. There may be some losses that can be offset against the gains of trade expansion. Then

the lost customs revenue must be compensated by increasing other forms of taxation: the new tax will cause the same damage here as the old duty caused. In this case, the trade-creating effects of tariff reductions must be greater than the adverse trade-reducing effects of the best alternative methods of revenue generation.

The effect of the scale of production as a result of integration is noted by American scientists C. R. McConnell and S. L. Brue. Analyzing the process of integration within the EU, they note that integration creates mass markets, which are necessary for the industries of the countries of the "common market" to achieve economies of scale of production. The more efficient production characteristic of large-scale markets enables industries in European countries to achieve lower costs that have historically been unattainable in narrow, isolated markets. At the same time, they note that the impact of integration on third countries is less defined due to rising tariffs.

Thus, no scientist treats the consequences of integration unambiguously. Integration has both positive and negative effects. The positive consequences include an increase in the demand for goods and services, the spread of trade, the creation of large enterprises, the reorientation of trade in goods from third countries, the transfer of resources to a more economical and efficient production system, the volume of investments from partner countries increases, the development of specialization and the division of labor. So, the access to financial, labor, material resources and the latest technologies is opened. It is also worth remembering the negative consequences that integration leads to: a reduction in state revenues from customs duties, the movement of goods from one country to other more developed partner countries, which will turn it into a backward region, an increase in product prices due to oligopoly, etc.

The *Global Competitiveness Index* is a global study that ranks the countries of the world according to the indicator of economic competitiveness. It is calculated according to the methodology of the World Economic Forum, which is based on a combination of publicly available statistical data and the results of a global survey of company managers. The surveys are conducted annually by the World Economic

Forum together with a network of partner leading research institutes and organizations in the countries analyzed in the report. The study has been conducted since 2004 and is currently the most complete set of indicators of the competitiveness of various countries in the world. The World Economic Forum defines national competitiveness as the ability of a country and its institutions to ensure stable rates of economic growth that would be sustainable in the medium term. Countries with high indicators of national competitiveness, as a rule, ensure a higher level of well-being of their citizens. It is assumed that this index should be used by states seeking to eliminate obstacles to economic development and competitiveness as a tool for analyzing problematic points in their economic policy and developing strategies for achieving sustainable economic progress. Representatives of the World Economic Forum note that the competitiveness of national economies is determined by numerous and diverse factors.

Comparative cross-country analysis based on benchmarking at two levels is widely used in the studies of WEF. At the micro level, the analysis is carried out by means of "reconnaissance" of the company's competitiveness, which makes it possible to assess the effectiveness of activities based on the analysis of its competitive environment, find optimal ways of interacting with counterparties, and take into account their features when forming a corporate strategy. At the macro level, the policy of competitiveness is studied across the entire economy, which allows identifying the most successfully competing companies, industries and sectors in the aggregate of national manufacturers on the international market on the basis of analysis of the competitive environment, as well as factors determining the competitiveness and competitive advantages of the country.

Undoubtedly, inefficient management of state finances and high inflation have a negative impact on the state of the economy, while the protection of intellectual property rights, a developed judicial system, and other measures can have a positive effect. Along with institutional factors, the education and training of the workforce, constant access to new knowledge and technologies can be of decisive importance. The factors that determine the competitiveness of the economy have different effects

on the economic systems of the countries of the world, depending on the starting conditions and the current level of development. It is obvious that the factors themselves change over time.

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P. Forkert, M. Sydorova, Yu. Honcharova

MODERN ARCHITECTURE OF DYNAMICALLY TYPED PROGRAMMING LANGUAGEVMS

Dynamically typed programming languages such as Python, Ruby, and JavaScript have become increasingly popular in recent years. Their dynamic nature offers several advantages over their statically typed counterparts, such as rapid prototyping, easy debugging, and the ability to dynamically generate code at runtime. However, it also comes with a performance cost, as the interpreter has to perform additional operations during program executions, for example, type checking and memory management. This work aims to research the ways how modern dynamically typed programming languages are implemented to achieve their performance metrics.

A lot of research that attempted to mitigate the performance cost [1–3] was conducted during the last several decades. Nowadays language virtual machines (VMs) feature sophisticated garbage collectors, efficient bytecode interpreters, and just-in-time (JIT) compilers, that convert frequently executed code into machine

code during runtime. Such architectures allow VMs to achieve performance close to that of compiled statically typed languages such as C or C++. Furthermore, modern VMs use adaptive compilation techniques that dynamically optimize the code based on runtime profiling data, allowing for further performance improvements.

Javascript as the only programming language supported in browsers currently features the most performant and efficient implementations:

1. V8 [4], developed by Google for use in their Chrome browser. It is now also used in Microsoft Edge and Opera.
2. SpiderMonkey [5], developed by Mozilla for their Firefox browser.
3. JavaScriptCore [6], developed by Apple for the Safari browser.

The architecture of all those VMs, while different in the details and actual code, is surprisingly similar – they all feature an efficient interpreter and several (usually two) JIT compilers, which allow them to balance between their latency and throughput.

When the application starts execution happens in the interpreter mode, a VM does not spend time compiling and optimizing code, therefore the feedback happens faster, but the code is executed slowly. In addition to code execution interpreter also collects additional metrics about the running code: which types occur at which call site, how many times each method or function was called, etc.

When some particular function or section of code is executed enough times – the VM compiles it with the first JIT compiler, which is usually called “baseline compiler” – it does not do many optimizations, but the compilation itself is fast. At this point, the code continues collecting metrics about its execution.

If a section of code executes even more times – then it is compiled by the next JIT compiler, usually called “optimizing compiler” because it applies different optimizations so the code is more efficient to execute. At this stage, the generated code after optimizations can reach the performance of compiled statically typed languages or even overperform them.

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B. Garazha, O. Baylova, O. Aliseienko

THE ROLE OF PLANNING IN BUSINESS ACTIVITY

In modern conditions, to raise innovative business methods, before opening a new entrepreneurial business or improving an existing one, it is necessary to determine the needs of the ever-changing market by its nature. When developing new products, the dynamics of market trends should be taken into account. Therefore, before opening a new business or expanding an existing one it is necessary to solve the following important questions: if it is worth investing in the project, if it stands the competition and what its uniqueness is? Business planning answers all these questions and helps to avoid any economic risks.

Mostly, entrepreneurs planning a new business seek inspiration from one of these four sources: 1) the previous work experience; 2) education or training; 3) nature hobbies, abilities or other personal interests; 4) understanding of the existence of unsatisfied needs or opportunities for market expansion. Sometimes the first reason is the work experience of a relative or a friend. As practice shows, today almost all beginner entrepreneurs analyze and plan the business before starting it.

A business plan is a carefully prepared document that discloses all aspects of any business venture that is started [2].

A business plan is a concise, available, accurate and easy-to-understand image of a planned business, the most important tool for studying various circumstances, which allows you to choose the most desired result and find out the ways to achieve it.

Business planning is becoming increasingly important due to rapid changes in the surroundings in which businesses operate. It's because, as time, passes the environment becomes increasingly uncertain, aggressive and dynamic in relation to the company. One of the possible tools for fighting the negative impact of the surroundings is business planning as a continuous and systematic process of organizing business activities through the development of strategies, tactics and strategies of operational actions for their implementation.

In order for the enterprise to be successful, it is necessary the business plan to be updated every year [1].

One of the most important requirements in relation to planned decisions is the guarantee of optimal resources use. The exploitation of the company's resources must be focused on the conditions, needs and market situation, also increasing production; application of scientific and technological progress; maximum performance reserves available for use; better use of tools and work items; organization of production, etc.

The balance of the plan is its significant quality feature. That is the quantitative relationship between the interconnected parts and goals of the plan. Balance is a condition that determines the effectiveness of the plan and the reality of the implementation of the plan. Their main expression is the relationship between resource needs and their availability.

Therefore, the business plan is an active work management tool that is the starting point for all business planning and implementation activities. A business plan allows to control, analyze and assess the level of success of activities during the implementation of a business project, also identify deviations from the plan and timely add corrections in the direction of business plan development.

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APPLICATION OF PERSONALIZATION, PERSONIFICATION AND CUSTOMIZATION IN ENTERPRISE E-MARKETING

It is advisable for almost any enterprise in the XXI century to use the electronic environment and apply the Internet marketing in order to achieve the main goal, namely profit maximizing. Auxiliary platforms can be both a website and an Instagram/Facebook/TikTok page, etc.

Thanks to the Internet, businesses can attract customers in a matter of seconds, while minimizing the cost of transportation, marketing promotion strategy, the number of intermediaries, and can also increase functionality, simplify the process of scaling and implementation, which allows a more thorough and individual focus on one-to-one marketing. But an important drawback to the advantage of the above is the increase in the level of competition among manufacturers. This feature increases the value of buyers and gives room to improve interactions to keep the customer's eyes on you [1].

So, in order to get the attention of the client, we suggest using personalization, personification and customization as methods of promoting the company among competitors. Let's consider the type of economic activity of the enterprise using the example of the introduction of business in the B2C format (from the English "Business-to-Consumer"), the basis of which is electronic retail trade [2].

Personalization. The process of personalizing the site is attuning to each specific user. Setting up personalization of the online store allows you to adapt to each client by selecting results in the search engine, issuing special offers, banners. The visitor receives advice with the most interesting products for him based on his personal preferences. That is, personalization allows:

to increase conversion	the user's journey is shortened, since the buyer does not have to search for the product, the system offers it by itself
to increase the average check	the system offers the most relevant products in cross-sale and upsell blocks, which increases the probability of purchase
to form user loyalty	the program helps to satisfy the needs and desires of customers, thus you take care of them, which increases their loyalty
to improve behavioral factors	the content becomes more personalized, which helps to attract the user to the site, increase the session time, the depth of views
to increase the effectiveness of the sales force	with the help of the system, you adapt the site to the behavior and needs of the user, which positively affects the effectiveness of the sales surge

An example of the use of personalization is Quizzes by BuzzFeed, which was launched by CadBury and produced personalized video quiz results that increased consumer awareness and brand loyalty. This quiz selected the taste for the customer based on the data they left. These videos were so engaging that 90% of users watched the video in its entirety, 65% went to Cadbury's website and 12% even shared their video on social media, further driving popularity.

Personification. Site personalization is often confused with personification. In turn, personification is a function of the site that has been given the features of a living person. It's a good idea to refer to your client as a fictional character, hero, or company representative. An effective way is to apply on behalf of someone who is an employee or the head of the company, as this creates trust and helps to form a positive image of your company in the customer. Basically, personification helps to solve the following tasks:

to take the place of competitors	there are many manufacturers and similar products today, and in order for the consumer to distinguish your brand and choose it from among others, we offer an individual approach to each consumer, which will raise your service a step above competitors
to maintain relations with customers	a good manifestation of personalized marketing is the creation of a chat, the involvement of assistants and bots to solve customer support issues. This tool will help to better interact with consumers, take into account and improve shortcomings

An example of the successful use of personification is the well-known candy brand "M&Ms", which thanks to this tool has updated its business introduction since 1995 and is still holding high positions.

Customization. The customization process is launched specifically based on individual requirements and product requests. Sometimes an online store offers to change almost all options of a thing, to develop a completely new design and functionality. For this purpose, a separate section is created under the names Customization, Creating your own model, etc. Customization of the product suggests changing the parameters at the user's request, for example, the color of the item (including its individual part), shape, size, etc. The customization system is a pretty strong psychological trick. As the customer changes the color, size, style, and other configurations of the model, he begins to feel like the designer of the item. Customization allows you to meet individual needs, taking into account all the features and requirements of the consumer, and as a result, create the absolute exclusivity of your products. The brand "Nike" can be given an example.

So, personalization, personification and customization, the set of three methods of promotion, will allow you to develop your unique approach in providing services to the client, increase brand recognition and competitiveness.

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**ANALYSIS OF THE MAIN TRENDS OF DAIRY MARKET
DEVELOPMENT IN THE CONTEXT OF THE
COUNTRY'S ECONOMIC SECURITY**

The development of agriculture is an integral element of the stability of the Ukraine's economic security level, along with its components – production, food, and foreign economic security. In its case, agriculture is also a complex system that combines the production processes of plant and animal products, and their condition are factors that positively or negatively affect the economic security of the state. One of these factors is the production of milk and dairy products, which in 2021, according to the State Statistics Service, is characterized by the level of meeting the needs of the population at the level of 95.21%, considering that 9.37% of the preservation is ensured at the expense of imports [1]. Thus, with the unsatisfactory value of the share of imports in consumption in the context of economic security and unsecured needs of the population at 4.79%, it is advisable to analyze the production of dairy products in more detail to apply the causes that negatively affect the food security of the population.

In recent years, Ukraine has developed a glaring tendency to reduce the number of cattle: in particular, as of January 1, 2022, compared to January 1, 2017, the number of cows decreased by 26.25% from 2108.9 thousand to 1555.3 thousand heads. Approximately 72.70% of cows were kept by households mainly in rural areas, which provide 68.30% of gross milk yield as of January 1, 2022. At the same time, 27.30% of the cow population is in agricultural enterprises, providing 31.70% of milk yield. It indicates that the production of milk by the residents is dominant in the production structure but not as efficient as in the corresponding enterprises. Thus, the reduction in the number of cows in Ukraine illuminates the reluctance of the population to take care of keeping cows. It was calculated that the population gets rid of 6.46% of cows annually, based on the geometric mean of the growth rate.

In figure 1, you will see the dynamics of the number of cows and milk yields in Ukraine. These changes can be classified as negative transformations, except for the volume of milk produced by agricultural enterprises because they have a slight increase.

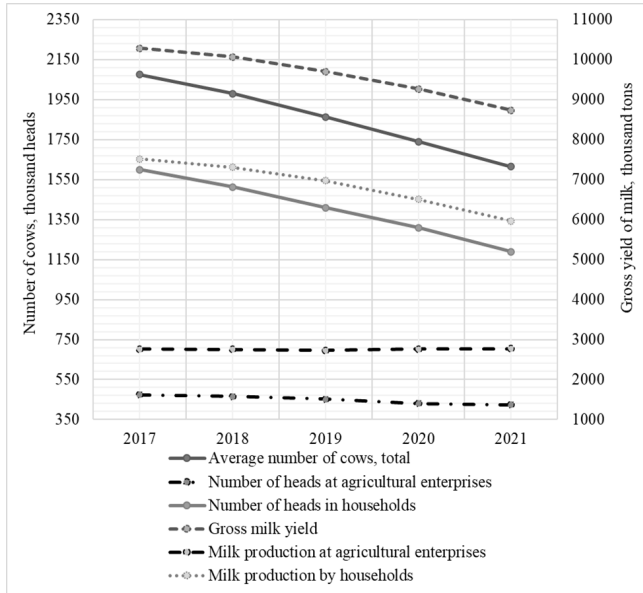


Fig. 1 – Dynamics of the average number of cows and gross milk yield at agricultural enterprises and households in 2017-2021

Source: built by the authors based on data [2]

It is worth noting that the average number of cows is determined using the chronological average because the initial information is instantaneous dynamic series. Considering the overhead dynamics, the dependence between these two values can be determined using the simplest regression model. Thus, the coefficient of determination is 98.96%, i.e., the variation of gross milk yields directly depends on the number of cows. According to Fisher's test, the model is statistically significant in the light the corresponding coefficient equals 0.005. After all, it is less than 0.05. Thus, with an increase in the number of cows by 1 thousand, the volume of milk will increase by 3.38 thousand tons per year, which will lead to growth in the economic security level of the population.

Obviously, this behavior of households regarding the cessation of production of milk and dairy products has its reasons. One of the reasons is the decrease in the share of milk from housekeeping that goes to processing enterprises from 32.29% in 2016 to 18.27% in 2021 (fig. 2).

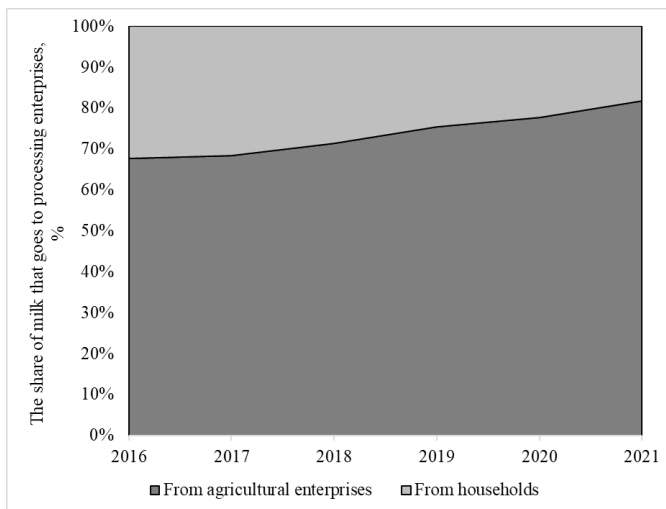


Fig. 2 – Sources of milk supply to processing enterprises in 2016-2021

Source: built by the authors based on data [2]

On the one hand, processing enterprises are gradually reducing the purchase of milk from households. Those who buy do so at much lower prices: the average purchase price of milk in 2021 was UAH 9.39 per liter. Processing companies agree to pay enterprises UAH 9.94 per liter and for the population only UAH 6.20 for the same volume. On average, in 2016-2021, the milk price from households was almost twice as low (by 48.69%). The decrease in the probability of selling milk of own production and the lack of income make the activity less profitable or, in general, unprofitable. Bearing in mind these factors, the population decides to stop keeping cows.

On the other hand, the behavior of enterprises with such decisions can be justified because new requirements for the safety and quality of dairy products entered into force in 2019 with a transition period until 2022. It is a part of

the obligations that arose after the signing of association agreements with the European Union (EU). The fact is that only dairy raw materials with a minimum level of bacterial contamination that corresponds to the Ukrainian milk extra grade are allowed for processing in EU member states [3]. The new standard defines three permissible types of milk: extra milk, higher and first grade. Households produce mainly second-grade kinds of milk because they do not have enough technical equipment, sometimes without necessary certification, and trade in local spontaneous markets.

In fig. 3 is shown the dynamics of the structure of cow's milk of the established basic fat content purchased by processing enterprises, depending on its quality.

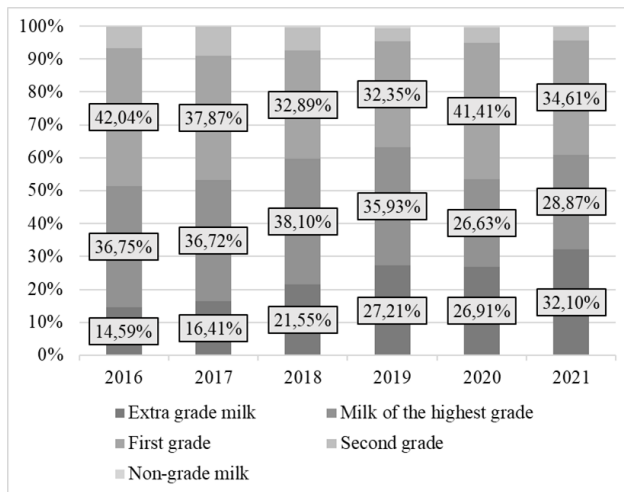


Fig. 3 – The structure of milk purchased by processing enterprises, according to its quality in 2016-2021

Source: built by the authors based on data [2]

In general, the share of extra, higher, and first-grade milk is growing and equals more than 90%, while the share of extra type milk in the structure is increasing from 14.59% to 32.10% in the light of the possibility of being exported to the EU member states. In 2019, the share of second-grade milk, produced mainly by households, sharply decreased due to the establishment of new requirements.

Thus, the decrease in economic security level is caused by a drop in the production of milk and dairy products, which do not meet consumer demand in the domestic market. It occurs due to the reduction in the number of cows in households. They do not receive part of the income due to a lower price for their products or cannot sell their products to processing enterprises due to the non-compliance of the quality of the milk produced with the established requirements. At Ukrainian processing enterprises, the share of extra-grade milk is growing (32.10% in 2021), aimed at consumers in EU member states.

Therefore, a gap in this production chain can be overlapped by government programs of multi-year support for peasant households that do not have milking machines, the necessary sanitary conditions on the premises, or even a sanitary book for animals. Unfortunately, overcoming this gap by own funding sources is impossible due to the difficult economic situation. If the state relies more on milk production by agricultural enterprises with higher labor productivity, it is necessary to create special conditions to stimulate these producers. That is, a state strategy must be formed. It must highlight on whom the state relies and which financial or tax mechanisms will encourage one or another manufacturer of dairy products. The lack of state stimulation of producers will lead to a shortage of milk, an increase in import dependence, and an increase in product prices.

Government measures like a driving force will help to stop the reduction of the number of cows by households and, in the future, will move to an increase in their number, which in turn, according to the regression dependence, will lead to an increase in the production of milk and dairy products, which in the long run will increase the level of food security and improve the state of economic security of the country.

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UKRAINE'S COOPERATION WITH THE UN

Ukraine is not only a member of the UN, but also a co-founding state during the 1945 conference in San Francisco. Ukraine also made a significant contribution to the coordination of the Preamble and the formation of the Goals and Principles of the UN Charter.

One of the points of pride for Ukraine is that in June 2018, the permanent representative of our country, V. Yelchenko.

In addition to participating in UN meetings, Ukraine is an active participant in various country development programs.

Currently, the document "Transforming our world: the 2030 agenda for sustainable development", which has specified 17 Sustainable Development Goals, has gained the most publicity. Ukraine joined this program, several years were spent on the formation of the Sustainable Development Goals of Ukraine, and so the Presidential Decree "On Sustainable Development Goals of Ukraine for the period until 2030" was issued on September 30, 2019 [2; 3].

Achieving the goals of sustainable development in Ukraine is mostly aimed at the following areas: solving the problem of ecology, starting the implementation of the environmental protection program; increasing the level of social development and economic growth at all levels.

Our country receives a lot of aid from specialized UN agencies. This assistance is directly technical, advisory, and financial. Also, this aid includes various programs, for example: democratic governance, poverty alleviation, support of public administration, fight against incurable and serious diseases, environmental protection.

Since the beginning of cooperation, Ukraine has received 200 million dollars from the UN for the implementation of more than three hundred projects in various fields: protection of human rights, nature protection, development of civil society, atomic energy [3].

Also, the UN is one of the main helpers of Ukraine during the beginning of Russian aggression (since 2014) and full-scale war (since 2022). This assistance is very appropriate for our country, because political and international legal support is of great importance, and the UN is an organization that involves a large number of countries, whose support is very important and necessary for us.

Ukraine is an active contributor to maintaining peace. Therefore, despite aggression from the Russian Federation, Ukraine takes an active part in the activities of the UN to ensure and support international peace and security.

Since the beginning of the Russian aggression on the territory of Ukraine, the UN Security Council has held more than forty meetings, which confirmed Russia's suspension from the UN on the Ukrainian issue.

Since February 20, 2014, the main task of Ukrainian representatives at the UN has been countering aggression from the Russian Federation, returning temporarily occupied territories, and ending violations of the UN Charter on the territory of Ukraine by terrorist groups and the Russian administration.

In 2016-2017, the main priority of Ukraine in the UN Security Council was to provide full information to the members of the Council and the international community about any increase in the threat from the Russian Federation on the territory of the annexed Crimea and in the east of Ukraine.

On February 13, 2017, the first-ever UN Security Council resolution 2341 was adopted, which concerned the protection of critical infrastructure from terrorist attacks. It was proposed by Ukraine.

Ukrainian diplomats secured the adoption of the UN Security Council resolution on convening an Extraordinary Special Session of the UN General Assembly, during which 3 resolutions were approved: "Aggression against Ukraine" (approved on March 2, 2022); "Humanitarian consequences of aggression against Ukraine" (approved on March 24, 2022); "Suspension of Russia's membership in the UN Human Rights Council" (approved on April 7, 2022).

Ukraine managed to involve the UN in negotiations regarding the evacuation of the civilian population and military from the territory of Mariupol.

Financial support for the citizens of Ukraine comes from the UN, which is very useful in the conditions of constant shelling, worsening economic situation and rising unemployment.

Ukraine closely cooperates with the UN, has permanent ties and receives constant aid. The UN, in turn, fully fulfills its duties, which are prescribed in the UN Charter, which greatly helps Ukraine in solving all crisis issues: socio-economic, security, political, and others.

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K. Krasnova, N. Riadova, T. Vorova

ECONOMIC UPS AND DOWNS

The way the world's work is done seems to be a fundamental "catching a new wave". Signs of a different wave are all around. The American economic malaise of the early 1990s has a different feel from that of earlier recessions. Even the great world recession of the 1930s was considered a lull in an inexorable long-term growth trend. This time business people are not so sure. Companies discover that they have to improve customer satisfaction while running leaner. They downsize, delayer and outsource. Many companies announce reductions in force. Even healthy, growing companies openly state goals such as doubling sales without adding employees. Major companies can rarely repeat their founders' rushes of heady growth; 1990, 2008 or 2021 won't come around again.

Among the economic arguments of recent years is whether the United States is slipping in manufacturing, and if so, whether the eclipse of manufacturing by

a service company is a good thing. “Losing manufacturing” is a state of mind. Optimists point to improved productivity growth. Average productivity automatically improves if one simply sends the low-productivity jobs elsewhere [1]. Pessimists see it as merely the natural result of outsourcing. Optimists see Gross National Product increasing. Pessimists note the relative decline of key industries: computers, machine tools, semiconductors, autos, steel, and so forth. When the market share of American-produced items such as tape recorders and VCRs hit zero, the Department of Commerce simply stopped tracking them [3].

Manufacturing insiders are more interested in the health of manufacturing know-how than in current output. Know-how grows from actual practice, not from abstract study. For instance, at the turn of the century, one could buy an American-built machine tool almost anywhere – almost like ordering seeds from a catalogue. Today the total capitalization of all American machine tool companies is less than \$1 billion, and probably closer to half that, an insignificant tick in the national income accounts [2].

More disturbing is the loss of competitive know-how. Production equipment has rapidly become computerized. Stodgy competitors have dropped out, but few thriving entrepreneurs seem ready to take their places. This kind of enterprise is now less easily built on solitary genius than it once was, nor can expertise as easily be confined to a single company. But too few manufacturers form partnerships to probe leading-edge practice.

On the bright side, educational institutions are seeing the resurgence of interest in manufacturing. Almost everyone realizes that wherever manufacturing is headed skilled, educated work teams are its capital of tomorrow. As Americans adjust to increasingly intense competition, they must consistently achieve levels of operating performance that tax the full nature of man and that were rarely if ever attained in the past. The first step in becoming better prepared is to recognize the need for preparation. Perhaps the slowdown is part of a natural evolution in the U.S. economy. The auto industry provides a clear example of that process. As vehicles accumulated, they needed roads, refineries, gas stations, repair garages,

parking lots and places to go. Gradually the U.S. auto market matured, meaning that it leveled out, thus stabilizing the rate at which we added vehicles to stocks.

The story of many mass-produced items roughly parallels that of automobiles. Refrigerators are mature, personal computers are in the same cycle. Americans became accustomed to product-centered growth sprees with few aftereffects. Another new technology, another whoopee on the roller coaster. They can no longer bury problems under fresh economic growth, leaving their mess behind. In the information wave computer technology is profoundly transforming agriculture, industry, and everyday life, just as industry radically transformed agricultural societies several centuries ago.

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A. Lozovskyi, A. Kuzenkov, Yu. Honcharova

ALGORITHMS FOR SOLVING LOGISTICS PROBLEMS UNDER CONDITIONS OF UNCERTAINTY

Decision-making under conditions of uncertainty is a decision-making process characterized by the multivariate development of events and the possibility of unforeseen situations. The task is to find a vector of target variables that satisfies the imposed constraints and optimizes a vector target function that forms a system of criteria and interdependent characteristics. The multi-criteria problem of mathematical programming is modeled on their basis. In this case, it is difficult to find a solution that satisfies all the conflicting criteria and the system of constraints. In general, the optimization logistics problem has the following form:

$$\left\{ \begin{array}{l} y = f(x) \rightarrow \max(\min) \\ x \in X \end{array} \right\},$$

where X is the set of admissible plans (alternatives, actions, previous variants of logistical solutions); f – a numerical function defined on a set X , which together with the maximization or minimization requirement is called the target function.

The solution of the optimization logistic problem is formed by the pair X^*, y^* , where X^* is the set of optimal plans, y^* is the optimal (maximum, largest or minimum, smallest – depending on the optimization orientation) value of the objective function, which is achieved by it on the set of admissible of plans X . Usually limited to a partial (rather than general) solution of the problem, determining only one among the set of optimal plans, and not the whole set.

They find a solution to the optimization logistics problem using special mathematical methods of optimization, computer programs and computer tools based on the appropriate source information.

An arbitrary optimization logistic problem contains two components: an objective function and constraints. The objective function formalizes the criterion of optimality, according to which the best one is determined among alternative options of logistics solutions. Constraints, on the other hand, define a set of acceptable alternatives. Constraints are given in the form of inequalities and/or equations.

Examples of optimization logistics tasks are the following:

- formation of a better economic plan for transportation of products, raw materials or other production resources from suppliers to consumers – directly or through certain distribution centers;
- determination of the maximum carrying capacity of the transport network;
- determination of the cheapest transport route between two specified points of the transport network;

The type of problem (linear, nonlinear, discrete) determines the methods that will be used to solve it, namely:

- linear programming (simplex method, dual simplex method, others);
- integer programming (methods of segmentation, branched search, combinatorial, heuristic, random search);
- non-linear programming (direct, indirect; design, linearization, etc.);
- others (depending on the specifics of the problem being solved).

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S. Martemianova, O. Baylova, O. Aliseienko

MODERN RESEARCH IN THE FIELD OF SOCIO-ECONOMIC SCIENCES AND INFORMATION TECHNOLOGIES

In the modern world, socio-economic sciences and information technologies are interconnected and complement each other. The use of information technologies in socio-economic research makes it possible to increase the speed and accuracy of data collection and analysis, which allows making more reasonable conclusions and recommendations.

One of the main advantages of using information technologies is the ability to cover a much larger amount of data, which allows for a more comprehensive and thorough analysis of socio-economic processes and phenomena. The use of artificial intelligence and machine learning in the study of socio-economic processes makes it possible to predict the development of the situation in the labor market, in the market of goods and services, which helps to increase the efficiency of decision-making.

The use of information technologies in socio-economic research is a necessary component for increasing the competitiveness of enterprises and countries as a whole. Research conducted using information technologies can become the basis for the development of innovative products and services, which can contribute to increasing the profitability of enterprises and raising the standard of living of the population.

However, the use of information technology in socio-economic research can create certain challenges and problems, such as:

- lack of standards and data quality assessment methods,
- the possibility of abuse and violations of privacy,
- risk of uncontrolled use of data.

Therefore, it is necessary to solve these issues, to develop standards and ethical principles for the use of data, to ensure the compliance of research with socio-economic norms and values.

Information technology can also help solve socio-economic problems at local and global levels. For example, with the use of information technologies, it is possible to develop and support public initiatives and organizations that work on the development of social and economic projects. In addition, information technology can help increase the availability of education and health, which are important components of socio-economic development.

Recently, regional economists have been paying special attention to information technologies. This is due to a number of factors:

1. Information technologies make it possible to store, process, and transmit huge amounts of information, thanks to which it is possible to carry out a deeper and more complete analysis of the development of territorial social systems of various hierarchical levels, primarily regional, since even an elementary description of such systems requires the possession of powerful layers of data.

2. Thanks to information technologies, it is possible to manage not only complex production processes, but also territorial social systems of different hierarchical levels.

3. Information technologies, which are the basis of modern research in all fields of knowledge, are increasingly gaining ground in regional economic science.

4. Information technologies led to the discovery of the attribution of information (understanding of information as an integral property of the whole matter, i.e., its attribute in general and territorial social systems, in particular). This means that information technologies can be considered as an organic component of the territorial social system "region", and, on the other hand, it is precisely thanks to the information technologies, it has become possible nowadays to provide an in-depth study of the integrity and structure of this system, to organize its space.

5. On the basis of information technologies, a new universal way of developing social structures – informationalism – has crystallized in the public bowels of various types of social systems. If, for example, material production is characteristic of capitalism, then under the conditions of informationalism, information is produced, that is, it is transformed into a commodity.

6. The development of information technologies made it possible to create and substantiate the theory of the information society (a society in which the role of information is growing at an increasing rate) and the theory of the information society (a society characterized by specific forms of social organization based on information technologies, which have turned into a fundamental source of production and power). These theories allow a new consideration of the problems of the perspective development of the economy of the regions, in particular from the standpoint of the mutual coherence of building an information society at the regional and national levels.

7. Thanks to information technologies, opportunities have arisen to generate new knowledge about the region as a complex territorial social system, about its relationships with other systems and subsystems, to create new methods of communication.

8. The use of information technologies is a transition to a qualitatively new step not only in the development of the productive forces of the region, but also in social development in general.

The study of information technologies, their impact on the development of a specific region should take place taking into account the factors outlined above.

Therefore, the use of information technologies in socio-economic research is a key factor for achieving sustainable and balanced development of national and global economies. However, it is important to ensure the ethical use of data and to ensure control and accountability for its use in order to increase public confidence in the results of socio-economic research.

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A. Mekenia, O. Don, O. Aliseienko

COOPERATION OF UKRAINE WITH THE INTERNATIONAL FINANCIAL CORPORATION

It is a well-known fact that the International Finance Corporation is a specialized agency of the UNO. Its main activity is aimed at financial support and development assistance to countries with low income per capita, with financial and economic instability. Providing recommendations on corporate governance of companies and banks, the development of agribusiness, leasing, recommendations to improve the conditions of management are within its competence. Ukraine joined IFC in 1993. Since then, Ukraine's cooperation with this influential international, monetary and financial organization has been actively developing. IFC helps Ukraine improve the standard of living of the population, solve problems with financing, provides effective assistance in reforming and developing the national economy. Partnership with IFC is an important component of the banking system of Ukraine.

IFC's cooperation with Swedbank began in 2005. At the beginning of cooperation, our state was advised and provided with practical recommendations at the level of conducting financial affairs according to international standards.

On August 27, 2008, IFC announced the continuation of its partnership with «Swedbank», namely in the direction of allocating funds for lending to small and medium-sized enterprises and mortgage financing for individuals. «Swedbank» OJSC and «Swedbank Invest» CJSC allocated loans in the total amount of \$70 million from their own account. Also takes an important part in the mobilization of loans totaling almost 69 million dollars [3].

In September 2017, IFC provided «Ukrgasbank» with \$20 million in financing to support and improve international trade operations, which should further contribute to economic growth. The partnership focuses on the development of export sectors of the national economy, namely industry and trade (financing of small and medium-sized businesses), the development of agribusiness, agriculture, and energy with the aim of increasing the share of green energy in the energy balance of our country. One of the results of IFC's advisory support was a significant increase in green financing.

In early April 2020, IFC is ready to invest about \$3 billion to support customers in the sectors of infrastructure, industrial production, agriculture, and services. Due to the situation with the global COVID-19 pandemic, Ukraine has spent a lot of budget finances to overcome these problems. After the downturn, assistance was necessary in the development of infrastructure sectors. IFC supported the construction of a new and powerful grain terminal «Neptune» which is located near Odessa, organized and helped to conduct tenders for two port concessions: the state company «Olbia» and «Kherson Commercial Sea Port». It should also be noted that IFC has allocated \$8 billion to finance Ukrainian clients from the private sector. These funds are received by IFC clients who either suffer from the economic consequences of COVID-19 or are vulnerable to them in the form of medium-term and long-term loans, mezzanine financing, equity capital and risk sharing tools. With IFC support, an Energy Efficiency Fund (EEF) was established between the EU Germany, and the Government of Ukraine to improve energy efficiency in the residential sector of the pilot program «First Swallows» throughout the country. This fund has achieved significant success. It also manages the EU-Germany Trust Fund (MDCF). Another significant program was the program for energy-efficient modernization of apartment buildings –«Warm Loans». During the first year, the program paid grants worth UAH 11.6 million to 137 apartment buildings. We also started cooperation with Bank Alliance JSC within the framework of our Global Trade Finance Program.

In August 2020, IFC signed a cooperation agreement with the National Finance Development Commission, on climate change in our country, building on

green bonds and ESG. Also consider how to improve access to capital, how to reduce risk, and prevent mistakes in management.

In April 2021, IFC will launch, together with the World Bank Group, a partnership with the National Bank of Ukraine (NBU) to support Ukraine in achieving its goals of transition to a low-carbon, flexible and resilient economy. For three years, IFC will work with the NBU to implement financing strategies based on green finance and appropriate environmental, social and governance (ESG) standards.

According to official sources, we can see that in 2022 the World Bank allocated more than \$30 million to Ukraine and Moldova. Which indicates financial assistance during the downturn. It is through the American-Ukrainian company Horizon Capital that the money will go through a trust fund with a total volume of \$250 million [1]. Horizon Capital is a leading private equity firm in Ukraine, backed by over forty investors, consisting of six funds with a total capital of \$1.2 billion. This company stated that they dedicate this fund specifically to the people of Ukraine, who inspire the whole world with their resilience against Russian aggression, and this contribution goes to the future of Ukraine, in which it occupies a worthy place. investment will provide Ukraine with the introduction of modern technologies, namely in e-commerce, the production of innovative consumer goods, in the financial sector. This is an important step for Ukraine to receive as much support from our partners as possible. In the future, IFC will provide support to Ukraine for the restoration of infrastructure affected by Russian terror. Transport, social and urban infrastructure, logistics, etc. are going to be renovated after the war.

It should be outlined that the cooperation with IFC provides many advantages in the development of the economic system of our country.

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THE ROLE OF INVERSE MATRIX IN MODERN LIFE

Computing the inverse matrix is one of the most important aspects of linear algebra. The inverse matrix can be used to solve systems of linear equations, compute the determinant of a matrix, and find solutions to various mathematical problems. This topic is important both for mathematical and computer science disciplines.

Computing the inverse matrix can be a time-consuming process. Therefore, for matrices of large sizes, computing the inverse matrix can be impractical in terms of calculation speed. However, there are methods and algorithms that allow reducing computational costs and increasing the efficiency of calculations.

The inverse matrix is a matrix that is the inverse of the original matrix. In other words, if we multiply the original matrix by its inverse matrix, we will obtain the identity matrix, where the “ones” are located on the main diagonal, and all other elements are “zeros”. For square matrices, i.e., matrices with the same number of rows and columns, the inverse matrix exists if and only if its determinant is not equal to zero.

The determinant is a numerical value that is defined for a square matrix and is represented by a number. Intrinsically, it indicates how "compressed" or "stretched" the space defined by the matrix is.

If the determinant of a matrix is not zero ($|A| \neq 0$), then such a matrix is called non-singular, otherwise ($|A| = 0$), it is singular.

One of the main properties of the inverse matrix is when a matrix is multiplied by its inverse, the resulting product is the identity matrix. This means that if a matrix can be inverted, it can be restored back to its original form using the inverse matrix. The inverse matrix is an indispensable tool for solving systems of linear equations and finding corresponding values of variables [1].

Table 1

Properties of Regular and Inverse Matrices

Property	Regular Matrix	Inverse Matrix
Determinant	non-zero	non-zero
Rank	full	full
Condition number	high	low
Eigenvalues	non-zero	non-zero
Product with transpose	non-symmetric	symmetric
Product with its inverse	identity matrix	identity matrix
Solvability of linear equations	depends on determinant	always solvable
Methods for computation	various	various

There are several methods available for finding the inverse of a matrix, and the choice of a specific method depends on the properties and size of the matrix to be computed. Common methods include the method of elementary transformations, the method of cofactors, Gauss-Jordan method, Cholesky decomposition, and LU decomposition. While these methods are not the only ways to determine the inverse of a matrix, they are generally effective [3].

The inverse matrix has the property of invertibility, which makes it very useful in solving systems of linear equations. However, the existence of an inverse matrix depends on the properties of the matrix A , particularly its determinant. Therefore, the inverse matrix method is not always the optimal solution for solving systems of linear equations.

In statistics and machine learning, the inverse matrix is widely used for solving various problems, such as linear regression, data clustering, factor analysis etc.

One of the most common tasks for which the inverse matrix is used is linear regression. Linear regression is a method of analyzing the relationship between a dependent variable and independent variables. The inverse matrix allows for the computation of the parameters of linear regression by minimizing the deviations between the observed and predicted values of the dependent variable. The use of the inverse matrix allows finding the solution of the linear regression problem with minimal error.

In cryptography and information security, the inverse matrix is used for various purposes, such as encrypting and decrypting data, constructing error-correcting codes, and creating encryption keys.

The inverse matrix can be used for encrypting and decrypting data. The encrypted text can be represented in the form of a matrix, which will be multiplied by the inverse matrix to obtain the original text.

Building check codes is the process of generating codes that allow checking the correctness of data transmission. These codes can be generated using the inverse matrix. Check codes can be generated using the parity matrix. The inverse matrix can be used to create encryption keys. Specifically, a key can be generated as an inverse matrix that is multiplied by a cipher matrix.

The inverse matrix can be used for solving authentication and authorization problems, for constructing cryptographic protocols, for data protection from hacking, as well as for other purposes related to cryptography and information security [2].

The inverse matrix is an important mathematical tool used in various fields, from science to finance and engineering. This matrix allows solving complex linear algebra problems and matrix operations, such as determining the inverse matrix, finding solutions to systems of linear equations etc. In modern life, the inverse matrix is widely used in various fields of science and technology, where accuracy and efficiency are key factors.

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SOCIALLY RESPONSIBLE BUSINESS

Socially responsible business refers to the practice of operating a business in a way that considers and contributes to the well-being of society and the environment, in addition to pursuing financial goals. It involves taking into account the interests of a wide range of stakeholders, including employees, customers, suppliers, local communities, and it works in the interests of the natural environment.

There are many ways in which business can be socially responsible. One of the most common ways is to implement environmentally sustainable practices. This can include reducing carbon emissions, using renewable energy, and minimizing waste. Another way is to ensure that the products and services provided are safe, healthy, and ethical. Companies can also support social causes and charities, provide fair wages and benefits to employees, and encourage employees to focus on their own tasks and goals.

There are many benefits of running a socially responsible business. It has a positive impact not only on the environment and society, but it can also improve a company's reputation and profit. Nowadays, customers are demanding safe, sustainable products and ethical services, and they tend to support companies that share their values. Additionally, socially responsible businesses often attract and encourage employees who are passionate about making a positive impact on the world [1].

Human rights are an essential component of a socially responsible business, and companies, which prioritize them, demonstrate a commitment to create more fair and equitable world. This can include providing equal opportunities to all employees and fair treatment, creating safe, healthy and comfortable working conditions as well as prohibiting any form of discrimination, harassment or abuse.

Another way that companies can promote human rights is by ensuring that their products and services are produced in an ethical and responsible manner. This can include monitoring their supply chain to ensure that suppliers are not using forced or child labor and they are paying fair wages.

Economic responsibility means making financial decisions with the intention of doing well. This involves investing in projects and initiatives that have a positive impact on society and the environment. Some examples of economic responsibility include investing in renewable energy sources, supporting educational programs and donating to local charities. These actions help to strengthen communities and promote sustainability, while also benefiting the bottom line. To uphold economic responsibility, business leaders must prioritize their obligation to corporate citizenship when making financial decisions. This means looking beyond short-term gains and considering the long-term impact of their actions on people and the planet [2].

There are numerous advantages of being socially responsible for companies. By demonstrating social responsibility, they can enhance their reputation, allure and keep talented employees and establish better connections with their clients, suppliers, and other stakeholders. Moreover, they can evade legal and ethical hazards that may lead to adverse publicity or financial setbacks.

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FOREIGN AFFAIRS OF UKRAINE

Before gaining independence in 1991, all processes on the world market were actually managed not by Ukraine, but by the country of which Ukraine was a part. Finally, Ukraine started building diplomatic relations with countries after gaining independence from scratch.

In 1991, Ukraine gained the status of a sovereign state, after which it began to build its own economy and, accordingly, international relations. These were quite difficult times: the transition from an administrative-directive to a market economy, from the all-Union economic complex to its own economic system, hyperinflation, and a crisis in almost all aspects of the economy.

Due to its location, Ukraine has three main directions in its foreign policy orientation: eastern (Russia, CIS countries), western (Poland, Western Europe, the United States), and southeastern (Bulgaria, Turkey, and Eastern countries) [1]. Ukraine immediately began to enter the global market. It declared itself as a democratic, legal country that plans to become a neutral state in the future, giving up nuclear weapons. The country also began to participate in many international organizations such as: The United Nations (since 1945), the Organization for Security and Cooperation in Europe (since 1992), the Council of Europe (since 1995), the Central European Initiative (since 1996), the Organization for Democracy and Economic Development – GUAM (since 2006), etc.[2]. The first countries to recognize Ukraine in the international arena were Poland and Canada. In total, by 2000, diplomatic relations were established with 153 countries and 53 embassies were established abroad. Today, Ukraine maintains international relations with more than 170 countries.

The years of independence have shown that Ukraine does indeed adhere to the principles of the country it presented itself as at the beginning. However, one country did not like Ukraine's development as a free, independent, democratic state,

and in 2014, russia illegally annexed Crimea, which has been officially part of Ukraine since 1954, and started a war in eastern Ukraine. Until then, Ukraine had been trying to build diplomatic relations with russia, but after 2014, Ukraine turned to developing international relations with the West, in particular with the European Union and the United States, although it still maintained partial ties with russia. Finally, all diplomatic relations between Ukraine and russia were severed after February 24, 2022, with the beginning of russia's full-scale invasion of Ukraine.

Thus, we can conclude that russia's war against Ukraine finally severed diplomatic ties, but in return we received worldwide recognition of Ukraine. During the full-scale invasion, almost all countries sided with us, we received humanitarian and military aid, and many countries imposed sanctions against russia in support of Ukraine. So it is safe to say that after Ukraine's victory, international relations will reach a new level.

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Y. Shatova, T. Smyrnova, H. Mudrenko

INSTAGRAM ENGAGEMENT TOOLS FOR BRAND PROMOTION

Marketing is one of the most diverse elements of promotion, advertising, formation of the price of a product or service, study of consumer psychology. Today it is worth talking about Internet marketing or digital marketing, since sales are increasingly taking place on company websites or social networks. One of the arenas for promoting brands is the world-famous social network Instagram.

First of all, the network is beneficial for advertising because it has a very large target audience – more than 12 million users. The advantage of promoting on Instagram is that this network is visual, users better perceive data in the form of photos and videos. Audience engagement is not only a trendy term in the media environment, but has also taken a prominent place on this social network. Attracting followers on Instagram is the essence of how users interact with content with their reactions. Relationships with the account can be completely different: likes, comments, repeated views of stories, reposts to personal and saving, views of IGTV videos in the feed. The index of engagement of followers is needed to evaluate the effectiveness of the content, it also helps to understand which posts work better and which worse. And in the future, they will produce content that attracts more attention and warms up the audience, stimulating them to make a purchase. Audience engagement rate directly affects reach. Currently, most social networks, in particular Instagram, have smart news feeds that adapt to the interests of users and show what people are most likely to react to. The algorithm of news feeds takes into account the behavior of subscribers in the network and indicators of content engagement.

There are several effective methods of promoting on Instagram.

Hashtags and geotags. A simple and, importantly, free way to promote. Using this method, you must do the following:

- publish 10-15 hashtags for each photo on a certain topic and note the required geolocation;
- use the service to search for relevant hashtags;
- develop a profile navigation system using hashtags;
- use hashtags and geotags in stories.

Mass raffles. This group of promotion methods is currently scalable. Although it does not exclude nuances that should be taken into account when using. Examples of mass draws are Giveaway, SFS, LikeTime.

- Giveaway is a very popular promotion method and at the same time can be detrimental to your account. The mechanisms of a standard giveaway are as follows:

the organizer of the raffle makes a publication indicating the main prize and conditions for participation (subscribing to the organizer's profile, liking photos, reposting photos, tagging friends in the comments). Attracting sponsors, who need to subscribe or like their posts, serves as a kind of method of promoting smaller accounts at the expense of the audience of a larger organizer. A winner will be chosen randomly among all participants who have fulfilled the conditions of participation

- The SFS option is a peculiar form of the same spread of positive thought. The user provides subscribers with information about the found account. In return, he can receive a similar advantage. In essence, this is a PR exchange, after which both pages remain in the black. As part of this promotion, the owner of the profile offers to post one photo mentioning the profile and with an invitation to study it, and then become a reader. Subscribers who participate in the SPS get a chance to attract an audience of bloggers.

- LikeTime. One of the many ways to promote on Instagram. Using this method allows you to get likes, increase the reach of publications, get to the TOP of Instagram and attract new subscribers. A big plus of this method is that it does not require cash infusions and can be used by both big and beginner bloggers.

Activity chats. Two years ago, Instagram's ranking system changed. Now the posts in the feed are not displayed in chronological order, but depending on popularity and number of views. Accordingly, the more likes and comments you have, the more chances you have to get to the top of the list and attract even more attention. In response to such a ranking system, chats of activity were invented, which represent an association of bloggers for mutual promotion. Participants of such a chat send it links to their posts and accounts to get likes and views, and perform similar actions in response. As a result, the post rises higher in the news feed and attracts the attention of readers of the accounts of other chat participants.

Targeted advertising. The most powerful tool that allows both big brands and anyone to reach the target audience. This ad is tailored to a specific audience and allows you to show creative only to the selected segment. This provides ample opportunities for marketers and entrepreneurs to solve business problems.

Advertising from bloggers. Another popular way of promotion is ordering advertising from bloggers. Sometimes it brings even more results than intrusive official advertising. Now in blogs you can find advertisements of little-known personalities and projects, as well as well-known successful brands. This is explained by the fact that native advertising better passes internal anti-spam filtering and inspires more trust. True, it is expensive to gain the support of a person who is trusted by a huge audience. It will be rational only if the audience of the blogger completely fits the portrait of your potential subscriber.

Placing posts with opinion leaders. Along with targeted advertising, this is one of the most effective paid promotion methods. Find a profile with an audience close to you, agree on the placement of a post and watch the growth of subscribers. Sometimes it is more effective to work with small profiles, with the number of followers from 5 to 10 thousand. Firstly, it is easier to agree on barter advertising with them, and secondly, activity, engagement and trust in bloggers are often higher in such profiles than in millionaire accounts.

If you can effectively promote your Instagram and increase your reach, it will make your business recognizable and popular. When running a social network, pay attention to useful tips for a positive result in the future.

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THE IMPACT OF SOCIAL MEDIA ON THE DEVELOPMENT OF SMALL AND MEDIUM-SIZED BUSINESSES

Virtual space is rapidly spreading to all spheres of human activity, causing changes in global economic processes. Hundreds of millions of people around the world use social media such as Instagram, YouTube and Tik Tok. At first, they used to go online for communication and entertainment. Nowadays, many influencers and entrepreneurs are using social media to develop their small and medium-sized businesses. For example, they create an online shop that sells different commodities such as clothes, books, electric appliances and so on.

The impact of social media on economy is an actual topic because social media are becoming an increasingly popular platform for doing business, in particular e-commerce. Every year there are more and more personal accounts on social media, as well as public corporate pages. Therefore, we will study how social media affect the development of small and medium-sized businesses.

Today, in most countries of the world, the number of people using the social networks is increasing dramatically. According to World meters, at the beginning of 2021, the number of social media users in the world was 4.9 billion people. This is 63% of the world's population [1]. Consequently, social media is becoming the main source of information for people about new products, services, advertising, promotions or other offers. As a result, entrepreneurs can make more money online than offline.

It goes without saying, that social media marketing has a positive effect on offline business. Creating an account on social networks to promote products does not require significant financial investments. For example, a number of café or restaurant owners create an Instagram account on which they post photos of food, interior, service, etc. of their establishment. This strategy attracts people to come, taste their dishes, and enjoy the atmosphere.

Also, online business has become an opportunity for the successful development of start-ups and the realization of entrepreneurial abilities. Therefore, companies can quickly and effectively respond to changing parameters of the market situation. For instance, in 2020, all the countries of the world were captured by the coronavirus infection and people did not have an opportunity to leave their homes and communicate in real life. For this reason, most shops and shopping centers were closed and consumers started shopping online. This situation made people spend more time online. On the other hand, many businesses did not go bankrupt because they were able to adapt to the current conditions on the market.

However, social media identity theft is growing more prevalent as we integrate social networks into our daily lives. Simple mistakes can compromise your personal information, allowing scammers to steal your identity, use your Social Security number, or damage your credit. Nobody is protected from theft of important information. If a hacker finds out the password to your online business, all the secret information will belong to them. As a result, you will lose access to your business, which will bring big financial losses. Moreover, this type of business sometimes is not effective for doing business in developing countries. Some entrepreneurs just do not want to legalize their activities on social media. They do not pay taxes to the government. As a result, this leads to inflation.

To sum up, social media are effective tools for small and medium-sized businesses. The results of the research show that users spend a lot of time on social media every day, so people get to know about the product faster than offline. In my opinion, business online will be more actual than offline in the future since it is not only convenient but also efficient.

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**RESEARCH ON FINANCIAL AND ECONOMIC INDICATORS OF
DOMESTIC BUSINESS UNDER THE CONDITIONS
OF THE MILITARY STATE**

February 24, 2022 is the date which completely changed not only our lives but also the life of the whole country, thereby dividing it into before and after. Since the outbreak of the war the economy of our country has suffered a significant blow – inflation, population migration, destroyed or damaged infrastructure, devaluation.

A large number of enterprises have been affected by the war. Some people have had a limited access to resources, there has been a lack of fuel and a decrease in demand, while others have experienced the loss of property or forced displacement. The businesses located in the west of Ukraine have not suffered such heavy losses, whereas every sixth enterprise in the east of Ukraine has been affected.

The survey results show that many enterprises, in particular industrial ones, have reduced the volume of production, while others have been forced to go out of business completely [1, p.2].

At the beginning of March 2022, most entrepreneurs and workers were worried about the safety of their relatives and few people thought about the further development of their business. However, after recovering from the events which had occurred, they realized that the country needed taxes, and salaries for employees. Of course, those who dared to restore their business, encountered many problems, namely, the lack of raw materials, logistics problems, not sufficient personnel, etc. [1, p.4].

Analyzing the domestic business today, it can be stated that the situation is divergent. More than half of the production located in the west of Ukraine is not operating at full capacity, i.e. at the level of 40-60% of pre-war volumes, and a quarter of other businesses seized their operation to 70-90% of pre-war level indicators. In the central part of the country, 27.4% of the enterprises reduced their activity to 70-90% of pre-war level, 23.6% operate at the level of 40-60%, and 22.6% of

the businesses completely ceased their production. But the situation in the south, north and east of Ukraine is even worse. From the results of the survey it can be noted that the majority of businesses have announced almost complete termination of their activities, respectively, in the north – 35.1%, in the south – 23.9%, in the east – 32.5%. In the southern part of Ukraine 18.3% of enterprises practically have not changed the volume of work.

To minimize the negative consequences of a force majeure situation caused by the war, it is advisable to relocate production to the western regions; 725 enterprises have already relocated there since September 2022, and 528 companies have already started working in a new place. A total of 1816 enterprises have issued an application for relocation so far; and more than 600 have called it off. The reasons can be different, but the most common is not advanced industrialization or inadequate infrastructure.

Businesses of all sizes are currently suffering from difficult economic conditions. It can be stated that micro and small businesses suffer the most because their financial and economic capacity somewhat differs from the power of large scale companies. It is obvious that businesses can help the country to recover from a recession. And one of the important factors in the country's further economic development is adaptation.

The process of production adaptation is now occurring faster than before the COVID-19 pandemic. Considering this fact, the economy of our state is gradually coming to life. About one in four businesses in the west, center and north has a development strategy and has already "flexibly" put its current work plan into action. In the south and east of Ukraine this is every fifth or sixth business. The weight factor that can also contribute to the country's survival and recovery is voluntary support of Ukrainian business, not only internal but first of all, external.

The territory of Ukraine has wide prospects, great opportunities and valuable resources, but firstly, new investments should be attracted; secondly, those restrictions that were introduced at the beginning of the war should be removed.

A large number of businesses, regardless of the current events, are optimistic and continue their work. After all, business is an active participant in a fight against the aggressor. The country's economy largely depends on its development, taxes and job offers. 93.4% of businesses are encouraged to support the economy of Ukraine, about 70% do it voluntarily. Ukrainian companies make a big contribution to helping the army, in particular, by joining the volunteer activities. But, nevertheless, it would be more expedient to cover the damage caused by the war and the losses caused the restrictions at the expense of the international reserve funds, which have been significantly enriched during the pandemic [2, p. 2].

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O. Verbonol, N. Duchinska, O. Aliseienko

APPLICATION OF DIGITAL TECHNOLOGIES IN CITY MANAGEMENT: PROS AND CONS

In recent decades, digital technologies have been used to effectively manage cities, which helps to reduce costs, improve the quality of life of the urban population, restore the environment, etc. Thus, the transformation of cities into "smart" ones is carried out, which benefits both the cities and their residents, as well as technological innovation companies that invest in the implementation of computer-innovative technologies to serve cities.

The projects of "smart" cities are supported by city residents, authorities at the local and state levels, international agencies, world banks, and private investors. At the same time, there are some contradictions in the use of these technologies, which requires state and public control in order to prevent negative consequences.

One of the problems is the loss of control at the local and state levels over the databases accumulated in private companies. Special sensors, video cameras, and electronic devices collect raw data and accumulate it. This data is still free, but can be used as objects of purchase and sale, because information in the market has a high value. In exchange for collecting data from their residents, information companies offer city governments the platforms and digital programs that are often free, the bundles of data collection services and storage, network infrastructure, etc.

To expand the market, marketing firms need information about the leisure time of the population, the time spent watching television and using computers, mobile phones, the formation of demand for new goods and services, etc., so they are ready to buy collected and systematized information.

Less economically developed countries of the world express fears about the emergence of a new colonial dependence on powerful technological companies: Google, Facebook, Microsoft, Apple, etc. The latter can change information about cities and their population, influence the conduct of their own research by reducing investments, urban planning, urban policy. The development models proposed by these agents may be detached from local reality, not taking into account national specifics, unified for any city [1].

It should be noted that the pace of digital evolution in Ukrainian cities lags significantly behind the global pace. Kyiv has become a developed "smart" city, in which the most innovative projects have been implemented ("Kyiv resident's card", online appointments with doctors, the ability to submit electronic petitions and voting, enrollment of children in preschool education institutions) [2]. Gradually, this concept actively spread in the pre-war period to other cities of our country.

Technological innovations in the functioning of cities and the state, in general, can lead not only to a comfortable existence for residents, but also to significant savings in state and local budgets. The best examples can be electronic document management, the single portal of public services online "Diya", which save time of the population and relevant institutions, saves their money and budget expenses.

We also note that not only private technology companies that accumulate and systematize them, but also state authorities, statistical services, universities, institutions, and the public should have access to databases.

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O. Verbonol, N. Duchinska, O. Aliseienko

"SMART CITY": GLOBAL EXPERIENCE

Large cities and megacities have a complex infrastructure: transport system, communications, service systems for residential and administrative buildings, water supply, garbage and waste removal, etc. The life of the population and the functioning of cities require safety and environmental friendliness. Thanks to the traditional, "manual" management, it becomes difficult, and sometimes impossible, to ensure the efficient life of cities, which contributes to the introduction of information technologies and the creation of "smart cities".

The latter represent a thoughtful interaction between the cities themselves and their residents thanks to the innovative computer technologies, a coordinated relationship between the existing life support and security systems.

Deloitte, an international company specializing in providing services, notes that there are more than a thousand "smart cities" operating in the world. A significant part of them is located, first of all, in China (about 50%). There were quite a few of them in North America, Western Europe, Japan, South Korea, and India.

Governments of countries and local authorities are interested in investments for the implementation of various modern Internet technologies that contribute to

the growth of well-being, ensuring safety, convenience, and saving time of residents of megacities. So, in Amsterdam, sensors are installed on garbage cans, which signal to special services about the level of their filling and the need for cleaning. In Barcelona, thanks to special sensors, drivers find free parking spaces for their cars, which is convenient, especially during rush hour.

In Argentina's smart cities, security is a priority, so special video cameras are installed to recognize people's faces and inappropriate or suspicious behavior and report it to the police in time.

As you can see, in "smart cities" systems seem to be able to "communicate" with each other, which facilitates the work of communal and security services [1].

The experience of creating "smart" cities in Poland is interesting for Ukraine. If in our country the implementation of the concept of "smart cities" is carried out mainly locally on the basis of budget programs and projects, in Poland a package of projects is implemented within the limits of this program – 3 projects in ecology, 16 – in transport, 4 infrastructure projects, 11 – in management. In Wrocław, significant investments in human and social capital are directed towards the development of modern infrastructure, among such projects are the development of infrastructure thanks to the Internet of Things technology and the increase of data transmission speed through the implementation of LoRa WAN – an extensive narrowband long-range network capable of increasing the transmission speed of 112 data from 0,3 kbit/s to 50 kbit/s, provide increased security level and reduce energy consumption. The "smart city" program in Wrocław provides for the implementation of projects in management, economy, lifestyles of the urban population, education, mobility, infrastructure, environmental protection [2].

Applying world experience, Ukraine before the war implemented digital transformation projects in Kyiv, Dnipro, Zaporizhzhia, Poltava, Lviv, and Ivano-Frankivsk within the framework of the "smart cities" concept. In the post-war period, thanks to the participation of foreign investors, it is necessary to develop the initiated projects on the entire territory of our country, which will help save budget funds and motivate private business to rebuild and develop the country.

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M. Yakymets, O. Bovkunova

INTERNATIONAL BUSINESS AND INTERNATIONAL MANAGEMENT: FEATURES OF RELATIONSHIPS

International business as an object of international management is a managed system that has its own specifics, which, in fact, sets its own requirements for the management system – international management. This specificity has characteristic features brought by the national, cultural characteristics of various states. For Ukraine, which is famous for its spiritual heart in the world, the specificity of international business management is manifested in the use of a spiritually oriented approach to management with a targeted impact on management objects. At the same time, Ukrainian managers operating international business facilities should be focused on ensuring that the management system they use does not deviate from the basic values of Ukraine and its people.

International business is a comprehensive and all-pervasive phenomenon of the modern international economy. Receiving benefits in the form of profits on the largest possible scale or other results makes business become international, multinational and predetermines the expediency of a company going beyond the limits of its own country. International business has a long history of its development, which is associated with the impact of domestic and external factors on it. First of all, the level of internationalization of a company's business depends on historical conditions, the degree of involvement of the company in business in the country, as well as on the level of cultural similarity and differences of the countries entering into business interaction.

International business has a number of specific features that characterize and distinguish it from domestic business: it is a multinational business as a result of its development; provides business interaction of private firms or their divisions located in different countries; is focused on providing business partners with greater benefits than they would have by doing business only in their own country; is based on the possibility of benefiting precisely from the advantages of cross-country business relations and operations; appears within the period of limits of the development of national business or when less benefit is received from it compared to international business; is sustainable with constant consideration of mutual benefits and adaptation of international management to the conditions of its organisation.

However, there are certain similarities between domestic and international business that make a number of management functions similar and typical of both businesses. We note some similarities: both businesses are accessible and universal, although in the first case this happens within the country, and in the second – in the intercountry space. Any company can be engaged in one or the other business, changing its strategic and tactical perspectives.

At the same time, these businesses, like any other activity, have their own limitations, which are implemented through the international management system. Both one and the other business in the process of functioning rely on technological globalization, changing the nature of their activities (to computerization, informatization, new telecommunications opportunities in order to cover the markets of goods, capital and labor that are of interest to business), acquiring fundamentally new opportunities for working and using modern international management technologies. National and international businesses depend on globalization, are influenced by global finance, political decisions, world crises, predetermining the feasibility of developing and using risk management.

The listed features of international business, confirming its nature and being time-tested, largely explain the emergence and development of international management as a special control system that has a targeted impact on international business and ensures the coordinated work of all its links.

Since international management is formed and has developed as a system of purposeful influence on international business, then all the essential features and characteristics of international management should reflect the features and characteristics of the business itself. In other words, there should be as much internationality in international management as there is in international business itself.

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PANEL 4

Actual Problems of Engineering and Technical Sciences and Modern Information Technologies

(DNU, Zoom)

S. Arakelov, A. Davydova, N. Kaliberda

LUNAR PROGRAMME – A LOOK THROUGH THE YEARS

Apollo-11 was an American space flight that landed humans on the Moon for the first time in July 1969. Commander Neil Armstrong and lunar module pilot Buzz Aldrin landed the Apollo Eagle lunar module. Armstrong became the first man to set foot on the lunar surface. Aldrin joined him 19 minutes later, and they spent about two and a quarter hours together exploring the place they called the Sea of Tranquility after landing. Armstrong and Aldrin collected lunar material to bring back to Earth while pilot Michael Collins operated the Columbia command module in lunar orbit.

The Saturn-V was an American super-heavy launch vehicle developed by NASA as part of the Apollo programme for human exploration of the Moon. The rocket was designed for human piloting, had three stages and used liquid propellant. The third stage was used to fly to the Moon and to launch Skylab, the first American space station.

As of 2023, Saturn-V remains the only launch vehicle to have carried humans beyond Low Earth Orbit (LEO). Saturn-V holds the records for the heaviest payload launched and the largest payload to LEO: this includes the third stage and unused propellant required to send the Apollo command and service module and lunar module to the Moon.

The Saturn-V was constructed primarily from aluminium, but also from titanium, polyurethane, cork and asbestos. Drawings and other Saturn-V plans are available on microfilm at the Marshall Space Flight Center [1].

Saturn-V is a three-stage rocket. The first stage of the S-IC was built by Boeing at the Michoud Assembly Plant in New Orleans, where Lockheed Martin would later build the space shuttle's external tanks. It was equipped with five Rocketdyne F-1 engines. The central engine was held in a fixed position, while the four outer engines could be rotated by hydraulic pendants to control the rocket. During flight, the central engine was shut down about 26 seconds earlier than the outer engines to limit acceleration. During the launch, the S-IC ran its engines for 168 seconds, and after the engine shutdown, the vehicle was at an altitude of approximately 42 miles (67 km), and travelled for about 58 miles (93 km), travelling at about 7,500 feet per second (2,300 m/s). The vehicle then descended and fell into the ocean [2].

The S-II second stage was built by North American Aviation in Seal Beach, California. Using liquid hydrogen and liquid oxygen, it had Rocketdyne J-2 engines similar to the S-IC and also used external motors for control. S-II was the largest cryogenic stage.

The S-IVB third stage was built by Douglas Aircraft in Huntington Beach, California. It had a single J-2 engine and used the same propellant as the S-II. The S-IVB used a common baffle to separate the two tanks.

The instrumentation unit was built by IBM and was placed on top of the third stage. It was built at the Space Systems Centre in Huntsville, Alabama. This computer controlled the rocket's operation just before liftoff until the S-IVB was ejected. It included the rocket's guidance and telemetry systems. By measuring the spacecraft's acceleration and position, it could calculate the rocket's attitude and velocity and correct any deviations.

The astronauts used the Eagle lander to ascend from the lunar surface and join Collins in the command module. They returned to Earth in the Pacific Ocean on 24 July after more than eight days in space.

Armstrong's first step on the lunar surface was broadcast live on television to a worldwide audience. He described the event as «One small step for man, but a giant leap for all mankind» [3].

Saturn-V marked the beginning of the development of advanced technologies. But what would this project have looked like if it had been developed using modern algorithms? According to preliminary calculations, which need to be refined and verified, the Saturn-V launch vehicle could have carried a much larger payload. This is because the first and second stages of the launch vehicle would be lighter, keeping all their characteristics unchanged, and replacing the F-1 and J-2 engine sets with modern designs with the same fuel components. At the same time, the Lunar Programme would become more affordable.

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B. Bakun, V. Shevtsov, N. Kaliberda

BASIC PRINCIPLES OF BEES' AND BUTTERFLIES' FLIGHT

For the movement of artificial devices there is a commonly used impulse, which is created by a path for expelling a part of the air into the opposite direction directly or behind the pulse of the reactive mass. At the same time, due to the run-up of the flow, control is carried out under the action of a force that compensates the force of gravity and ensures flight along a given trajectory.

Concerning insects, their flight is traditionally explained through Newtonian mechanics as the wings generate a downward flow of air, which propels the insect upwards. Nonetheless, a more accurate explanation of insect flight can be achieved by utilizing Newtonian mechanics that rely on the concept of mass flow rate [1].

In a hover, insect wings follow a symmetrical figure-of-eight pattern, moving back-and-forth from side-to-side. The wings maintain a positive angle of attack (AOA) on every stroke to pass through a mass of air each second (m/dt), which is accelerated to a velocity downwards (dv). The downward airflow can be assisted by leading edge vortices on the wings. This action creates a downward force ($\text{Force}_{\text{DOWN}} = ma = m/dt * dv$) [4, p. 1]. See Fig 1. The inertia of the air generates a reactive equal and opposite upward force (Force_{UP}), which provides lift and pushes the insect upward. To generate lift, the wings transfer momentum and energy to the air [1].

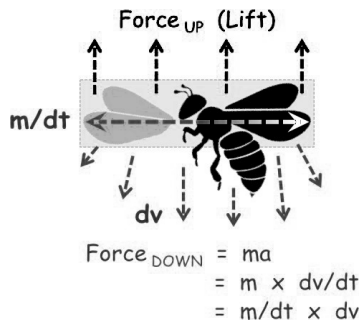


Fig. 1 – Insect hovering.

A key benefit of applying Newtonian mechanics based on the mass flow rate (lift = $m/dt * dv$), is that it enables the key components of lift to be analysed separately between: the mass of air flown through each second (m/dt) by the wings, and the velocity (dv) that this air is accelerated downward [4, p. 2].

It's clear to see, that the total amount of lift generated by the different combinations of 'm/dt' and 'dv' can be shown graphically along a constant lift curve. 'm/dt' and 'dv' have an inverse relationship along a constant lift curve [4, p. 2]. See Fig. 2.

How lift is generated between 'm/dt' and 'dv' depends on things like aspect ratios, insect mass, and wing beat frequency.

The Newtonian approach can then be used to assess the energy-efficiency of lift generation for insects with different aspect ratios. The lower the aspect ratio, then the higher the proportion of lift generated from 'dv', as

compared to ‘m/dt’. Then the more energy-inefficient the lift generation process is, as kinetic energy is proportional to the velocity of the downwash (dv) squared ($K.E. = 0.5 m v^2$) [4, p. 2].

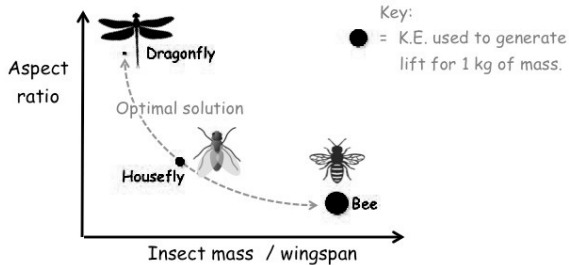


Fig. 2 – Graph of insect aspect ratio

For example, bees generate lift in a highly energy-inefficient manner because they rely heavily on accelerating a small mass of air (low m) downwards to a high velocity (high dv) to generate lift. A bee’s short aspect ratio wings are optimal given its lifestyle collecting of nectar (high-energy food) from flowers and engaging in short, high-speed (high-energy) flight [2]. The Newtonian explanation for bees analyzes ‘m/dt’ and ‘dv’ separately:

- On each wing cycle, the bee’s small wings pass through a small mass of air (small ‘m’)
- A high wing beat frequency means that the total mass of air pushed down each second is modest (modest ‘m/dt’), compensating for its small wing area [3]
- A high wing beat frequency aggressively accelerates the air downwards to a high velocity (high ‘dv’), to generate the required large amount of lift for their large mass [3]
- Overall, bees generate a large amount of lift, as shown by the equation: High lift = modest m/dt * high dv (see Fig. 3).

In contrast, the butterfly’s large wings pass through a relatively large mass of air (large ‘m’) on each wing cycle. But the low wing beat frequency means produces a low ‘m/dt’ and a low downwash velocity (low dv) [1]. See Fig. 4.

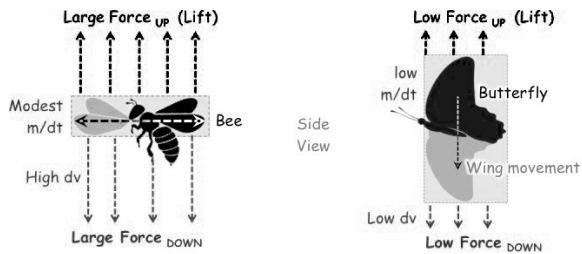


Fig. 3 – Bumblebee lift. 1

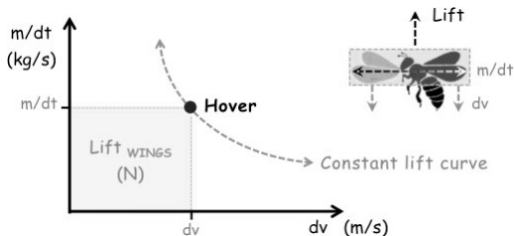


Fig. 4 – Graph of the constant lift curve 1

The wings can push air downwards by moving vertically up- and-down like a butterfly, or horizontally back-and-forth like a bumble bee; as long as a positive wing AOA is maintained [3].

In conclusion, Newtonian mechanics based on the mass flow rate can explain the physics of how insects generate lift to fly. This help to analyze the physics behind of lift between Newtonian and fluid mechanics. It should be possible to perform calculations and experiments that confirm the assertions above. For example, to prove that an insect in a hover accelerates a mass of air downwards each second to fly.

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CYBER SECURITY OF THE COUNTRY IS A MODERN CHALLENGE

Recently, the number of problems facing the world has been increasing. While they are associated with globalization, increasing diversity, interdependence of the modern world, many social processes and phenomena. The development of computer and telecommunication technologies, including Internet technologies, on the one hand, provides mankind with extraordinary opportunities for their use, and on the other hand, it carries extraordinary threats. At present, any activity of society is inextricably linked with information and information technologies. Therefore, the need for digital transformation in our country is quite clearly understood at the state level.

Along with the development of cyberspace, the number of crimes in this area with the use of information and communication technologies, software, software and hardware, other technical and technological means and equipment is growing rapidly. The implementation of these threats can cause significant damage both at the micro and macro levels within sovereign states, as well as on a global scale. This led to an understanding of the need to solve the problem of neutralizing or minimizing this new set of threats.

The scale and transboundary nature of information threats both for the common man and for the country as a whole require the formation of an appropriate protection system. Cyber security tools in the state must be constantly modernized, transform their approaches and mechanisms for countering information dangers, adapting to new challenges of the global information space.

The correlation ties of civil society are growing in the context of the growth of the level of interactivity of the latter based on information and communication technologies that allow collecting, processing and transmitting information at the local, national and international levels.

Technical and technological progress has created conditions for the formation and development of a new formation using standard and designing new cryptographic algorithms for protecting information in computer systems and networks, implementing an information security system in communication systems. The dynamic development and introduction of new information and communication technologies has provoked significant social and digital transformations.

Recently, any activity of society is inextricably linked with information and information technology. Therefore, the issues of information security, the security of operating systems and databases, anti-virus protection, the security of Web services and Cloud systems, the use of modern artificial intelligence technologies, the security of network communications based on the application of modern principles, methods and methods of the theory of secure systems require both constant monitoring, and modern ways of their improvement and modernization.

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I. Dolotov, N. Guk, Yu. Honcharova

GRAPH REPRESENTATION OF WEBSITE STRUCTURE: MODEL AND ALGORITHM

This article examines the fundamental principles of building web sites and structural construction of web pages. The task is to develop ways to represent the site for subsequent manipulation with it as an object of a certain type and to introduce a list of possible operations for working with such an object. To solve this problem, the fundamental principles of structural construction of websites and some possible models for the effective representation of their structure are considered.

In the context of this task, the formalization of information about the structure of the site in the form of a directed graph is proposed, and an algorithm for forming the desired graph based on HTML pages placed on the server is developed.

A website is composed of a series of pages, making the minimum unit of web data – a web page [5, p. 2]. Any program designed for Internet navigation allows viewing of web pages and searching through them. However, lately, the focus has shifted from individual web pages to web sites as a whole, and gradually the concept of a web site has become an independent entity. This trend enables the identification of a site as a separate data object and facilitates the handling of the entire site, rather than individual pages.

Each web site comprises a set of pages, with a main page that initiates further navigation throughout the site. Nearly every site is organized as a set of pages, accessible through links [2, p. 4; 3, p. 153], Based on this structure, several models for site representation can be distinguished:

- 1) a list representation;
- 2) a graph representation.

When describing a website as a list, it is necessary to display all the information about the website in the form of a list, including a list of web pages with their contents. If a website is represented as a graph, then the vertices of the graph will be web pages, and the edges will be hyperlinks.

The graph representing the structure of the web site is shown in Figure 1. The site structure graph consists of a set of vertices $A = \{A_i\}$, $i = 1, 2 \dots n$, where vertex A_i represents a web page of the site, and n is the number of pages. The main page of the site is always A_1 [4, p. 4].

$A_i \rightarrow E_i$, which means that each vertex A_i is associated with a set of outgoing edges $E_i = \{a_{ij}\}$, $i = 1, 2 \dots n; j \in \{1, 2 \dots n\}$. Edge a_{ij} connects vertex A_i and A_j and corresponds to a hyperlink to web page A_j located on web page A_i .

Based on the analysis of the website structure, it is possible to determine the general algorithm for constructing the graph of its structure [1, p.10644].

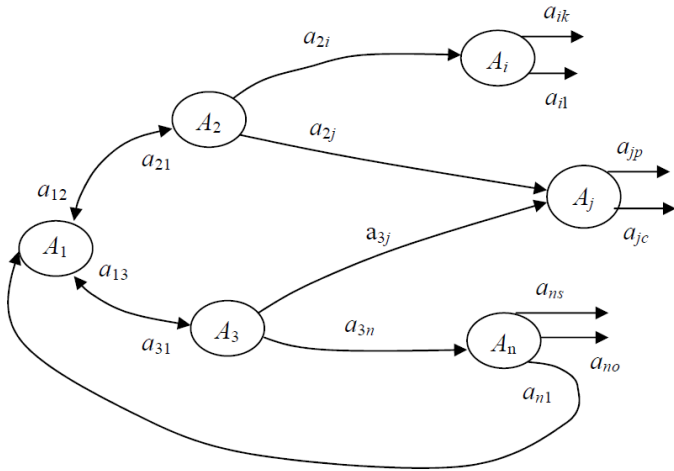


Fig. 1 – Graph representing the site structure

The algorithm begins by constructing the main page of the website A_1 . A request is sent to the main page of the website (the result of the request is an HTML document). A_1 is constructed based on the received information.

The search for hyperlinks is performed in a loop. Each found link a_{ij} is checked for belonging to the considered server. If this condition is satisfied, then it is checked whether the resulting page A_j already exists. If not, A_j is created and placed in the Q queue for further processing. If A_j already exists, then the link a_{ij} is added to the currently considered page, and the search continues.

After all the links a_{ij} of the page A_i are found, a new address A_j is extracted from the Q queue, a request is sent again, and the next iteration of the algorithm cycle is performed until the Q queue is empty.

As a result of the algorithm's work, an object representing the website model is formed, which can be used for various operations such as comparison, sorting, searching, etc.

After parsing the website structure and representing it as a graph, the website can be saved in a relational database for further processing [1, p.10646]. Thus, it becomes possible to save a set of websites in the database for further analysis,

search, comparison, identification of identical pages and link structures, and other operations.

If all the properties of each web page A_i are saved in the database, the website can be fully restored to the form in which it was saved in the database.

The structure of web sites has been studied and several possible models for their representation have been proposed, such as the list model and the graph representation. The representation of a website model as a graph has been formalized, and an algorithm for constructing the graph based on the website has been developed. To implement the algorithm, the structural elements of a website, namely the page and the link, have been identified.

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D. Doroshenko, R. Bilichenko, N. Kaliberda

«HOW TO BECOME A MILLIONAIRE?» OR THE SEVEN PROBLEMS OF THE MILLENNIUM

Who wants to become a millionaire? For this, you do not need to buy a lottery ticket or do any tricks. The Clay Mathematical Institute in the USA is gladly ready to pay a million to someone who simply solves at least one of their mathematical problems. It sounds simple, but who can solve even one of them?

In 1900, at the International Mathematical Congress in Paris, David Hilbert announced 23 mathematical problems that, in his opinion, should be solved in

the 20th century. At the end of the 20th century, mathematicians tried to formulate similar strategic tasks for the next 21st century. Thus, in May 2000, experts from the Clay Mathematical Institute (Cambridge, Massachusetts, USA) selected the seven most important problems of modern mathematics. The number of problems in the list (seven) was chosen based on the fact that the founder of the institute, Boston millionaire Clay, allocated seven million dollars as a prize, that is, a million for solving each problem. These important problems have been called the «Millennium Challenges».

There is a historical parallel between the Millennium Problems and Hilbert's list of problems in 1900, which had a significant impact on the development of mathematics in the 20th century. Of Hilbert's 23 problems, most have already been solved, and only one – the Riemann hypothesis – has entered the list of problems of the millennium.

As of the end of 2022, only one of the seven millennium problems (the Poincare hypothesis) has been solved. First, let's find out if these tasks are simple:

- **The P vs. NP problem.**

The question is whether, for all problems for which a computer can quickly verify a given algorithm (i.e., in polynomial time), it can also quickly find this solution. The equality problem of complexity classes P and NP is one of the most important problems in the theory of algorithms and has many implications in mathematics, philosophy, and cryptography. The official statement of the problem belongs to Stephen Cook.

The following interesting and transparent wording is also found on the Internet: *"Suppose you, being in a large company, want to make sure that your acquaintance is also there. If you are told that he is sitting in the corner, then a fraction of a second will be enough to make sure of the truth of the information by taking a look. In the absence of this information, you will be forced to walk around the room, examining the guests"* [2, p. 9].

In this case, the question is whether there is such an algorithm of actions, thanks to which, even without information about a person's location, you can find him

as quickly as if you knew where he is. This problem is of great importance for various fields of knowledge, but they have not been able to solve it for more than 40 years.

- **The Hodge conjecture.**

An important problem in algebraic geometry. The conjecture describes classes of cohomology on complex projective manifolds realised by algebraic submanifolds. In fact, there are many simple and much more complex geometric objects. Obviously, the more complex an object is, the more time-consuming it becomes to study it.

- **The Birch and Swinnerton-Dyer conjecture.**

The hypothesis is related to the equations of elliptic curves and the set of their rational solutions. For complex equations, the search for solutions becomes extremely difficult, it is enough to recall the history of proofs of the famous Fermat's theorem to be convinced of this. This hypothesis is related to the description of algebraic equations of the 3rd degree – the so-called elliptic curves. And in cryptography, they form a whole section of their name, and some digital signature standards are based on them.

- **Yang-Mills theory.**

The problem comes from the field of elementary particle physics. It is necessary to prove that for any simple compact gauge group G , the Yang-Mills quantum theory for R^4 space exists and has a non-zero mass defect. This statement is consistent with experimental data and numerical simulations, but it has not yet been proven. Based on the Yang-Mills theory, a standard model of elementary particle physics was built, within the framework of which the Higgs boson was predicted and discovered.

- **The Riemann hypothesis.**

The conjecture states that all non-trivial zeros of the Riemann zeta function have a real part of $\frac{1}{2}$. Its proof or refutation will have far-reaching consequences for number theory, especially in the part of the distribution of prime numbers. The Riemann hypothesis was part of Hilbert's eighth problem. For a long time, people have been trying to find a regularity in their placement, but no one has been

lucky so far. As a result, scientists applied their efforts to the distribution function of prime numbers, which shows how many primes are less than or equal to a certain number. Many statements about the computational complexity of some integer algorithms are proven under the assumption that this hypothesis is true.

- **The Navier-Stokes equation.**

The Navier-Stokes equation is a system of equations describing the motion of a viscous fluid, one of the most important problems of hydrodynamics. Despite the importance of the problem, the existence of smooth solutions with finite kinetic energy has not been mathematically proven. For some individual cases, solutions have already been found, in which, as a rule, parts of the equations are discarded as not affecting the final result, but in general, the solutions of these equations are unknown, and at the same time, it is not even known how to solve them.

- **The Poincaré hypothesis (proved).**

It is considered the most famous topology problem. Informally speaking, it states that any three-dimensional object that has some properties of a three-dimensional sphere must be a sphere with accuracy up to deformation. In 2002, the mathematician H. Perelman published a paper from which the validity of the Poincaré hypothesis follows [1; 2].

Nowadays, mathematics is associated with scientists who look strange and talk about equally strange things. Many people talk about its isolation from the real world. Many people, both younger and quite conscious, say that mathematics is a useless science, that it was useless after school/institute. But in fact, this is not true – mathematics was created as a mechanism by which to describe our world, and in particular many observable things. It is everywhere, in every home. As Vasil Klyuchevsky said: «*It is not the flowers' fault that the blind man cannot see them*» [3]. Our world is far from as simple as it seems, and mathematics is also becoming more complex and sophisticated, providing an increasingly solid foundation for a deeper understanding of the existing reality.

All these tasks at the moment are key for the further development of humanity. The main question: is it even possible to solve all the above tasks within

the millennium? As the saying goes: nothing is impossible! Patience and hard work are the way to solve these problems.

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A. Dubrovina, O. Nikishyna, T. Pryshchepa

REVOLUTIONIZING HEALTHCARE: THE TRANSFORMATIVE POWER OF AI IN MEDICINE

Artificial intelligence (AI) is revolutionizing the healthcare industry by transforming the way medicine is practiced. From diagnosis to treatment, AI is being used to improve patient outcomes, reduce costs, and increase efficiency in the healthcare system. In this article, we will explore how AI is being used in medicine and its potential benefits and challenges.

One of the most promising applications of AI in medicine is in diagnosis. AI can help doctors make more accurate and faster diagnoses by analyzing large amounts of patient data, such as medical images, lab results, and medical histories. For example, AI can be used to analyze medical images and identify abnormalities that may be missed by human doctors. This can help detect diseases such as cancer at an earlier stage, which can improve patient outcomes [2, p. 247-250].

Another way AI is being used in medicine is in drug discovery. AI can help researchers analyze vast amounts of data and identify new potential drug targets. This can significantly speed up the drug discovery process, which traditionally takes years and costs billions of dollars. By using AI to identify new drug targets,

researchers can develop new treatments for diseases that were previously considered incurable [1, p. 329-338].

AI is also being used to personalize medicine. By analyzing patient data, AI can help doctors identify the most effective treatments for individual patients. This can improve patient outcomes and reduce healthcare costs by avoiding ineffective treatments. For example, AI can be used to analyze genetic data to identify patients who are at risk for certain diseases and develop personalized prevention and treatment plans.

Despite its many potential benefits, AI in medicine also faces challenges. One major challenge is the need for large amounts of high-quality data. AI algorithms require large amounts of data to train and improve their accuracy. This means that healthcare providers need to invest in data collection and management infrastructure to fully realize the potential of AI in medicine.

Another challenge is the need for regulatory frameworks to ensure patient safety and privacy. AI systems must be thoroughly tested and validated to ensure that they are accurate and safe for patients. Additionally, patient data must be protected to ensure privacy and prevent misuse [3, p. 887-934].

AI is already being used in various areas of medicine, including diagnosis, drug discovery, personalized medicine, and more. Here are some specific examples:

Medical imaging: AI can be used to analyze medical images such as X-rays, CT scans, and MRIs to identify anomalies that may be missed by human doctors. For example, AI algorithms can be trained to detect early signs of lung cancer on chest X-rays or identify skin cancer on dermoscopic images.

Drug discovery: AI is being used to accelerate the drug discovery process by analyzing vast amounts of data and identifying new potential drug targets. For example, AI algorithms can be used to analyze gene expression data and identify new drug targets for diseases such as Alzheimer's and Parkinson's.

Personalized medicine: AI can be used to analyze patient data and identify the most effective treatments for individual patients. For example, AI algorithms can be used to analyze genetic data and identify patients who are at risk for certain diseases or who may respond better to certain treatments.

Medical diagnosis: AI can assist doctors in making more accurate and faster diagnoses by analyzing patient data such as medical images, lab results, and medical histories. For example, AI algorithms can be used to diagnose diabetic retinopathy by analyzing retinal images or predict patient outcomes after surgery by analyzing medical records.

Medical research: AI can be used to analyze medical research data and identify new insights and trends. For example, AI algorithms can be used to analyze large-scale genomic data to identify new biomarkers for diseases or to identify potential new uses for existing drugs.

These are just a few examples of how AI is being used in medicine today. As the technology advances and more data becomes available, we can expect to see even more innovative applications of AI in healthcare.

In conclusion, AI is transforming the way medicine is practiced, from diagnosis to treatment. Its potential benefits are vast, including improved patient outcomes, reduced healthcare costs, and increased efficiency in the healthcare system. However, the challenges of AI in medicine must be addressed, including the need for large amounts of high-quality data and regulatory frameworks to ensure patient safety and privacy. With continued investment and innovation, AI has the potential to revolutionize medicine and improve healthcare for all.

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RESEARCH METHODS FOR MODELING THE AUTOMATIC SYSTEM OF DYNAMIC TRAFFIC REGULATION

Urbanization and population growth have led to the enlargement of vehicular traffic, entailing such problems as congestion, delays, and accidents. Automatic systems of dynamic traffic regulation are used to mitigate these problems by optimizing traffic flow, reducing congestion, and increasing safety. Despite existing such automatic systems, they often do not consider many factors: different traffic flows during different times of the day, weather conditions, and pedestrians' absence. Additional factors that influence traffic in Ukraine are road conditions and lack of byroads and highways. Mathematical models are used to design, analyze, and optimize these systems. This paper aims to investigate the available methods to develop a mathematical model for the automatic system of dynamic traffic regulation.

Many different technologies and theories might be used to improve traffic management. We are going to consider the following instrumentation: graph theory, neural networks, fuzzy logic.

Graph theory is probably one of the widely accepted theories in logistics and transportation. The most famous graph theory problem is the Königsberg bridge problem proposed by Euler in 1736 [2]. Graph theory operates with graphs. A graph is a structure that consists of a set of objects in which some pairs of the objects are in some sense related [1]. Objects are usually considered vertices and relations – edges. The most common problem is finding the shortest way from one point to another. Typical city roads can be represented as edges, starting and ending points of a route or crossroads can be represented as vertices. The following picture demonstrates the schematic representation of the graph applied to Dnipro city map.



Fig. 1 – Schematic graph representation

In this case we can add different weights to the edges. For example, the road size, the amount of traffic lanes, and the length of the edges can be specified. Traffic lights positions and their schedule as well as speed limits can be added additionally. It is noteworthy that an enormous number of parameters can be taken into account in the process of building the optimal route. In the context of traffic regulation neural networks and fuzzy logic can be used in combination with graph theory or other modeling methods to improve significantly the existing traffic regulation system. For example, we can use neural networks to determine the most optimal traffic lights schedule, and fuzzy logic to formalize nonbinary parameters such as weather conditions, the behavior of drivers and pedestrians, accidents, landscape and so on.

Further research and development of the project includes the creation of a mathematical model and implementation of graph theory, neural networks and fuzzy logic to create an algorithm that is meant to improve existing traffic regulation systems.

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EFFICIENT SET SEGMENTATION USING CLUSTERING ALGORITHMS FOR NETWORK TRAFFIC ANALYSIS

Network traffic analysis is a complex and multifaceted issue that encompasses a range of technologies and implementations designed to capture, process, categorize, control, and modify network packets based on their content. It is also a critical aspect of modern network security, involving the real time collection, processing, and analysis of network packets to detect and prevent security threats.

By using efficient set segmentation techniques, cluster analysis can provide more comprehensive understanding of network traffic patterns, allowing for the identification of abnormal behavior that may indicate a security breach. This is particularly useful for identifying network attacks, which can be distinguished from normal traffic patterns through the use of data analysis methods such as entropy. In this article, we will explore the role of cluster analysis in network traffic analysis and its applications in efficient set segmentation for improved security, with a focus on the identification of network attacks and normal traffic patterns.

The primary objective of the study is to develop and apply methods and algorithms for accurate and proactive identifying various types of network attacks within network traffic. Recent research has demonstrated that data analysis techniques can differentiate efficiently and accurately normal and abnormal traffic, using the concept of entropy. In this study, we propose to use clustering methods such as hierarchical clustering, DBSCAN, OPTICS, and K-MEANS to detect attacks. Our results demonstrate that DBSCAN, OPTICS along with hierarchical clustering provide the best outcomes.

During the research, a dataset with 4,898,431 rows and 42 columns was utilized. One column describes the type of traffic and is not involved in the clustering process, leaving 41 columns to be processed. 15 columns contain floating-point data, 23 columns contain integer data, and 3 columns contain object

data. The data preprocessing revealed that most users employ private and http services, so we focused our analysis on these two types of services. Similarly, we selected only SO, SF, and REJ flags from the flag column for analysis.

Also, after conducting the analysis of boxplot, distplot, and violin plots for each feature, we identified several features that were candidates for removal from the dataset. Specifically, based on our analysis, we determined that the `su_attempted` and `num_file_creations` features could be dropped from the dataset.

Hierarchical clustering with single, average, and total linkage was the first clustering method used in the study. The distances between the points were measured using Euclidean, Manhattan, or Canberra distances. Principal component analysis was also used to reduce the data dimension. A confusion matrix was used to evaluate clusters that contained attacks, and the silhouette score was used to identify an appropriate number of clusters. DBSCAN and OPTICS algorithms were implemented in the same way. Below you can a short description of the best clustering results.

1. Hierarchical clustering with single linkage

The Euclidean metric is used to present the results of clustering for 5 clusters. Parallel coordinate plots were constructed for all features, and as an example, we present a plot for the feature of duration (connection time).

2. DBSCAN

The best interpretational results were achieved with clustering using the Manhattan distance metric. The data was divided into 5 clusters using this algorithm with input parameters of $\epsilon = 3$ and a minimum number of points of 10.

3. OPTICS

During clustering with the OPTICS algorithm, a value of ϵ was chosen as 0.5. The best results were obtained using the Canberra distance metric, although the Euclidean and Manhattan metrics also produced fairly accurate results. In all three cases, the data were clustered into 2 clusters using the algorithm. Below are the results using the Canberra distance metric.

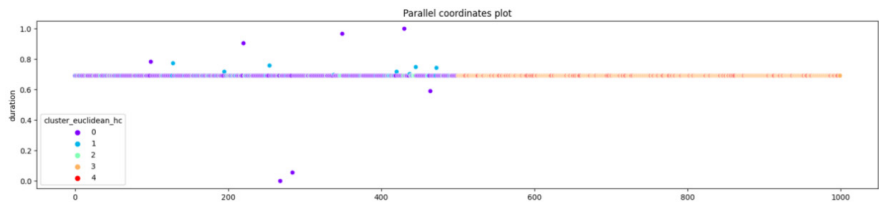


Fig. 1 – The plot for the duration feature of data clustered by the hierarchical method (Euclidean distance)

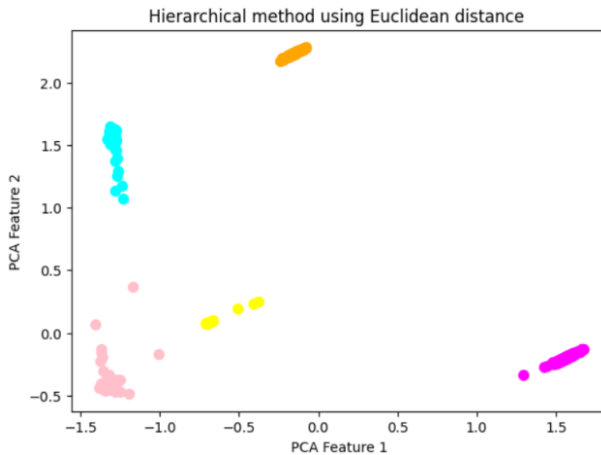


Fig. 2 – The plot of data clustered by the hierarchical method using Euclidean distance and principal component analysis

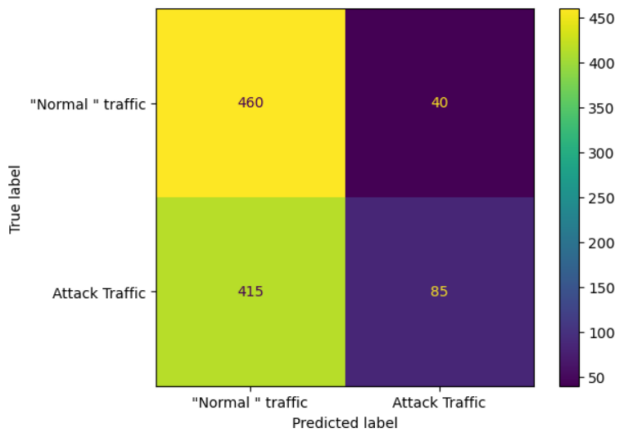


Fig. 3 – The confusion matrix for data clustered by the hierarchical method using Euclidean distance

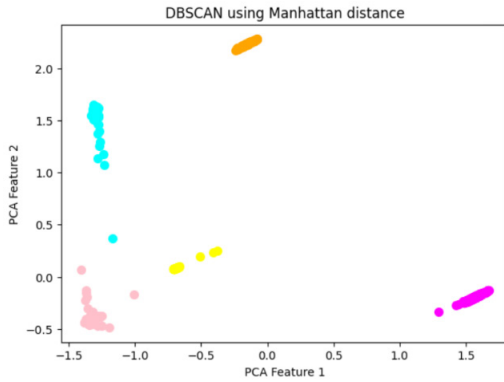


Fig. 4 – Graph of data clustered using the DBSCAN method with Manhattan distance and applying Principal Component Analysis (PCA)

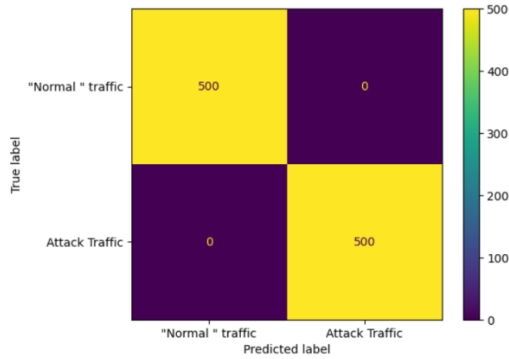


Fig. 5 – Confusion matrix for data clustered by DBSCAN method using Manhattan distance metric

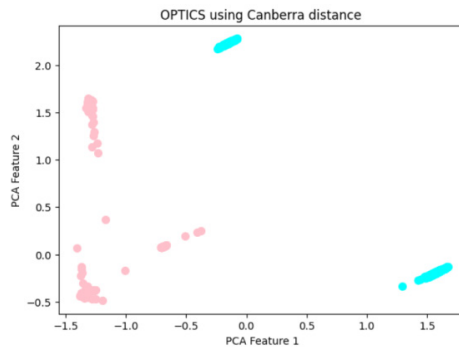


Fig. 6 – Graph of data clustered by OPTICS method, using Canberra distance and principal component analysis (PCA) method

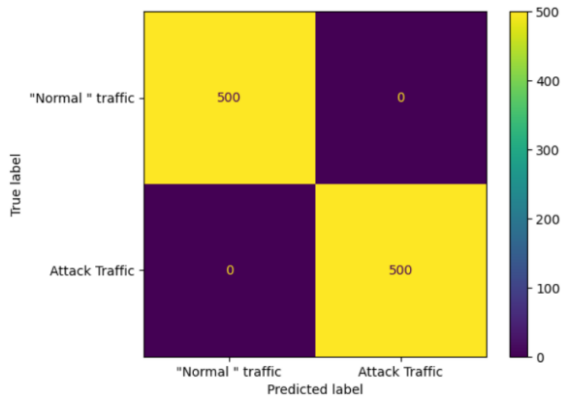


Fig. 7 – Confusion matrix for data clustered by OPTICS method, using Canberra distance

To sum up, clustering methods are important tools in detecting changes in network traffic and identifying attacks. Density-based methods, which can identify outliers and uncover the underlying clustering structure, are particularly useful in identifying traffic related to attacks. With the increasing complexity of the field of efficient set segmentation, there is a growing expectation for clustering to have a more prominent role in its applications. Further research and innovation in clustering techniques will be the key points for unlocking their potential in this area.

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THE ROLE OF ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND NEURON NETWORKS IN THE SPHERE OF SOCIO-ECONOMIC SCIENCES AND INFORMATION TECHNOLOGIES

It has become a daily occurrence for us that new words begin to join our familiar vocabulary. We have often heard such terms as artificial intelligence, machine learning, neural networks, deep learning. Someone knew these words from the beginning of their inception, and someone met them only yesterday. All of these tools were primarily created to automate processes and perform similar tasks, but they should not be confused. So, undoubtedly, they need to be sorted out.

Machine learning is a term used to describe an algorithm that allows a machine to generate a certain result based on input data and is used in the creation of artificial intelligence. Machine learning allows you to make the most accurate predictions and calculations through the use of neural networks and other learning methods. Machine learning is based on three main elements: data, algorithm, signs (see Fig. 1).

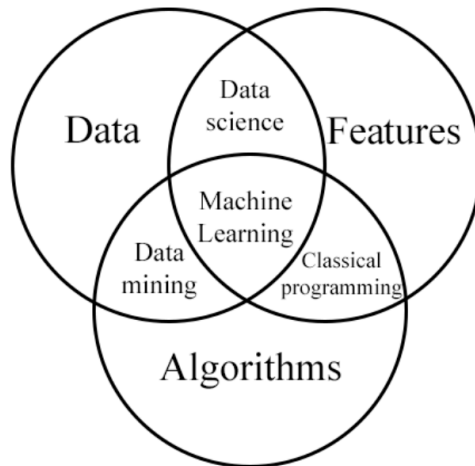


Fig. 1 – The fundamental foundation of machine learning

Data is literally any information that we can provide for the system to work with. An algorithm is a system of sequential operations to solve certain problems. Signs are those characteristics according to which we compare the final result. The main types of machine learning are classical learning, neural networks, and deep learning. Today, neural networks and deep learning have become more widespread due to their complex algorithms and capabilities.

A neural network is a term used to describe a program capable of storing, analyzing and reproducing information. As we noted earlier, neural networks are a type of machine learning. At a basic level, a neural network has four main components: inputs, weights, bias or threshold, and output. The approximate formula by which the optimal calculation is made in neural networks is given below:

$$\sum_{i=1}^m w_i x_i + bias = w_1 x_1 + w_2 x_2 + w_3 x_3 + \dots + bias$$

Artificial intelligence is a term used to describe machines designed to imitate human intelligence artificially. Such devices are capable of streamlining, optimizing and performing actions that have a better result. These devices are based on laws in the field of mathematics, computer science, physics, psychology, etc. In general, there are several categories of artificial intelligence, which are divided by the ability to perform more complex and massive tasks, starting from simple calculations and ending with the solution of cognitive problems inherent in the human brain and modeling of highly complex systems. Currently, artificial intelligence is used in various industries – from engineering and finance to healthcare. Artificial intelligence is fairly well used, despite the fact that it has arisen quite recently. Tesla is using AI to drive autonomy across vehicles and robots, LinkedIn is using it to match job applicants, Facebook is using AI to detect content that may violate community norms, smart search and Google algorithms are also examples of AI applications. Many chatbots with artificial intelligence help people solve minor problems related to calculations, finding information, making decisions, etc.

It can be concluded that, by now, artificial intelligence, which was provoked by the idea of achieving a human level of intelligence with the help of machines,

machine learning, which started as a scientific pursuit to search for artificial intelligence, and neural networks, which were only a learning hypothesis, have become so widespread, that they can not but affect people's lives. All these methods of automating routine, heavy or massive work help to optimize and increase the efficiency of people's work in various areas of life.

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V. Haidara, O. Bovkunova

THE ROLE OF SUPER-RESOLUTION ABILITY IN THE SPHERE OF INFORMATION TECHNOLOGIES

Super resolution is an image processing technology that allows you to increase the resolution of an image, restoring lost details. Super resolution refers to the process of producing a high spatial resolution image from one or more low resolution images. High-resolution images provide more detailed information to enable more accurate image analysis. Many fields require high resolution imaging, such as medical or satellite sensing, telescope imaging, pattern recognition, video surveillance, etc.

The super resolution method includes three main tasks: upsampling the image, increasing the maximum spatial frequency, and eliminating defects that occur during image capture, such as blur and noise. In essence, through the resolution process, you can get closer to reproducing the missing high frequency components and minimize aliasing, blurring, and noise. Over the course of the study of super

resolution, many different methods have been proposed to obtain a high resolution image. Some methods use statistical models and some use deep neural networks. Methods differ greatly in accordance with the choice of dimension (spatial, spectral, or even both).

The two main steps in super-resolution are registration and reconstruction. Accurate registration is essential for excellent reconstruction results. Phase-based image matching is used to evaluate pixel translation during the registration step. While high-resolution image reconstruction processing the Papoulis-Gerchberg algorithm is used most often, which is one of the best-known super-resolution methods.

The Papoulis-Gerchberg method is an algorithm used to reconstruct an object or image from its diffraction pattern. It was developed in 1970 by Gerchberg and Papoulis. This method has found extensive application in the field of optics and wave optics. The main idea of the Papoulis-Gerchberg method is that restoration of an object or image can be achieved by alternatively minimizing errors in spatial and frequency features. First, the diffraction pattern of the object or image is measured. An initial approximation of the object or image is generated randomly then. This initial approximation is used to create a diffraction image, which in turn is used to create a new approximation of the object or image in the spatial domain. This process continues until matches are reached between the original diffraction pattern and the calculated diffraction pattern. The Papoulis-Gerchberg method has its limitations and cannot give accurate results if the original diffraction pattern has a high level of noise or if the object or image has a complex structure.

However, it is still a useful tool for object and image reconstruction in optical systems where diffraction image measurement is the only available method for obtaining object information.

When using super resolution methods, there are three points to pay attention to: image registration is extremely important for successful super resolution, if low resolution images have redundant data, then super resolution does not work very well. If low resolution images contain all information about high resolution images, that is, there is no extra data among them, then super-resolution works perfectly.

It can be concluded that superresolution can be widely used in many spheres of human activity. One of the main advantages of super-resolution is that it allows you to increase the resolution of an image without significant loss in quality, which usually occurs with the standard image upscaling method. However, it should be noted that super-resolution can be a cumbersome process that requires a lot of resources. Such a process can take a long period of time and require a lot of computing power.

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Ya. Honcharov, T. Zaitseva, Yu. Honcharova

METHODS OF MODELING CONTACT OF ELASTIC BODIES

The calculation of strength and reliability of various critical elements of structures and functional equipment assemblies is a mandatory stage of design. Many of these elements have pronounced contact within a certain surface. Data on the stress-strain state of such elements and assemblies can be obtained using modern mathematical modeling techniques. Only for a relatively small number of contact problems, analytical solutions have been obtained based on the theory of elasticity. Therefore, numerical methods are the most promising way to study the contact interaction of bodies. Many scientists and researchers have worked on the modeling of the contact of elastic bodies. There are some of the most notable scientists in this field:

- Gerard A. Maugin, who investigated the contact of elastic bodies and developed the concept of elastic rods;

- Jean-Jacques Moreau, who made significant contributions to the mathematical theory of contact of elastic bodies;
- Antonio Curnier, who developed the finite element method for modeling the contact of elastic bodies;
- Klaus-Jürgen Bathe, who made significant contributions to the field of mechanical system modeling, including the contact of elastic bodies;
- Theodore von Kármán, who studied problems related to the contact and friction of elastic bodies.

In the context of contact interactions between multiple bodies, the use of structured meshes is often not feasible. The need for unstructured meshes arises, for example, in calculations using domain decomposition methods, as well as in the construction of locally refined meshes. Coupling of unstructured finite elements at contact lines can be achieved using iterative procedures, which ensure the continuity of the approximate solution or the normal components of its derivatives and form the so-called alternative Schwarz methods [1; 2]. Direct procedures that use the method of Lagrange multipliers [3; 4], penalty methods [5], and mortar methods [6–8] are also possible.

There are many programs available for modeling contact between elastic bodies. The most popular programs for modeling contact between elastic bodies currently include:

7. ANSYS – a software for numerical solid mechanics modeling, which has built-in tools for modeling contact between elastic bodies.
8. Abaqus – a program for complex engineering problems that includes modeling of deformation, strength, and dynamics of elastic bodies in contact.
9. LS-DYNA – a program for numerical modeling of solid dynamics systems, which has built-in tools for modeling contact between elastic bodies.
10. COMSOL Multiphysics – a software for numerical modeling of various physical processes, which also has tools for modeling contact between elastic bodies.

11. OpenFOAM – a program for numerical modeling of various physical processes, typically used for modeling gas and liquid media, but which also has built-in tools for modeling contact between elastic bodies.

12. SimScale – an online platform for numerical modeling, which has built-in tools for modeling contact between elastic bodies.

Calculation of strength and reliability of structural elements and functional units of equipment is a mandatory stage of design, and obtaining data on the stress-strain state of such elements and units can be achieved using modern mathematical modeling tools. Analytical solutions have been obtained for many contact problems in elasticity theory, but for more complex problems, numerical methods and the use of software such as ANSYS are the most promising research approaches for studying contact interactions between bodies.

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THE COMPATIBILITY OF CODE WRITTEN IN C# AND C++

During software development, situations arise when it is necessary to call code that has already been implemented in another programming language. Previously, this problem referred to, for example, the use of libraries written in C/C++ in Java applications, which is solved via the JNI mechanism [1]. Then, the task of using such C/C++ libraries in applications written in C# was also added. Let's take a closer look at the latter task. There are several ways to develop software in C# when there is a part of the required functionality already implemented in C++.

1. Rewrite the code completely in C#, adapting it according to the capabilities of C#.
2. Develop the program again, regardless of the existing C++ implementation.
3. Combine languages, i.e. use the ready-made C++ implementation in the C# project.

Comparing the options for using a ready-made implementation of C++, it should be noted that each of them can be used in software development. However, there are important points associated with the first option:

- C++ provides more opportunities for a programmer than C#, which is why code written in C++ can be much more efficient.
- The difference in memory management between C++ and C# can lead to difficulties in adapting code. In C++, for example, the developer usually manages memory allocation and deallocation independently, whereas in C#, a garbage collector does this.
- The significant difference in approaches to implementing multithreading in C++ and C# may require essential code modifications during such adaptation.

That is, it is necessary to delve into and thoroughly explore the work of C++ code in order to qualitatively rewrite the code in C#. This can make things difficult if the C++ code is complex enough.

When using the second option, it will be necessary to re-solve tasks that have already been solved and tested by other developers. Therefore, this option is also inefficient.

The last, third option is the most efficient as it utilizes pre-existing code without the need for modification or rewriting. It only requires "connecting" to the C++ code in order to use it in C# code.

For such purposes, Microsoft recommends using the attributes for import/export `__declspec(dllexport)` and `__declspec(dllimport)` – respective extensions for C/C++ languages. They can be used to export and import functions, data, and objects to and from a DLL library written in C/C++ [2].

However, such a decision requires familiarity with the library interface – method names, parameters, and return values. It takes some to create the wrapper code, i.e., code that will be called in a C# project and serve as a bridge to the C/C++ code, passing parameters and results in the appropriate directions.

The process of creating wrapper classes can be automated using the SWIG tool – Simplified Wrapper and Interface Generator [3]. SWIG is a free tool for connecting programs and libraries written in C/C++ to programs and libraries written in other programming languages (TCL, Perl, Python, Ruby, PHP, Java, C#). To use this tool, the library developer creates a file with a description of the exported functions.

```
/* File : example.i */
%module example

%inline %{
extern int gcd(int x, int y);
extern double Foo;
%}
```

SWIG generates source code for linking C/C++ and a desired programming language and creates wrapper classes. After that, the developer can use the created wrapper classes in the code of their project to call functions from the C/C++ library.

Based on usage experience, it should be noted that despite SWIG being a proven code generator, errors can occur in wrapper classes. Additionally, such wrapper classes require the dll library to be located in the same directory as the executable file within the file system.

It is recommended to separate the generated code into a separate project and move the wrapper code for automatic DLL binding to a specific, designated directory, such as the Resources folder in C#. This will facilitate project setup and testing.

Below is a fragment of the generated file for the above-described functions after some minor modifications.

```
class examplePINVOKE
{
    public const string addressDll = "example.dll";
    protected class SWIGExceptionHelper {

        public delegate void ExceptionDelegate(string message);
        ...
        [global::System.Runtime.InteropServices.DllImport(addressDll,
EntryPoint="CSharp_gcd")]
        public static extern int gcd(int jarg1, int jarg2);

        [global::System.Runtime.InteropServices.DllImport(addressDll,
EntryPoint="CSharp_Foo_set")]
        public static extern void Foo_set(double jarg1);

        [global::System.Runtime.InteropServices.DllImport(addressDll,
EntryPoint="CSharp_Foo_get")]
        public static extern double Foo_get();
    }
}
```

In conclusion, we would like to emphasize that the issue of interaction between code written in different programming languages, particularly C/C++ and C#, is presented. Moreover, the features of working with the SWIG library on conferred, which undoubtedly helps to reduce the development time of wrapper classes and, under certain conditions, enables the immediate start of developing subsequent modules after configuring and testing the wrapper code.

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K. Kibalnik, R. Yecha, N. Kondratiuk, O. Posudiiivska

NEW FOOD PRODUCTS IN THE COMBAT OF DIABETES

Diabetes mellitus is a disease of the endocrine system, which is characterized by a violation of the absorption of glucose in the body [1] and is one of the most common chronic diseases, which requires constant monitoring of health and adherence to a special diet. The diet of diabetic patients should include foods containing vitamins, minerals and antioxidant substances in increased quantities, but at the same time, the amount of sugar and carbohydrates should be limited. Unfortunately, such products and dishes that meet the requirements of dietary nutrition for diabetes do not have a very pleasant taste, so the main goal of modern food offerings should be the products with a powerful health-improving function and high organoleptic indicators.

One of these products is fruit-berry puree, which can be used as a separate dish, as well as a sauces for other dishes in the daily diets of patients with diabetes. It has been proved [2] that the use of berries and fruits stabilizes the level of glucose in the blood, as it contains a sufficient amount of vitamins, mineral compounds and antioxidants. Adding sweeteners to purees can solve the taste problem by giving products sweetness without involving the insulin machine.

When developing fruit-berry purees with the use of sweeteners, the need for the content of dietary fibers, such as pectins, was taken into account. The amount of beneficial substances that regulate the health status of people with diabetes has been increased by adding dry powders and extracts of fruits and berries. As a result of such

addition, the portion size of the product can be reduced and may not exceed 75-100 g per day. The "Puree" product has high organoleptic properties: pleasant taste, texture, color, aroma, and appearance.

Apples were chosen as the base, as they contain vitamin C, which supports the immune system and strengthens the walls of blood vessels. Apples also contain dietary fiber – pectin, which effectively normalizes the intestinal microflora and regulates blood glucose levels.

Black currant was chosen as an additional ingredient, which contains gamma-linolenic acid (GLA). In combination with flavonoids in black currant, GLA reduces inflammatory processes, including those in the joints.

Due to the content of monoamineoxidase inhibitors, black currant is able to regulate nervous disorders, including diminishing depression [3].

A mixture of erythritol and sucralose was used as a sweetener, the consumption of which does not affect the level of glucose in the blood.

Erythritol is a natural non-carbohydrate polyol sweetener.

Sucralose is an artificial but safe thermally stable sweetener.

Based on the above, it can be argued that the development of such fruit-berry puree for people with diabetes is an important and useful initiative.

Fruit and berry purees can be an excellent source of nutrients and energy for people with diabetes. They can be used as a substitute for standard sweets containing a large amount of sugar. The development of such a product requires a scientific approach and study of its impact on the health of patients with diabetes.

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APPLYING OPTIMIZATION THEORY TO BUILDING FUZZY VORONOI DIAGRAMS

The paper demonstrates the possibility of constructing fuzzy Voronoi diagrams based on a single approach: the formulation of a continuous problem of optimal partitioning of sets from n -dimensional Euclidean space into subsets with a quality criterion that provides the appropriate type of Voronoi diagram.

The theory of optimal partitioning of sets is a universal mathematical approach for constructing Voronoi diagrams, which is based on the following general idea. The initial problems of optimal partitioning of sets, which are mathematically formulated as infinite-dimensional optimization problems, are reduced through the Lagrange functional to auxiliary finite-dimensional non-smooth maximization problems or non-smooth maximin problems, for the numerical solution of which modern effective optimization methods are used. The peculiarity of this approach is the fact that the solution of the initial infinite-dimensional optimization problems can be obtained analytically in an explicit form, and the analytical expression can include parameters that are sought as the optimal solution of the above-mentioned auxiliary finite-dimensional optimization problems with non-smooth objective functions.

The universality of the proposed approach to the construction of Voronoi diagrams is also confirmed by the fact that the models and methods of solving continuous problems of optimal partitioning of sets can be generalized to the case of a vague assignment of the initial parameters of the problem or the requirement of a vague partitioning of the set, as a result of which the resulting Voronoi diagrams can have a vague nature.

The paper proposes an algorithm for constructing one of the variants of fuzzy Voronoi diagrams, when the set of points forming a Voronoi cell can be fuzzy.

The algorithm was developed based on the synthesis of the methods of the theory of optimal partitioning of sets and the theory of fuzzy sets.

The developed algorithm is programmatically implemented in C# on the WPF platform and using the 3D Unity Engine. To speed up calculations, the technology of calculations on a graphics accelerator (GPGPU) using Compute Shaders in the HLSL language was used. This turned out to be possible and advantageous from the point of view of the algorithm's running time, since the algorithm for calculating the fuzzy partition needs to calculate the value of the membership function at all nodes of the grid at each iteration, while these calculations are independent of each other and can be calculated in any order, i.e. are ideal for parallel computing. At the same time, since the problem of fuzzy partitioning with fixed centers is an inner problem for the problem of fuzzy partitioning with placement, that is, it is performed at each iteration, the acceleration of its calculations is justified. In fact, compared to calculations on the processor, the working time is ten times different, and it allows building images of partitions almost in real time. With the help of the developed software, the work of the algorithm is tested on examples of building standard, additively and multiplicatively weighted diagrams with fuzzy Voronoi cells.

The result of applying the theory of continuous problems of optimal partitioning of sets as a universal mathematical approach for constructing a Voronoi diagram and its generalizations is the possibility to construct not only already known Voronoi diagrams, but also to construct new ones.

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THE MAIN TRANSPORT PROBLEMS

The transportation problem is a classic optimization problem in operations research, where the objective is to minimize the total transportation cost of goods from several sources to several destinations. The problem involves determining the optimal shipping quantities between the sources and destinations, subject to supply and demand constraints [1].

The transportation problem can be formulated as a linear programming model, where the objective is to minimize the total transportation cost. Let us consider m sources and n destinations, with the supply and demand for each source and destination given by a_i and b_j , respectively. Let x_{ij} be the amount shipped from source i to destination j . Then the transportation problem can be formulated as follows:

$$Z(X) = \sum_{i=1}^m \sum_{j=1}^n c_{ij} x_{ij} \rightarrow \text{Min} \quad (1)$$

$$\sum_{j=1}^n x_{ij} = a_i, \quad i=1,2,\dots,m \quad (2)$$

$$\sum_{i=1}^m x_{ij} = b_j, \quad j=1,2,\dots,n \quad (3)$$

$$x_{ij} \geq 0, \quad i=1,2,\dots,m, \quad j=1,2,\dots,n. \quad (4)$$

where c_{ij} is the unit transportation cost from source i to destination j .

The transportation problem can be solved using various methods, including the simplex method, the network simplex method, and the transportation simplex method. The transportation simplex method is a specialized version of the simplex method that exploits the problem's special structure to solve it more efficiently.

The transportation simplex method involves constructing an initial feasible solution and iteratively improving it until an optimal solution is reached. The initial

feasible solution can be obtained using various methods, such as the northwest corner rule, the least cost rule, and the Vogel's approximation method.

The basic idea of the transportation simplex method is to identify a non-basic variable with a negative reduced cost and enter it into the basis. Then, a basic variable with the smallest ratio of the right-hand side value to the entering variable coefficient is selected to leave the basis. This process is repeated until an optimal solution is reached.

The transportation problem is a fundamental problem in operations research, with various practical applications in logistics, supply chain management, and transportation planning. The problem can be formulated as a linear programming model and solved using various methods, including the transportation simplex method. The transportation simplex method is an efficient method that exploits the problem's special structure to solve it more efficiently.

There are three main types of transportation problems:

1. **Balanced Transportation Problem:** In this type of problem, the total supply from all sources is equal to the total demand at all destinations. This means that the problem has a feasible solution.

2. **Unbalanced Transportation Problem:** In this type of problem, the total supply from all sources is not equal to the total demand at all destinations. This means that the problem does not have a feasible solution, and some additional constraints or adjustments are required to make the problem feasible.

3. **Degenerate Transportation Problem:** In this type of problem, one or more of the allocation variables take on a value of zero in the optimal solution, leading to a degenerate solution. This can cause problems with some solution methods, such as the basic transportation simplex method, and requires special handling techniques.

The solution methods for the different types of transportation problems are as follows:

The balanced transportation problem has an equal total supply and demand, and it can be solved using the transportation simplex method. The method involves finding an initial feasible solution, identifying the basic variables and calculating

their costs, and then iteratively improving the solution until an optimal solution is reached.

The unbalanced transportation problem has an unequal total supply and demand, and it requires additional constraints or adjustments to make it feasible. There are several methods for solving unbalanced transportation problems, such as:

- Adding a dummy source or destination to balance the problem
- Reducing the supply or demand to balance the problem
- Using the stepping-stone method to find an optimal solution.

The degenerate transportation problem has one or more allocation variables that take on a value of zero in the optimal solution. This can cause problems with some solution methods, such as the basic transportation simplex method. To solve a degenerate transportation problem, the following methods can be used:

- The modified transportation simplex method, which avoids cycling and ensures convergence to the optimal solution
- The minimum cell cost adjustment method, which modifies the problem to eliminate degeneracy
- The Russell's method, which modifies the problem to avoid degeneracy.

In summary, the transportation problem can be solved using various methods depending on the type of problem. The transportation simplex method is used for balanced transportation problems, while unbalanced and degenerate transportation problems require additional techniques such as adjusting the problem, using the stepping-stone method, or using modified solution methods to obtain optimal solutions.

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ADVANTAGES AND DISADVANTAGES OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is transforming the world in numerous ways, and its applications are increasingly integrated into various aspects of human lives. The potential advantages of AI include improved efficiency, productivity, and accuracy, increased safety, and enhanced decision-making capabilities. However, the technology also poses several disadvantages, including ethical concerns, job displacement, and potential safety hazards. This article aims to explore the advantages and disadvantages of AI, highlighting both the potential benefits and risks associated with its use. The study concludes by emphasizing the importance of responsible AI development and deployment to mitigate potential harms.

Artificial intelligence (AI) has become a prominent area of research and development in recent years, with significant advances made in machine learning, natural language processing, and robotics. AI has the potential to revolutionize various industries, including healthcare, finance, manufacturing, transportation, and education, among others. The technology is increasingly integrated into different aspects of human lives, with the potential to improve efficiency, productivity, and accuracy, among other benefits.

Despite its potential advantages, AI also poses several disadvantages that require careful consideration. These disadvantages include ethical concerns, job displacement, and potential safety hazards, among others. As such, it is essential to explore the advantages and disadvantages of AI to develop effective strategies for responsible AI development and deployment.

Advantages of AI

Improved Efficiency and Productivity

AI can improve efficiency and productivity in various industries by automating repetitive and tedious tasks, thereby allowing workers to focus on more complex and

creative tasks. For example, in manufacturing, AI-powered robots can perform repetitive and hazardous tasks, such as welding and painting, with greater accuracy and speed than humans [12, p. 76]. In the financial sector, AI algorithms can automate tasks such as fraud detection, risk assessment, and portfolio management, thereby reducing the workload for financial analysts and improving the accuracy of financial decisions [5, p. 365-380].

Increased Safety

AI can enhance safety in various industries by reducing the risk of human error and accidents. For example, in the transportation industry, AI-powered self-driving cars can reduce the risk of accidents caused by human error, such as distracted driving and fatigue [7, p. 247-250]. In the healthcare industry, AI algorithms can assist medical professionals in making accurate diagnoses and treatment plans, thereby reducing the risk of medical errors.

Enhanced Decision-Making Capabilities

AI can improve decision-making capabilities by analyzing vast amounts of data and identifying patterns and insights that would be difficult for humans to detect. For example, in the marketing industry, AI algorithms can analyze customer data and behavior to identify trends and make personalized recommendations, thereby improving the effectiveness of marketing campaigns [6, p. 1-16]. In the legal industry, AI-powered tools can assist lawyers in legal research and document analysis, thereby improving the efficiency and accuracy of legal services [8, p. 67-93].

Disadvantages of AI

Ethical Concerns

AI raises several ethical concerns, including privacy violations, bias, and the potential for misuse. For example, AI-powered surveillance systems can infringe on individuals' privacy rights by collecting and analyzing their personal data without their consent [1, p. 57-77]. AI algorithms can also perpetuate bias and discrimination, particularly in hiring and other decision-making processes [4, p. 329-338]. The potential

for AI misuse, such as using autonomous weapons, poses a significant ethical concern that requires careful consideration and regulation [11, p. 887-934].

Job Displacement

AI automation has the potential to displace jobs and change the nature of work in various industries, leading to unemployment and income inequality. For example, in the manufacturing industry, AI-powered robots can replace human workers in repetitive and tedious tasks, leading to job loss [3, p. 7]. Similarly, in the transportation industry, self-driving trucks and taxis could replace human drivers, leading to job displacement [10].

Potential Safety Hazards

AI-powered systems can pose potential safety hazards, particularly in industries such as healthcare and transportation. For example, in healthcare, AI algorithms can make incorrect diagnoses or treatment recommendations if not properly trained and validated, leading to patient harm [2, p. 1593-1595]. Similarly, in the transportation industry, self-driving cars can malfunction and cause accidents, leading to potential harm to passengers and pedestrians [9, p. 12-14].

To conclude, AI has the potential to transform various industries and improve efficiency, productivity, and safety. However, the technology also poses several risks and challenges, including ethical concerns, job displacement, and potential safety hazards. As such, it is essential to approach AI development and deployment with caution and responsibility, taking into consideration its potential benefits and risks. Effective regulation and oversight are also critical to ensure the responsible development and deployment of AI to mitigate potential harms. By taking a responsible approach to AI development and deployment, we can harness the technology's potential while minimizing its risks and ensuring that it benefits society as a whole.

Artificial intelligence has become an increasingly important technology in various fields, ranging from healthcare to finance. It has the potential to bring numerous benefits, such as increased efficiency, improved accuracy, and enhanced

decision-making. However, it also comes with several drawbacks, including ethical concerns, job displacement, and the potential for bias and discrimination.

To maximize the advantages of AI while minimizing its disadvantages, it is important to carefully consider its development and implementation. This includes addressing ethical concerns and ensuring that the technology is transparent, explainable, and unbiased. It also involves investing in education and training programs to ensure that the workforce is equipped to adapt to the changing landscape. As AI continues to evolve and become more sophisticated, it is crucial to remain vigilant and aware of its potential impact. By taking a proactive approach, we can harness the full potential of AI while mitigating its potential risks.

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THE WAYS TO IMPROVE PERFORMANCE OF ELECTRIC ENERGY RECUPERATORS

The use and conversion of potential and kinetic energy of a train into electric energy makes it possible to solve the problems of reducing the costs of electric traction of trains and ensure energy saving in industry [1]. When solving this complex technical problem, it is necessary to take into account limitations on the permissible braking force due to wheel-rail traction failure and the operation modes of the traction power supply system [1]. From the evaluation of the efficiency of electric energy recovery from traction electric rolling stock into the DC contact network, it follows that the engineering problems are mostly solved.

Single-phase and three-phase rectifier-inverter converters (RICs), driven by the network, and single-phase four-qS converters are currently used for electric braking of trains and electrical energy recovery into the AC power grid [1]. During the operation of this equipment, the effective AC mains voltage is reduced due to rectangular-shaped equalizing current loading, and the instantaneous AC mains voltage curve is distorted. The study is aimed at examining the energy processes in the known energy recovery devices to determine and eliminate the cause of their unsatisfactory operation.

The theory of energy processes in electric circuits with semiconductor devices is based on extraction of the fundamental harmonic of voltage and the first harmonic of current from the spectrum of harmonic components of non-sinusoidal voltage and current at the converter input. This method allowed simplifying the calculation of active power at the input of semiconductor converters with different pulse control methods of power semiconductor devices (PSC). The known theory of energy processes does not allow revealing the cause of unsatisfactory work of pulsed semiconductor converters. The developed in IrGPS power characteristics take into account reduction of irreversible transformation of electric energy into another kind

of energy due to non-conductive state of semiconductor devices of electric energy recuperators and reactive elements of electric power system [2, p. 1030]. Operation of electric energy recuperators can be improved by technical solutions, which allow eliminating the cause of reducing their energy efficiency.

As a result of the study, it was found that the voltage in the contact network increases during the recuperation of electric energy by the developed device, which allows increasing the productivity of the railroad. Instead of increasing the phase angle of the equalizing current relative to the alternating voltage in the network to 90 electrical degrees to control the active power of regeneration by the developed regenerator, the total argument of the total power at the regenerator output is maintained at the level of $\varphi_{\Sigma} = 3-6$ electrical degrees. This makes it possible to limit the magnitude of the reactive component of the equalizing current in the process of regulating the active power of the recuperator.

It is proposed to stabilize the argument of full power at the recuperator output at a given level when regulating active recuperation power by means of a smooth change in current in the excitation windings of traction motors and switching sections of the secondary winding of traction transformers of the electric rolling stock.

Total losses of active power in the traction transformer, in the developed EPS recuperator and in the AC contact network are reduced by 3 times in comparison with the total losses of active power in the traction transformer, EPS RPM and contact network.

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REAL-WORLD EXAMPLE OF APPLICATION PERFORMANCE ANOMALY DETECTION THROUGH MEMORY ANALYSIS

The growing complexity of modern software applications has led to the emergence of various performance-related issues that significantly degrade application performance and negatively impact user experience. The constant evolution of software applications and hardware architectures has led to a diverse range of memory behaviors, complicating the development of a one-size-fits-all solution. Given that just-in-time (JIT) compilation can effectively convert source code [1] into machine-specific instructions, it is plausible to reverse process by comprehensively capturing and analyzing the memory contents associated with the execution of the application. As memory snapshots encompass thread-associated data structures, they inherently contain valuable information pertaining to the operations executed by the respective threads, thus providing insights into the runtime behavior of an application.

The Event Tracing [2] technique, integrated into the operating system kernel, can be activated to generate detailed information that reveals the activities of each thread at millisecond granularity. Consequently, this allows for a comprehensive understanding of time distribution within the scope of various operations, thereby enabling the analysis of application performance and potential bottlenecks.

The real-life event tracing from underperforming system has revealed that 2.5% of exclusive CPU time is spent on ‘InitializeCounters’ method:

Name ?	Inc ?	Exc % ?
OTHER <<mscorlib.dll\System.Collections.Hashtable.get_Item(System.Object)>>	434.0	6.9
OTHER <<clrjit_New>>	235.0	3.8
OTHER <<mscorlib.dll\System.Collections.Concurrent.ConcurrentDictionary`2[System.__Canon,System.__Canon].TryGetValue(System.__Canon,System.__Canon ByRef)>>	234.0	3.6
Sitecore.Kernel.Sitecore.Diagnostics.PerformanceCounters.PerformanceCounter.InitializeCounter()	237.0	2.5
OTHER <<mscorlib.dll\System.String.Concat(System.Object[])>>	125.0	1.9

Fig. 1 – CPU event tracing holds Diagnostics in TOP 5 most CPU-consuming functions

Upon conducting reverse-engineering of the method body [3] from memory snapshot [4], it becomes evident that the implementation employs a thread-safe application programming interface (API) despite the absence of any technical necessity for such an approach. Upon recreating the model and processing it through Intel VTune profiler the ‘LOCK CMPXCHG’ instruction is seen to consume the most of time:

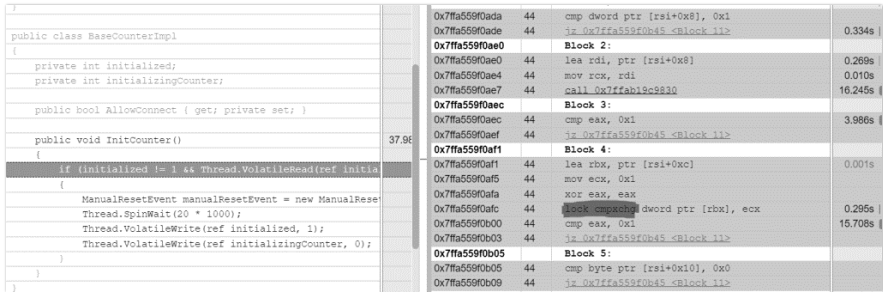


Fig. 2 – Exclusive access involving cache coherency across all cores

The execution of the LOCK CMPXCHG instruction [5] in Intel processors has a direct impact on the processor's L1 and L2 caches. When the LOCK prefix is used in conjunction with the CMPXCHG instruction, it guarantees exclusive access to the memory location involved in the operation.

To ensure mutual exclusion, the processor must enforce cache coherency across all cores which may involve invalidating or updating the cache lines in other cores' L1 and L2 caches that hold the targeted memory location. Consequently, the LOCK CMPXCHG instruction may result in increased cache coherency traffic, leading to performance implications such as increased latency and reduced throughput.

The conditions order change to firstly check if counter is allowed to be initialized resulted in over 22 times execution speed improvement from 5.8 seconds to 0.26 seconds according to Intel VTune profiler results:

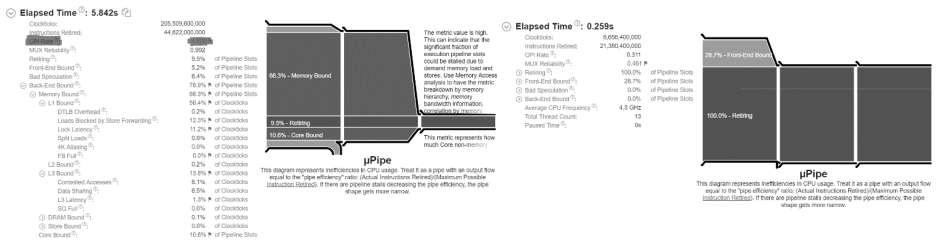


Fig. 3 – Visible performance difference

Conclusion

The research was performed by combining event tracing and memory snapshot sources.

Event tracing has highlighted the most CPU-consuming methods, while memory snapshot has supplied executed code as well as thread information.

Both original candidate code versions were benchmarked by Intel VTune profiler to collect the execution statistics.

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INVERSE PROBLEMS OF REPRODUCING OF PHYSICAL AND MECHANICAL FIELDS IN INACCESSIBLE REGIONS

Inverse problems are those problems in which the cause must be calculated from the given effect. For example, based on the values of the acceleration of the body, you need to calculate the force acting on the body. Another example: based on the given values of the force acting on the body, it is necessary to calculate the force field (gravitational, electromagnetic). Inverse problems include problems determination of some physical properties of objects, such as density, coefficient of thermal conductivity, modulus of elasticity depending on coordinates or in the form of functions of other parameters. The success of the procedure for solving such problems depends to a large extent on the quality and quantity of the information received information experiment, as well as from the method of its processing. Let us consider the problem of restoration of the potential field in the inaccessible region based on the given values of measurements of this field in the accessible region.

Let some physical field be described by the Laplace equation:

$$\Delta u = 0 \tag{1}$$

The area of existence of the field Ω consists of two parts: $\Omega = \Omega_1 \cup \Omega_2$. The part Ω_1 is available for measuring field characteristics. Measurement in the area Ω_2 is impossible. Let the points $P_1, P_2, \dots, P_n \in \Omega_1$ have known (measured) potential values u_1, u_2, \dots, u_n . It is necessary to construct a function $u^*(x)$, that satisfies equation (1) at the points of the entire region Ω , and at the measurement points $P_1, P_2, \dots, P_n \in \Omega_1$ will be close to the measured values u_1, u_2, \dots, u_n . In real applied problems, the points are located along the perimeter of some flat figure (in the case of a two-dimensional problem) or on the boundary of some body (in the case of a three-dimensional problem).

Let $\varphi_1(x), \varphi_2(x), \dots, \varphi_m(x)$ - be linearly independent solutions of the Laplace equation. Then their linear combination

$$v_m(x) = \sum_{i=1}^m A_i \varphi_i(x) \tag{2}$$

will also be a solution to this equation. As functions $\varphi_i(x)$ you can take harmonic polynomials or functions of the form $G(x - \beta_i)$, where $G(x)$ is the fundamental solution (Green's function) of the Laplace operator, β_i is a set of points (location of sources) that must lie outside the region Ω . The location of these points can be chosen arbitrarily, but for better accuracy it is recommended to choose their location uniformly around Ω_2 . Let's find the coefficients A_1, A_2, \dots, A_m from the condition of proximity $v_m(x)$ to the measured potential values at the points $P_1, \dots, P_n \in \Omega_1$. The standard deviation is used as a measure of proximity:

$$F(A_1, A_2, \dots, A_m) = \sum_{j=1}^n [\sum_{i=1}^m A_i \varphi_i(x_j) - u_j]^2. \quad (3)$$

The coefficients of the linear combination (2) are found from the condition of the minimum of the function $F(A_1, A_2, \dots, A_m)$. This condition gives m linear algebraic equations. For large values of m , the problem of finding the minimum of function (3) is ill-posed, as the system of linear equations is unstable. To construct an approximate solution of the obtained system of linear equations, we apply the Tikhonov regularization method [1–3].

The idea of the method is to replace the incorrect extremal problem for the initial functional $J(v)$ with a sequence of correct extremal problems. Most often, during the implementation of this idea, the so-called Tikhonov functionals are used:

$$T(v, \alpha) = J(v) + \alpha \Omega(v), \quad (4)$$

where $J(v)$ – is the functional of the initial problem. By $\Omega(v)$ we mean some functional defined on a subset of the domain of the initial functional, which acquires only non-negative values. The numerical parameter $\alpha \geq 0$ is called the regularization parameter; at $\alpha=0$ the functionals $T(v, \alpha)$ and $J(v)$ coincide.

Model examples consider the qualitative dependence of the solution on the value of the regularization parameter. The solutions of the system of linear algebraic equations should be those for which the error due to regularization is comparable to the measurement error and does not have critical deviations due to the instability of the system.

In further studies, it is planned to investigate in more detail the influence of the choice of location of source points β_i on the accuracy of calculations. Another

interesting problem that is planned to be investigated is the construction of a basis for the case of discontinuous boundary conditions. After all, in places of sharp field difference, this method is not applicable in its usual form due to the presence of the Gibbs phenomenon.

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F. Mostovyi, N. Guk, Yu. Honcharova

MODELING OF GENERATIVE RECOMMENDATION SYSTEMS

The goal of this work is to describe shortly the approaches to building the system which provide recommendations in the form of an ordered sequence of HTML pages of the resource that is proposed to the user [1; 2; 4; 5] and the results, obtained in the process of research. To perform the ranking procedure, which is in the center of different investigations [4; 6; 7], statistical information about user transitions between web pages is used. The web resource model is depicted as a web graph as well as the user behavior model is represented as a graph of transitions between resource pages. In its turn, the web graph is represented by an adjacency matrix, and the transition graph has a weighted probability matrix of transitions between vertices.

It is considered that user transitions between web resource pages can occur by entering a URL in the browser's address bar or by following a link on the current page [3]. User transitions between vertices in a finite graph, in accordance with probabilities determined by the weight of the graph edges, are represented by a homogeneous Markov chain and are considered as a random walk process on the graph with the possibility of transitioning to a random vertex. It is noteworthy

that the Random Walk with Restarts method is used to rank web resource pages for a particular user.

For obtaining the valuable practical results the numerical analysis was performed for an existing website of an online store. The output data on user sessions were divided into training and test samples. Based on the training sample data, a weighted probability matrix of user transitions between web resource pages was constructed. Metrics such as accuracy, completeness, and Half-life Utility were used to evaluate the quality of the constructed recommendation system. Accuracy values of 65-68% were obtained on the elements of the test sample, and the optimal number of elements in the list of recommendations was determined. The influence of model parameters on the quality of the recommendation system was studied.

The study's findings will form the basis for further research.

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MODELLING OF CHEMICAL AND TECHNOLOGICAL PRODUCTION PROCESS OF FERROCENE CARBOXYLIC ACID

Ferrocene and its derivatives improve energy characteristics of solid rocket propellants. This work presents the created computer model of industrial production of ferrocene carboxylic acid, based on the laboratory method of synthesis of ferrocene carboxylic acid from ferrocene and carbon dioxide gas, employing ChemCAD software, version 7.1.2 [2].

The process of synthesis starts with the preparation of the solution of benzene, ferrocene, and aluminium chloride [2]. Solution is mixed and heated to 40°C. Carbon dioxide gas is added to the solution, the reaction proceeds with the temperature of 50°C. After the reaction is completed, the solution is cooled to 6°C. Then, cold 12% aqueous solution of tin dichloride is added to the cooled solution after the synthesis for decomposition of aluminium chloride. The heterogeneous mixture is filtrated from the precipitate. The mixture of benzene and water is separated. After filtration the precipitate is dissolved in 20% aqueous solution of sodium hydroxide and is filtrated from the precipitate of undissolved ferrocene. 0.1 M *HCl* is added for acidification of alkalic solution to precipitation of ferrocene carboxylic acid. The precipitate is washed with clean water and dried in the air. Determined that 10.28 g of ferrocene carboxylic acid is obtained from 16 g of ferrocene with the output of 52%.

Each technological operation is modelled by the corresponding UnitOp from the ChemCAD program [1]. Modelling of the processes of mixing of benzene, aluminium chloride and ferrocene, as well as modelling of the reaction of ferrocene with CO_2 , are modelled by the Stoichiometric reactor module. The process of cooling of the reaction mass after the action of the reactor is simulated using the Heat Exchanger module. Two heat exchange flows are supplied to the Heat Exchanger module, the mass flow of which is calculated in accordance with the heat balance of

cooling process. Decomposition of the catalyst is modelled by the Stoichiometric reactor module. Filtration of the suspension is modelled by the Centrifugal filtration module. Separation of water and benzene is modelled by the Component separator module. Dissolution of crystalline sodium hydroxide and washing of the sediment after filtering the suspension with an alkalic solution are modelled by the Stoichiometric reactor module. Filtration of the ferrocene sediment from an alkalic aqueous solution is modelled by the Centrifugal filtration module. The process of acidification of an alkalic solution of ferrocene carboxylic acid is modelled by the Stoichiometric reactor module. Filtration of the sediment of ferrocene carboxylic acid from an aqueous solution is modelled by the Centrifugal filtration module. Washing of ferrocene carboxylic acid with water is modelled by the Solids washer module. Drying of ferrocene carboxylic acid is modelled by the Dryer module.

The resulting model allows us to analyse the consumption of substances and energy, to choose the optimal mode of operation of the technological scheme and to project real productions when required. Optimization of the model shows the feasibility of separating the processes of mixing of the components and carrying out the reaction with carbon dioxide gas, the need for cooling the reaction mixture exactly to 6°C in order to reduce the influence of heat of the reaction of aluminium chloride with water, the possibility of drying the product in a conventional oven at a temperature of 100°C.

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SEGMENTATION METHODS FOR IMPROVEMENT OF THE PRONY'S METHOD RELIABILITY FOR NOISY SIGNALS

A lot of signal processing problems call for the spectral analysis of the signal, which is usually done with the help of the Discrete Fourier Transform (DFT). The main problem of this approach is the fact that it often distorts the spectrum peaks, widening them [1, p. 341]. Such peaks can sometimes overlap and, in the most extreme cases, even merge into a single shape. Thus, a need for alternative methods arises. Parametric spectral methods such as the Prony's method can be used instead. These methods fit the predetermined model to the analyzed signal and can precisely estimate any frequency as long as it is lower than the Nyquist frequency, but they suffer greatly in the presence of noise. In this paper, the method of signal segmentation is explored as a possible method for the improvement of the reliability of the Prony's method, which uses a complex exponential signal model [2, p. 2].

Due to the probabilistic nature of the noise, some parts of the signal may be more influenced than the others. It would be logical to give the parts of the signal where the noise is less prominent a higher ability to influence the parameter estimate values. One possible way of implementing such an idea is to represent the signal as a sequence of its segments, which may overlap. After this, an already well-established method is applied to each of the segments. Along with this, an algorithm is used to estimate the segment's relative noise level. The final estimate is then given as the weighted average of the segment's estimates with the normalized relative noise levels used as the weight parameters. In order to estimate the noise level of the segment, the estimated autocorrelation matrix's spectral decomposition can be used. This approach can also be used to estimate the values of the linear prediction vector, which is essential for the Prony's method.

The method was tested on a sine signal with the normalized frequency being varied from 0.1 to 0.4 with a signal to noise ratio of 20 dB which is considered

significant. Each time the experiment was repeated 1000 times. As can be seen in Fig. 1, such method can improve the results of the estimation for a notable range of frequencies in comparison with the classic Moore-Penrose approach and the usual eigenvector approach.

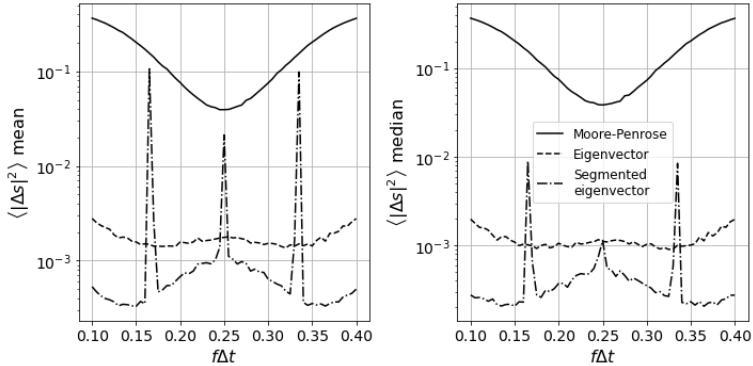


Fig. 1 – Plots of mean (left) and median (right) of the error power for each of the frequencies

The computational experiment has demonstrated that the method has merit if the places where the error spikes occur are taken into consideration. In most cases the proposed method shows better results than the eigenvector and Moore-Penrose method. For some normalized frequencies the precision is improved by almost and order of magnitude.

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ANALYSIS OF FOOD PREFERENCES OF THE X, Y, Z GENERATIONS

Nutrition is one of the key components of life, and food preferences are one of its biggest factors. Over time, not only do eating habits change, but also the food itself. People born in different periods of the last century are formed into generations. Generations are united by their lifestyle, attitude to technology, progress and have a clearly defined position towards themselves and society. As a result, generations X, Y and Z have different attitudes and eating habits. Today, there is a lack of information on a clear understanding of the impact of food preferences on the formation of diets of the world's main working population, but it is clear that nutrition is inextricably linked to the health and strengthening of labour reserves of many ethnic groups.

Generation X (people born between 1965 and 1980) were the first to transform their eating habits towards a healthier diet. Unlike the previous generation of baby boomers, Generation Xers are more likely to refuse fast food and prefer fruit and vegetable dishes. According to HealthFocus International [1], more than 50% of Generation X-ers are able to create healthy diets.

Generation Y (people born between 1981 and 1996) is the most conscious generation in choosing products and processing methods. They pay attention to the quality and origin of their food and prefer organic and farmed products. According to Euromonitor International [2], the majority of Generation Y seek to buy products with a "clean label" or "organic" product. We have noted an important detail that almost no one has paid attention to. Generation Y consumes more protein than others [3], which contributes to their muscle strength and healthy organs and organelles.

Generation Z (people born after 1997) is the most technologically advanced generation, which is reflected in their food preferences. According to Technomic [4], Generation Z prefers to order food online after carefully analysing reviews of the manufacturer or supplier, and they consume healthier snacks based on nuts and dried fruit. We believe that such healthy eating habits are related to this generation's

greater awareness of the principles of proper and healthy eating, achieved through the processing of accessible and useful information from online content.

Thus, we note that Generations X, Y and Z have different food preferences, but common features in the formation of their diets. For example, the awareness of all three generations of the health and environmental benefits of plant-based food has formed their tendency to increase consumption of plant-based food: fruits, vegetables, and herbs.

In addition, all these generations prefer products with a “clean label”, without the addition of artificial colours and preservatives. This indicates that all of these generations want to be healthy through healthy eating.

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S. Petrova, T. Leskevich, N. Kaliberda

STEAM-EDUCATION IS A PROMISING AREA FOR THE DEVELOPMENT OF ENGINEERING AND TECHNICAL SCIENCES

Our world is becoming faster, more intense, high-tech and non-standard every day. The new challenges of a dynamic world pose difficult tasks for education: learning should be more interesting than other hobbies, knowledge should be practical and meet modern requirements, learning should be in an interesting form and should have a logical conclusion with obtaining a good job. Over the past few years, many different teaching methods have been developed, among which STEAM-education is one of the most effective.

STEAM-education is a system of education that stimulates the acquisition of knowledge and skills in technological scientific fields. This education is aimed at supporting creativity and innovative skills. The concept of STEM encompasses Science, Technology, Engineering and Mathematics and refers to educational programmes and professions that integrate knowledge and skills in these fields. STEM often involves reinforcing technical disciplines with humanities. The logical step was an attempt to implement such an association, to add the creative aspect of personal development to the purely technical concept of STEM. This is how systems emerged where art is present alongside science, technology, engineering and mathematics – the STEAM methodology. STEAM promotes the development of important attributes and skills: comprehensive understanding of problems; creative thinking; engineering approach; critical thinking, understanding and application of the scientific method; understanding of the basics of design. STEAM makes it possible to attach meanings to numbers and facts, without which it is difficult for a person to perceive information of various levels of abstraction for a long time, be it mathematical formulas, physical or chemical.

The acronym STEM was coined in 2001 by researchers at the US National Science Foundation to describe a trend in educational and professional fields. In Ukraine, the concept of the development of STEM-education was approved by the decree of the Cabinet of Ministers of Ukraine in 2020. Why is STEM/STEAM-education so relevant? The transition to European-level innovative education involves training a new generation of specialists capable of modern social mobility and mastering advanced technologies. Under the current conditions in Ukraine, the following are in demand: IT specialists, programmers, engineers, high-tech professionals, bio- and nanotechnology specialists. The urgent problem of engineering and technical sciences is the need for comprehensive training of specialists in various educational fields of natural sciences, engineering, technology and programming, areas covered by STEM-education [2].

The introduction of STEM-education will change our country's economy, making it more innovative and competitive. According to some estimates, involving

only 1% of the population in STEM professions increases the country's GDP by \$50 billion. And the need for STEAM specialists is growing 2 times faster than in other professions, because STEAM develops abilities for research, analytical work, experimentation and critical thinking [3].

An urgent problem for Ukraine in the teaching of engineering and technical disciplines is the introduction of elements of STEAM-education. Now there are many questions that need to be solved as a priority: updating the regulatory and legal framework; creation of a network of regional STEAM-centers (laboratories); development of scientific and methodological support and special teaching aids, training of scientific and pedagogical workers capable of realizing the tasks of STEM-education. This approach to education requires the formation of research competence in students: the ability to make independent observations, investigations, experiments, which primarily involves the ability to observe facts and events, independently formulate a research problem, express hypotheses, determine methods of testing hypotheses, determine regularities, determine methods of confirmation or refutation of hypotheses, draw conclusions. The successful development of STEM-education is carried out through cooperation in the learning and teaching process between pedagogical teams and external participants, such as higher educational institutions, academic research institutions, research laboratories, science museums, nature centers, enterprises, business structures, public and other organizations.

From the experience of the best national and world educational practices in STEM-education, the following modern forms of work are proposed: work on joint projects in a team; creation of own projects; debate clubs; hackathons; webinars; trainings; presentations. Working with STEAM-projects helps to integrate knowledge of informatics, physics, biology, engineering and technical sciences with modern societal problems and allows you to independently find and propose the latest solution [1, p. 28-31].

Is the future in creativity? The new approach is not exclusive: it is not the prerogative of "technology", "mathematics", "science" and "engineering". STEAM can be found in every aspect of life. The methodology can be applied to

almost any engineering and technical discipline. STEAM is a tool that helps students take the first step towards understanding the complexity of the world and realising the multilevel connections between different aspects of life.

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A. Polyakov, N. Zamova, T. Vorova

DESIGN AND REUSE CYCLES

Environmental product design begins by eliminating environmentally troublesome materials. For instance, plated-metal parts are “designed out” to eliminate the potential hazards of plating, or the metal is coated in other ways. Paint and coating formulas now rarely use mercury fungicides or lead. Whenever possible, water-based paints eliminate the evaporation of organic solvents. The best way to handle hazardous waste is to have none. Design for disassembly (DFD) promotes remanufacturing and recycling. A well-publicized DFD automobile is BMW’s Z1 sportster. It uses pop-on, pop-off fasteners and thermoplastic parts, which can be recycled, in place of thermosets, which cannot. By contrast, the low recycle value of Japanese auto design and lower scrap-iron prices have recently driven Japanese “car cannibalizers” out of business [2].

BMW’s Z1 design extends the basic concept of Saturn. The cars’ underbodies have detachable plastic panels. A Saturn rammed by a pickup truck recently demonstrated an advantage of the design for repair. The body panels were removed, the underframe straightened, and the same panels remounted. Having a large number of parts obviously adds time to both assembly and disassembly. Well-

established methods of design for assembly that reduce part counts may also aid disassembly – if fasteners are removable. Complex fasteners are a pain. Screws take a lot of time to install: jam automated assembly equipment, then freeze when installed and refuse to peaceably disassemble. In addition, using a number of diverse materials creates problems in production. The more materials used, the harder to take them apart, and the more work to sort them [1].

Today's limits and trade-offs are challenges for the future. Now a high-density printed circuit board is not a DFD candidate, and tires may be recapped but not recycled. Modern tires are composites of different polymer compounds formulated for wear and performance in a given application. Composite frame parts increase strength-to-weight ratios, very important for lighter, more fuel-efficient cars – especially solar-powered ones. But composites designed to bind together for performance do not easily come apart for recycling. Much better to design items such as PC boards and tires for remanufacturing.

The marketing side of DFD presents an interesting opportunity. Initially, the concept may attract “green” buyers, but longer run, a return deposit on durables such as cars and computers would not have the same effect as with a soft-drink bottle. It does not even get the same response for an aluminum can. Instead, DFD represents another step in a manufacturing company becoming more like a service company. Combining DFD with modular design will let buyers periodically upgrade the purchase, much as they now buy newer versions of software.

DFD modular design presents possibilities for service by interchanging modules. In fact, if the original manufacturers do not compete with excellent service, one can easily imagine knock-off shops stealing it from them. That leads back to the environmental aspect of DFD: how to have social control of the dirt-to-dirt cycle of use. The basic concept is simple: do not sell product, sell a service process with products embedded in the service. Once customers sign on for service, they must return a product or module to get something else. If they want to sign on with a competitor, they return product. Provisions can be made for damage. The economics of this make no sense as long as materials, energy, and disposal are cheap. If these

are expensive, then enterprises that are superior at managing total recycling processes with customers will be able to beat the costs of competitors using throwaway methods. The system encourages maximum service competition with a minimum of Big Brother regulation. Real competition to improve the processes depends on open-system information.

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Y. Polyvanov, N. Kondratiuk, O. Hurko

HYDROGELS IN THE CHEMICAL, PHARMACEUTICAL AND FOOD INDUSTRIES

Hydrogels are a system consisting of a polymer and water. It should be noted, that polymers have a long chain, which certainly gives them properties to form gels when dispersed in water. Depending on the available number of hydroxyl groups (-OH), which are also included in the composition of carboxyl groups (-COOH), hydrophilicity increases significantly, turning polymers into hydrocolloids.

It follows from the above that hydrogels in food products are able to change the consistency. This statement affects a number of key rheological properties, for instance, fluidity (viscosity) and texture. It cannot be denied that modifying of the texture and/or viscosity of a food system changes its sensory properties. In addition, such hydrocolloids as polysaccharides and proteins belong to the category of permitted food additives in many countries of the world. Scientists emphasize that in order to achieve the desired consistency and taste hydrogels are used in such dishes as cream soups, pureed soups, sauces, salad dressings, pastas, fillings use. Besides, hydrogels are also used in such food products as jellies, galyaret, jams,

ice creams, confitures, jelly-like desserts, candies, decorative semi-finished products for confectionery.

Consequently, hydrocolloids in food systems have a wide range of functional properties: thickening, gelling, emulsifying, stabilizing and controlling the growth of ice and sugar crystals. It follows that the degree of thickening depends on the type and nature of hydrocolloids. Eventually some of them give a low viscosity at a fairly high concentration, although most of them give a high viscosity at a concentration below 1% [1].

To date, the positive aspect of the development of the most advanced therapeutic agents are the properties of natural polymers ensure the effectiveness of drug doses over a long period of time.

In addition, the advantage of developing the prescription composition of systems based on hydrogels also lies in the controlled rate of release of medicinal substances, which undoubtedly improves the process of drug delivery to target organs.

It follows that such delivery systems can be classified as reservoir and matrix. Admittedly, hydrogels are non-reactive polymer matrices that provide controlled delivery of active substances [2, p. 1016].

To sum up, hydrogels are often used for clinical purposes. In particular, regenerative medicine and tissue engineering, for diagnostics, immobilization of cells and tissues, optimization of biological adhesion. However, it is worth noting that hydrogels are more and more actively used in food, production of food dietary supplements, cosmetic products, nutricosmetics.

What is more, natural hydrogels are biocompatible in most observations, which is an important aspect for humans.

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DIGITALIZATION PROCESSES IN THE MODERN WORLD

Technological changes taking place in the modern world are driving the development and use of new types of transformations. At the initial stages of its formation, this phenomenon was perceived as a process of transition from analog to digital innovative technologies [1].

The challenges of time encourage the change of the industrial era into an era of innovative transformations. Modern digital technologies consist of various devices and servers, crypto-keys and passwords, which are becoming an integral part of the intellectual, economic or business everyday life of a modern person.

Initially, the use of digital IT technologies was considered as a certain additional opportunity to declare oneself in the online space, but over time it turned into a necessity [2]. The popularization of social networks has aroused a lot of interest among consumers, and today globalization is rapidly covering all new spheres of human activity. Today, it is becoming the norm to use gadgets for a whole range of IT services in education, legal, financial and many other areas [3].

It should be noted that modern IT tools can improve the quality of education, make it interactive and effective. The remoteness or absence of a teacher will encourage students to find new forms of acquiring knowledge, using the capabilities of modern Internet technologies and cyberspace [4, p. 22]. Mastering the digital space is improved by participating in various startups, constantly developing the skills acquired, which can be used in the future as a technical and technological digital software product.

Modern technologies will allow you to use non-standard approaches, various logical combinations, which will make it possible to be a competitively stable specialist in any field in the future. The achievements of modern science have been quite successfully tested in the field of electronic commerce, remote control of robots and remote sensing of the Earth and many others [5]. Feeling the need to meet the challenges of the times, the state pays due attention to this issue.

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M. Shevchenko, V. Makedon, O. Bovkunova

DEVELOPMENT OF A METHOD FOR CONSTRUCTION OF INFORMATIONAL FUNCTIONALLY ORIENTED MODELS OF AN ENTERPRISE

Automation of enterprise (organization) management is currently still a very important and urgent problem, since the intuition and personal experience of the manager is often not enough to make effective and timely efficient management decisions. Therefore, the modern approach to management involves not so much the investment of large funds for the purchase of expensive equipment as the creation and implementation of automated systems (AS) to support managerial decision-making. The creation of the AS has always been and still remains a complex systemic process, exacerbated by the following circumstances:

- a modern enterprise is a rather complex system of interacting elements (divisions);
- each enterprise is unique and typical design solutions require complex adaptation;
- the flows (information and material) connecting the subsystems of the enterprise, as well as the enterprise with the environment, are also unique.

That is why, when developing an AS, a thorough preliminary study of information flows is required. To do this, it is necessary to create an adequate information model of the enterprise. The process itself is not easy either.

Currently, there are sets of tools that facilitate the process of creating an information model, for example, CASE tools. With their help, you can significantly simplify the process of creating the actual model. However, the preliminary stages associated with the description of the subject area remain outside the competence of CASE tools and are performed informally at the verbal level. Meanwhile, the adequacy of the information model depends on the quality of their implementation. We emphasize that from the point of view of functioning, it is the information model (IM) that is essential, since it determines to a large extent the efficiency of the entire AS. For the IM itself, only the document flow (movement or traffic of documents) is essential, and only with a thorough study of this traffic is it possible to optimize it, i.e. organize it so that the documents arrive on time and do not form a queue. In other words, at the level of the entire AS, it would be possible to make timely management decisions. Of course, a lot also depends on the technical implementation of the AU, but this is only necessary, but not sufficient condition for the effective operation of the AU.

One of the varieties of IMS are the so-called corporate information systems (IS). Recently, great results have been achieved in the practice of creating such ISs. This became possible largely due to the fact that all the information that the corporation has is entered into a common integrated database and all departments of the corporation are related to this database in accordance with their competence. Common integrated database is a multi-application database. It is the extremely important, but not the only component of IS. Another important part of it is the communication network, which includes the usual channels of telephone, e-mail, etc. connections. That is, the communication network is gradually transformed into the so-called integrated service network. The information component, therefore, is present in any IMS, defining it as an information subsystem and significantly influencing the structure and effectiveness of the IMS. Thus, it makes sense to study and optimize ISs

separately. This can be done by building IS models. Following this strategy, one should always proceed from the fact in which subject area and to what extent information is adequately collected in the IS.

So, while studying IS, one should stress the indisputable fact that the information accumulated in it is a model of some area of the real world. The main requirement for any IS is to ensure the adequacy of this model. The main tools for increasing the efficiency of complex information systems are: operational analysis of the situation, drawing up an operational calendar work plan, modeling management processes. Modeling is understood as the replacement of one object (original) with another object, called a model, and the study of the properties of the original is carried out by examining the properties of the model. The need to use models arises when obtaining solutions on a real object is expensive, difficult or even impossible. The model simplifies, reduces the cost and speeds up the process of studying the original.

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M. Shevchenko, V. Makedon, O. Bovkunova

POSSIBILITIES OF RESEARCH OF INFORMATION CARRIERS WHILE UNAUTHORIZED ACCESS TO EDS KEYS

The main application of EDS keys was found in the financial sector – while working with trading platforms on the Internet and in systems of remote banking service (hereinafter referred to as RBS) – what gave rise to high interest in these keys from attackers. Crimes related to unauthorized access to systems RBS have

some features that affect the capabilities production of computer and computer-technical expertise and research media.

There are several stages of NSD, each of which leaves traces in the computer system:

1) Primary penetration. It is implemented through the implementation malware of the Downloader or Backdoor class on the computer, for example, through programs of the Exploit class.

2) Fixing their positions on the infected computer. Installation of specialized Trojan programs that copy keys EDS from a removable storage medium (USB disk or floppy disk), keyloggers to copy the password to access these keys (for the purpose of further money transfer from a computer intruder). In order not to lose control over the infected computer, modified package of utilities for remote administration (R-Admin, TeamViewer, WinVNC, etc.), can be installed additionally as well as daily updating versions of installed malware to avoid detection of old versions by antivirus programs. There are cases when Trojan programs are made in a single copy for each specific organization being hacked, which guarantees the absence of malware signatures in anti-virus databases.

3) Collection of information about the RBS system. Copying EDS keys, interception of entered passwords, making screenshots during work of the user with protected resources. As a rule, money transfer funds from a hacked account are not carried out on the first day after infection of a computer. Intruders are trained to work in a specific Internet banking system, they check account statements, study the features of payments being made.

4) Waiting for the receipt of money on the account. If the frequency of funds to the hacked banking account is fixed, then attackers will regularly check the status of the account, hoping for new transfers to the account.

5) Transfer of funds. It is implemented directly from infected computer using a USB-connected key or from the attacker's computer using copied access details.

6) "Sweeping" traces. After an unauthorized payment, the attackers must promptly either cash out the money, or transfer them to other accounts along

the chain, possibly splitting stolen money in smaller amounts. So that the account owner does not detect the loss and can not apply to the bank with a request to block money on the account, attackers try to block or make it difficult for the user to work with his account. For this special malware programs that interfere into the user's work is installed on the infected computer (blocking or slowing down the user's work), deleting some files of operating system or destroying the entire file system on computer disks completely.

An expert or a specialist must find such traces of UA on the hard drive of an infected computer: 1) date and time of the initial infection of the computer, source infection; 2) type, characteristics, settings of malware, used for unauthorized access, reports and logs of their work; 3) information that personalizes the author of malicious programs; 4) the actions carried out by the attacker in the system, and addresses from which the attacker performed the remote computer administration; 5) information on the preparation of payment orders (drafts).

So, it is important to stress that establishing the type of malware detected on the computer programs is an important stage of an expert research, since the expert must determine whether it was possible using detected malicious programs to carry out unauthorized access to the RBS system, or they are not related to this computer crime. Investigation of undetectable malware is possible with the use of debuggers or in a virtual machine environment. It should be noted that modern malware has the definite algorithms for detecting and counteracting debuggers and virtual machines in its arsenal.

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WAYS OF REDUCING CARCINOGENS IN SMOKED FOOD

Smoking is a technological process of processing raw materials of animal origin, which creates a unique taste and aroma of a food product. According to available information, between 40 and 60% of all meat processed in Ukraine is smoked. Such products have a long shelf life, as numerous smoke components have an antimicrobial effect and prevent oxidation. However, it is well known that some of the smoke substances can be harmful to health due to their potential mutagenic/carcinogenic properties.

Polycyclic aromatic hydrocarbons (PAHs) and heterocyclic amines (HCAs) are oncogenic substances. These compounds are formed during the processing of meat (beef, pork, poultry) and fish at temperatures above 150°C. HCAs are formed as a result of excessive heating of sugars and amino acids contained in raw meat and marinating mixtures. The source of surfactants is overheated fats. HCAs and surfactants accumulate on the surface of smoked products and constitute a hazard when consumed.

So, despite the great taste and aroma of smoked products, it should be remembered that they can be sources of mutagenic substances that can alter the consumer's DNA, exposing them to cancer. It should be noted that when ingested, HCA and surfactants are metabolised by enzymes, which makes them dangerous for the large intestine, mammary glands, liver, and prostate [1].

During the analytical research conducted by us, it became known that many ethnic traditions consist in the processing of meat and fish raw materials by means of smoking, roasting on an open fire (grilling). However, it is reliably known that the formation of HCA and surfactants can be prevented by proper preparation of products before heat treatment at high temperatures, namely, preliminary marinating of meat [2].

For instance, vitamin E, which is contained in oils (sunflower, corn, sesame, rapeseed, pumpkin), can prevent the formation of carcinogens. In addition, the antioxidant compounds in rosemary, turmeric [3], garlic, berries and fruit [2] can inhibit both the formation of HCAs and surfactants on the surface of foods and prevent their metabolism in the human body. It should be noted that there are effective technological methods to reduce carcinogenic compounds on the surface of meat and fish products. For example, reducing the processing time of products can be achieved through pre-marinating. Muscle fibres soften under the influence of organic acids contained in marinades during the marinating process, and thus products reach the state of cooking readiness faster or at lower temperatures.

Thus, taking into account that pre-marinating reduces the duration of heat treatment, and the marinade components, due to their high antioxidant effect, can reduce the amount of HCAs and surfactants both on the surface and in the human body, it can be said that with moderate consumption of properly prepared smoked products, it is possible to avoid the mutagenic effects of carcinogens and protect the consumer's body from cancer.

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ARTIFICIAL INTELLIGENCE – A FRIEND OR FOE FOR HUMANS?

Artificial Intelligence (AI) is the ability of machines to learn, think, perform actions and adapt to the real world, expanding human capabilities and automating energy costs or dangerous tasks. Some experts think that artificial intelligence has sufficient potential to radically change the life of the whole society [1]. But the question remains what will these changes bring as a result?

In 2010, scientists at the University of Michigan found that artificial intelligence can evolve. They created a virtual race of Avidians who have computer code instead of DNA, which is constantly being improved. Since artificial intelligence can function autonomously, American scientists are confident that it is dangerous and must be isolated.

Despite all precautions, a number of researchers believe that it is impossible to keep artificial intelligence in check. For example, Elizer Yudkovsky, a researcher at the American Institute of Singularity, did the experiment to create artificial intelligence. It showed that even human-level intelligence can deceive a person and «escape» from captivity [2].

Scientific researchers note that in the near future, artificial machines will improve themselves, and their rapid development will be impossible to stop. Technologies will be able to surpass humans. They will manage research, develop weapons, calculations in financial markets. Researches think that such processes will increase the number of unemployed, lose people's sense of their own uniqueness and cause irresponsibility. Therefore it can become even the end of the human race [3].

Many technology innovators (Stephen Hawking, Bill Gates, Ilon Musk) fear that people may lose control of superintelligent machines, and artificial intelligence will do more harm than benefits [4].

On the other hand, the safe study of space, the depths of the ocean or the earth's core are not suitable for people or for ordinary machines. Any experiments and tests with the help of AI will be much faster and cheaper than a person can do. Artificial intelligence can not only manage hundreds of factories around the world at the same time and without stopping, but also carry out a quality assessment. This will significantly reduce the cost of production. It will also be possible to arrange work on hazardous and dangerous objects, where a high mortality and trauma are likely [5].

Many people worry that nowadays artificial intelligence can not only replace a person in the workplace, which many people are experiencing, but also help humanity as a whole. Modern artificial intelligence is already able to detect diseases in the early stages preventing the development of epidemics.

In any case, so far the benefits of AI are much more than harm, and there is no reason to think that «robots have plotted something bad against a human». The main danger to a person is another person. And the benefit / harm of artificial intelligence will depend entirely on how people themselves dispose of new achievements of science and technology.

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CHALLENGES HUMANS HAVE FACED IN SPACE EXPLORATION

Cost of space exploration is so huge that it must be mentioned first in this list. Today it costs about \$10,000 to get a single pound of mass into low earth orbit. A significant part of this cost is related to the design and production of the launch system. Nearly 40% of the total mission cost is related to ground and launch processing. The full life cycle cost must be lowered by an order of magnitude to enable frequent human and robotic operations in space [1].

The space environment is unsuitable and difficult for habitation. Space is filled with dangerous cosmic rays and irregular solar storms that could cause intense radiation. Scientists predict that astronauts traveling to Mars will be exposed to radiation levels up to 20 percent more than they will ever receive during their lifetimes on Earth. This intense radiation could cause heart, lung, and eye problems as well as neurological disorders and even cancer [310].

The third is, quite simply, the distance. It is perhaps the most apparent hazard for humans because we do not live as long as space travel. Astronauts can give birth to children on a spacecraft, but it even sounds scary. For instance, Mars is on average 140 million miles from Earth. It takes about 250 days to reach there.

Create self-sustaining and reliable human environments and habitats that enable the permanent colonization of space and other planetary surfaces. Currently, the infrastructure and integrated technologies needed to support permanent, self-sufficient human settlements away from Earth do not exist. Effective closed loop systems do not exist to replenish consumable resources. This makes long-term stays cost-prohibitive and poses significant risk to personnel if resupply missions do not arrive on time [1].

People like dreaming of settling the planet Mars, but it is rather difficult to do so. Global dust storms occur every 5.5 Earth years (three Martian years) and could

last for months. Besides covering the solar panels, they could also block sunlight from reaching Mars, which could put the stations and astronauts at risk. Fortunately, dust storms on Mars are unlikely to cause serious physical damage to the stations. Despite their name, they are more like a breeze than a storm. A study by postgraduate students at the Massachusetts Institute of Technology (MIT) has shown that a human colony on Mars could die of starvation. The group based their research on a crewed mission planned by Mars One [2].

So, we have to solve many difficulties if we want to be in space. We must keep doing it, and we have to spend so many resources on it as we can. Our space power will help us to become the greatest civilization in history.

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Рецензенти:

Бобух Н. М., д-р філол. наук, проф., завідувачка кафедри української, іноземних мов та перекладу ВНЗ Укоопспілки «Полтавський університет економіки і торгівлі»;

Бірюкова Д. В., канд. філол. наук, доц., в.о. завідувача кафедри іноземної філології, перекладу та професійної мовної підготовки Університету митної справи та фінансів;

Кирпита Т. В., канд. філол. наук, доц. кафедри перекладу та іноземних мов Українського державного університету науки і технологій.

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