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ART STUDIES

IMPORTANT REPRESENTATIVES OF ALEXANDRAPOL ASHUGH CENTER

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ABSTRACT

The folk music of Alexandropol prepared a fertile ground for the development of professional music of the oral tradition, the sugah and sazandar arts. Ashughs were an integral part of the city's musical life. They were regular participants in family gatherings, parties, weddings and other celebrations. Zahri, Ghairati, Bave, Haves, Malul, Zulal-oghli, Shirin were among the most famous clans. Many of their songs were also played in cafes. Traditional competitions took place here, which sometimes turned into a unique performance. However, it happened that teams also competed under spontaneous circumstances.

Keywords: Alexandropol, urban culture, ashug, traditional music, ashugh Sheram.

Alexandropol in the 19th century is one of the important centers of Armenian urban culture. On the one hand, the absolute dominance of the multi-ethnic Armenian national face, on the other hand, the unique cultural manifestations of national minorities and their relationships gradually formed a new unique Armenian urban cultural life, which already in the 19th century. the latter was characterized by its stable and unique traditions. Gradually, a multi-genre system of song-music became stable in urban life, XX century. initially acquiring local musical stylistic features. All in all, Alexandropol has lived a full musical life. Here, all social classes had special musical and aesthetic requirements, which stimulated the development of this art. Folk song in its various genre manifestations was extremely popular in the city. Immigrants from Western Armenia, who were carriers of deep singing traditions, preserved this heritage in their daily life. In this same environment, heroic, national-patriotic songs took a special place. They were written down and published by scientist Al. Mkhitaryans and musician-teacher A. Brutyan.

Of course, the panorama of urban folk music also includes performances of neighboring peoples (Georgians, Turks, Persians, Arabs, Russians), as well as various works by authors, troupes, and composers. However, along with their performance-stylistic features, they bore a very specific local, Alexandrian stamp.

The folk music of Alexandropol prepared a fertile ground for the development of professional music of the oral tradition, the sugah and sazandar arts. Ashughs were an integral part of the city's musical life. They were regular participants in family gatherings, parties, weddings and other celebrations. Zahri, Ghairati, Bave, Haves, Malul, Zulal-oghli, Shirin were among the most famous clans. Many of their songs were also played in cafes. Traditional competitions took place here, which sometimes turned into a unique performance. However, it happened that teams also competed under spontaneous circumstances.

Traveling troupes also performed in the city. They were invited to private homes, where they were played romances and fairy tales accompanied by sazi, santoor, and bagpipes.

One of the famous cafes of Alexandropol was Hovhannes and Karapet Talyans. They were the sons of

Kyamali troupe who migrated from Kars and soon turned their cafe into a famous troupe concert venue. Gradually, well-known troupes Malul, Sazai, Jamali, Fizahi, Fahrat, Pyatare and others gather here. Soon they were joined by troupe Jivan, to whom about three dozen troupes were soon to choose a master craftsman (ustabashi) for themselves. The protocol testifying to that has been preserved to this day.

The hermitage of Alexandropol eventually grew into a unique school and fulfilled its historical mission. Ashughak singing had its own traditions. they forced the Armenians to write mainly in Turkish and Persian languages. In the cultural atmosphere of Alekpol, however, that tradition was transformed. Already in the 1850s, Ashugh Shirin composed Armenian songs here. [3]

The decisive move, however, was reserved for Jivanu. He urged all the groups to invent Armenian songs as well. Contemporaries testify that Jivanu was supported in that case by the famous Armenian writer Gh. Aghayan, who was teaching in the city in those years.

Apart from the linguistic component of the songs, Jivani gradually turned his attention to the composition of the melody. Traditional troupe tunes served as unique templates.

Most of the Aleksandarapol troupes enjoyed a great reputation in the Caucasus. It was also the reason that troupes popular among neighboring peoples came to the city, often not only for concerts and competitions, but also for long-term, interactive contacts.

The constant companions of the Ashughs were the groups of musicians, which were also called sazandars. These were professional bands with traditional orchestrations and a rich repertoire. Composer Nikoghayos Tigranyan, who was also one of the brilliant connoisseurs of the mentioned art, provides detailed information about the Sazan centuries of Alexandropol. The usual bands consisted of two zurnas and one dhol. In groups composed of saz, kamancha, santur and dahira, they also sang and played in unison. In groups composed of tar, chongur, tambourine, or dumbuk, only the solo singer sang, interrupting the tambourine gyaf.

Sazandars and zurnachis from Alexandropol were honored and desired participants in the festivities not

only of the local and neighboring villages, but also of many other cities of Armenia and beyond its borders. The famous Irish traveler and Armenologist Henry Lynch in 1893. In his notes about his trip to Armenia, he writes that the pleasant playing of sazandars from Alexandropol can be heard not only in their city, but also in Vagharshapat, Tiflis and elsewhere.

"A unique pastoral atmosphere was created in Alekpol with its traditions and customs and different directions. The youngest of the Alekpol troupe-singers and closest to us in time was the troupe-singer Grigor, Talyan, descended from an old musical family, Usta Gokor, who was very much loved by the people of Alekpol, later Sheram, a well-known and popular singer everywhere. Avetik Isahakyan".[2. p.3]

The musical life of Alexandropol in the 19th century. the second half was marked by the birth of Ashugh Sheram's work and his highly popular activities. Ashugh's songwriting innovation, based on Armenian national musical thinking, was exceptional. It is known that, having mastered the basic patterns of classical art of Asugha, Sheram fundamentally abandoned Asugha template-melodies during the period of self-establishment of his work and invented an original, unique melody for each of his poems. Moreover, the weighty role of the musical component is evident in his compositions.

According to G.Levonyan's apt definition, "It is difficult to approach the texts of Sheram's songs as mere verses separately, because they are, one might say, organically connected with their seasons. The author invented his songs together, putting the perch on the dosh." [5, p.14] He adapted the speech to the weather, many times ignoring the elementary rules of syllables and rhymes. In this sense, Sheram can be called a songwriter, whose unique melodies from the moment of their creation until today excite the listener with their highest expressive and artistic qualities.

Undoubtedly, the issue of the genealogy of Sheram's songwriting, his musical thinking and, in general, the full disclosure of the origins of his art can be the subject of a deep musicological study. We believe that one of the important findings of this multi-polar research is the importance of the benevolent atmosphere, which contributed to the unrestrained manifestation of the great band's unique talent, demanding new songs from him. As an important fact, let's mention 1880. Al. The songbook published by Mkhitaryants, which also included 22-year-old Grigor Talyan's song "Roses opened in the garden".

Grigor Talyan was born in 1857 in Aleksandropol, in the family of famous musicians who opened the Talyanneri cafe, famous for many troupe competitions in the city. This was the breakthrough period when an Armenian atmosphere was already formed in the city, mixed with the musical traditions of the local residents, Karsians, Carinthians, Mshetsi, Vanetsi.

An original sphere of the musical life of Alexandropol was folk singing. This art, with unlimited possibilities of expression, but developing within a specific genre system, formed a favorable arena for the musically gifted young man. From the beginning, he preferred playing the tar, which was later uniquely revealed as a significant melodic factor in Ashugh's songwriting. Thus, the tar was originally a unique medium

that would stimulate the great songwriter's creative endeavors, being uniquely stylized especially in the melodies of his heavy and melodious songs.

An inseparable part of the city life was the troupe, Sazandar song and music. Grigor Talyan, a young man, could not remain indifferent to the latter either, who already at the age of 18 started making chonkurs, then also tars. How much he was attached to his favorite musical instrument, his following memoir about those years speaks. "Once, my elders sent me to the forest with woodcutters, as if they were cutting woodcuts, to make woodcut boards, to take them to Gyumri to sell, or to sell them. I had a light bass, I took it with me to play there in my free time." [6, p.52]

The family tried to make the future student a poet, but it was during this period that his songwriting talent appeared, which immediately found his supporters. "All my friends used to gather at my place, I didn't do anything like that, I fell in love with music so much, I couldn't put my hands down day and night. It wasn't enough during the day, at night until 1, 2 o'clock, my mother would get angry with me, she would say, "boy, it's enough, get up, go to sleep", but I didn't listen to her, I would take off my clothes, get into my underwear. , I would take the perch on my chest and lay down, and even play with my fingers slowly." [4, p.25]

Thanks to his excellent knowledge of folk songs, Sheram managed to create samples that were stylistically consistent with them. Thus, perhaps his most famous song, "Roses Opened in the Garden", in a unique way condenses the typical structural and linguistic features of urban folk lyrical songs. The same can be said about "Cool Night", "Wandering Wandering" and other songs. In Armenian folk art, the skill and function of stylizing a folk song or inventing a song similar to a folk song has been accepted. Sheram's discovery and stylistic interpretation of the folk song goes hand in hand with mastering the performance features of the tar.

Sheram's first serious performance steps are connected with the famous sazandar Chongur Hako of Alekpolz. The latter enjoyed great popularity in the city and was an expected guest at all kinds of gatherings. It is here that the innate talent of the future great troupe was born, and already in these years he was well versed in the repertoire that was acceptable to all classes of the Alexandropol society. Already at the age of 25, he had performed in all clubs.

This was, of course, the period when the future Ashugh mastered the features of urban folk singing, Sazandar instrumental music genre system, melodiousness and intonation dictionary. According to the existing facts, Grigor Talyan's creative outburst began very soon, which was to become an inseparable part of the musical life of Alexandropol.

This was the period when the National Missionary School was founded in Alexandropol, where new traditions were formed through the efforts of Jivanu. The most important trend was exclusively the composition and performance of Armenian songs. Sheram was also an important participant in that process and tried to bring to a new level the unique artistic expressiveness of the Shoghani song.

Carefully reading the autobiographical episodes, we consider it possible to see Ashugh's constant desire to abandon melody-patterns and invent his own melodies as a unique musical way of thinking, which took

place in the musical environment of Alexandropol, under the direct influence of folk music. As the musicologists note, the meter and structure of the poem in Sheram's songs are derived from the composition of the melody, which again testifies to his constant striving to achieve the desired expressiveness with new melodic means. Moreover, feeding on the roots of folk intonation, Sheram brought to the musical environment of Alexandropol both simple and jangly and luxurious songs, passed through the prism of his creativity, reaching perfection.

The popularity of Grigor Talyan's songwriting in the 1890s seems to have been an established fact. However, in order for him to be considered a true master or professional, according to one of the important conditions of the samkar of the troupes, he had to fully master the classical repertoire of the professional musical art of the oral tradition, in particular the mughams. It was this condition that served as an incentive for him to continuously improve.

For this purpose, he even takes advantage of the opportunity to play in the famous Jumshud group from Karabakh and performs in Alexandropol, and with the members of that group, he experiences a long trial period to improve his playing technique. In the end, he passes a unique "exam" in the community and is awarded the title of ashugh.

Sheram was able to win the unconditional love of his fellow citizens, especially the youth, with his unique art. His songs were not only popular. Moreover, new inventions, new nuances and, of course, unique melodies were constantly expected from him, which would later complement the Armenian national musical treasury. The fact that Sheram quickly refused to season his poems with shoughi-style melodies seems to be again linked to the persistent demands and requests of the music-loving youth who sympathized with him. "Many of Sheram's songs, K. Durgaryan rightly noted, have entered the people's daily life and are preserved with all sanctity. The parties he hosted were perfect concerts, according to contemporaries." [1, p. 4]

Ashugh was kindly invited to weddings, where his songs were performed. According to Al.Mkhitaryants, the composer, due to Sheram's activities, performances of string ensembles have become traditional at Alexandropol weddings.

At the end of the 19th century, Sheram's songs were already performed by famous musicians and groups in the city, his art was of interest to professional musicians. Judging by Ashugh's memoirs, he was ready to continue his musical education and develop his performance skills to a new level, if living conditions and family circumstances were arranged differently.

Sheram's songs were performed and sung for various groups by Yefrem Gyadukyan, a well-known professional musician in Alexandropol, who had a musical education and worked closely with the band.

1902-1915 Five collections of Sheram's poems are published in Alexandropol. "The Lyre" (1902), "Gangati Chanter" (1905), "Love and Struggle" (1907), "Barren Garden" (1913), "Unbridled Rush" (1915). Among them, he called "Gangati Shanter" a collection

of revolutionary songs and published it under the name of the fake "Petrograd" publishing house. The common songs found in other collections were not given due attention in Soviet-Armenian musicology, were not recorded, and today most of them have been forgotten due to not being recorded in time. This regrettable omission in a full study of Sheram's creative legacy will certainly leave its mark.

Sheram's songs interested many famous poets and musicians of the time. His songs were recorded by Komitas, Al. Mkhitaryants, A. Brutyanyan, V. Talyan, D. Ghazaryan, A. Kocharyan, A. Tigranyan, Al. Spendaryan and other composers highly appreciated. They considered Sheram's Alexandropol handwriting and style to be particularly valuable, the unique features of his musical design-constructive, monodic thinking can best be revealed in their combination with the well-known samples of the urban musical art of Aleksandropol. which is the subject of a separate publication.

Ashugh Sheram's songwriting, which is still in demand in Armenian performing arts today and arouses great interest with its genetic purity, unique stylistic description, reflects the aesthetic realities of musical life in Alexandropol with its essential features. Directly stemming from the demands of urban musical life, at the same time, this art was directed and gained momentum in the urban environment, which today, more than a century later, still strives for this art and carries it as a standard of Armenian folk singing.

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CHEMICAL SCIENCES

ECOLOGICAL CONSEQUENCES OF CHEMICAL POLLUTION OF ECOSYSTEMS OF UKRAINE

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ABSTRACT

Any armed conflict always causes an ecological disaster, due to large emissions of chemical substances. Russian forces are attacking port infrastructure along the Black and Azov Sea coasts and ships at anchor, causing water pollution and the spread of toxic substances into the sea. Petroleum products have a negative effect on marine biocenoses, forming films on the surface of the water, which disrupts the exchange of energy, heat, moisture and gases between the sea and the atmosphere. In addition, they directly affect physico-chemical and hydrological conditions, cause the death of fish, seabirds and microorganisms. All oil components are toxic to marine organisms. Oil has another side property. Its hydrocarbons are able to dissolve a number of other pollutants, such as pesticides, heavy metals, which, together with oil, concentrate in the near-surface layer and poison it even more.

Soil contamination with fuel and lubricants and other petroleum products occurs as a result of the movement and damage of ground military equipment. In soils impregnated with fuel and lubricants, water permeability decreases, oxygen is displaced, and biochemical and microbiological processes are disrupted. As a result, the water and air regimes and the circulation of nutrients deteriorate, the root nutrition of plants is disturbed, their growth and development are inhibited, which causes death.

Keywords: chemical pollution, ecological damage, ecosystems.

Formulation of the problem. During explosions of military shells, a huge amount of dangerous substances are released into the environment - both for humans and for other living organisms nearby. Specialists of the non-governmental organization "Ekodia" explain that some munitions may use very toxic chemical compounds, such as white phosphorus, which emits poisonous gas and causes burns when burned, and poisons soil and water if it gets into the environment. Phosphorus is practically insoluble and can be stored for decades in salty seawater under conditions of oxygen deficiency. Many compounds developed as chemical warfare agents that are highly toxic to humans are also toxic to other vertebrates at high concentrations. They can affect some aquatic organisms, as well as accumulate and persist for years in the natural environment. The danger is not only explosions, but also ships that remain permanently at sea.

Analysis of recent research and publications. Both the Black Sea and the Sea of Azov have suffered from environmental degradation for decades, which was complicated by their geographical location. The Black Sea receives the waters of three of Europe's largest rivers, and its catchment area is about five times its surface area [1]. Due to the location of large industrial

and agricultural regions in the Black Sea basin, pollution problems were widespread. The great depth of the Black Sea and its shallow periphery lead to the fact that the water does not mix well, and below 100-150 m it is almost devoid of oxygen. The Sea of Azov, on the other hand, is extremely shallow, and it is dominated by the inflow of the Don and Kuban rivers. The nutrients they brought to the shallows once supported high fish stocks, but eutrophication, pollution and overfishing have led to the degradation of the sea's ecosystem [2-4].

The main effects of war on coastal and marine ecosystems include chemical and acoustic pollution, physical damage to natural habitats, and the decline of conservation activities. Military action also hinders environmental monitoring and management of the Black and Azov Seas. Damaged industrial facilities and settlements can be important sources of chemical pollution of the coastal and marine environment [5].

The factors of mortality of marine biota also include pathogens that can get into the sea as a bacteriological weapon, or accidentally due to damage to urban sewage or an agricultural complex. Scientists discovered this pollution mechanism even before the start of a full-scale war - the Russians deliberately, in a barbaric

way, polluted their own water areas and international waters, dumping sewage from agricultural farms in the Krasnodar Territory into the sea, which caused dolphins to get toxoplasmosis [6].

Spills from ships put protected wetlands at risk, and the widespread use of sea mines increases the risk to ships and the subsequent risks of releases to the environment if they collide with mines.

In 2017, American scientists from the Argonne laboratory invented the Oleo Sponge technology. Outwardly, the invention resembles ordinary sponges for washing dishes, but the human eye cannot see the most important thing: this technology works at the nano-level. Oxidized metal atoms with complex nanostructures penetrate the fibers of the sponge, giving it the ability to effectively combine with oil in water, separating these liquids. Sponges not only clean water from oil, they store raw materials. Collected oil can be used again in production after "squeezing" the sponge. And the sponge itself can be reused. Collected oil can be used again in production after "squeezing" the sponge. And the sponge itself can be reused. This technology, according to scientists, is safe for the environment unlike other methods: modern sorbent technologies absorb oil for a single use, and then the oil-saturated materials must be disposed of. But the Oleo Sponge method is environmentally friendly—it doesn't harm marine life, animals, or the environment in general—a key advantage over chemical dispersants or incineration methods used today [7-10].

In addition to water resources, soils are also polluted. The destruction of the upper fertile layer of the soil, which was formed over centuries, occurs as a result of explosions of rockets, artillery shells of various types, high-explosive aerial bombs, drones, shells of various types of MLRS, "vacuum" bombs, etc. This is despite the fact that over the past 100 years, domestic soils have lost about 30% of humus. War accelerates this process. Soils lose their fertility due to changes in their physical, chemical, and physicochemical properties. The explosion of a projectile of any type is the entry of a number of toxic compounds into the soil. According to the specialists of the NGO "Ekodiya", during the detonation of rockets and artillery shells, carbon monoxide, carbon dioxide, water vapor, nitrous oxide, nitrogen dioxide, formaldehyde, cyanic acid vapors, nitrogen, as well as a large amount of toxic organics are

formed. Soil scientists note a systematic 6-8 times excess of mercury, zinc and cadmium indicators [11-15].

The purpose of the work. The purpose of the work is a detailed coverage of the problems of chemical pollution of Ukrainian ecosystems as a result of the war.

Results. The explosions pose a serious threat to marine mammals, which are listed in the Red Book of Ukraine and protected by many international conventions. For example, all three species of dolphins that live in the Black Sea are listed in the Red Book, but dead individuals are increasingly found on the coast. Recently, inspectors of the National Park "Tuzlov Estuaries" found a dead dolphin with burnt skin - this happened due to the explosion of an underwater bomb. At the same time, dead dolphins are found not only on the Ukrainian coast. A particularly large number of dead and disoriented dolphins washed ashore was also recorded by scientists in Turkey and Bulgaria this year. Isolated cases were recorded in the northwestern part of the Black Sea, that is, in the Romanian and Ukrainian sectors of this part.

Reuters called the impact of a missile on the Moldovan-flagged tanker *Millennial Spirit*, which had been drifting in the Black Sea for more than four months, an "ecological disaster". The ship was transporting diesel fuel.

The damage from diesel fuel entering water is no less than from crude oil spills, although the consequences of both products are similar. The damage from an oil spill is very dangerous, because the oil covers the water layer with a thin film that blocks the access of oxygen to the water. As a result, algae do not receive enough light to produce oxygen, fish and fry die, which live and feed almost on the surface of the sea. Even a minimal oil spill has negative consequences for the environment. First of all, it is harmful to small organisms and plankton that float in the water column. It can also lead to the death of fish, harm oil spills and birds, which suffer by falling into "oil slicks". Oil tends to sink below the water level and form "clouds" of droplets below the surface. It is extremely difficult to collect such oil, and for its disposal sometimes environmentally dangerous methods are used, such as, for example, burning. However, in the conditions of the war, it is now impossible to do even this.

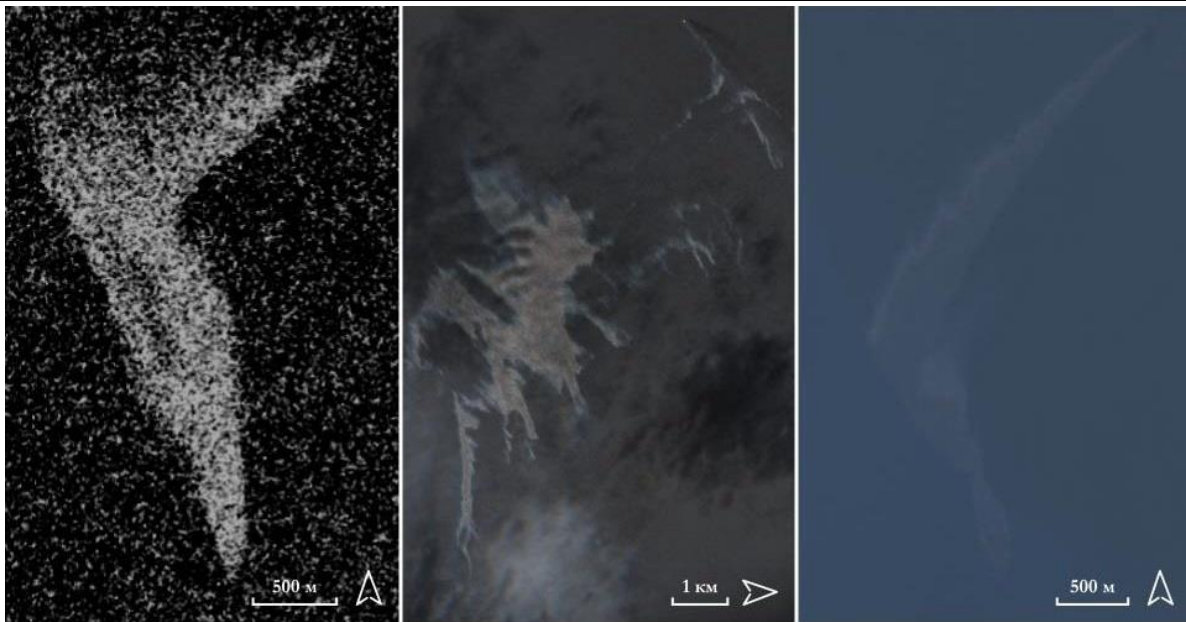


Fig.1. Oil spill in the Black Sea [16]

Fires on the coast

Another problem is that coastal ecosystems are being destroyed by fires that cannot be extinguished due to possible shelling - according to preliminary data, the fire has covered 130 hectares on the Kinburn Spit alone. Areas of forest ecosystems have been lost, rare species of animals and unique sand flora have been destroyed and damaged; birds listed in the Red Book have lost places suitable for nesting (Fig 2.).

The natural heritage of Ukrainians — national parks and natural biosphere reserves — also suffers

from the war. Currently, there is only one national natural park on the Black Sea and Azov coasts that is not occupied by the Russians - it is "Tuzlovsky lymani", the others - "Azov-Syvaskyi" park, "Dzharylgatskyi" and "Meotida" - are under occupation. These territories must be protected by the state - inspectors, park employees must go around the parks to record changes in the environment, fight poachers, etc., but due to the war, proper protection is impossible in the occupied territories, and in the non-occupied ones - it is weakened, because there is not enough staff

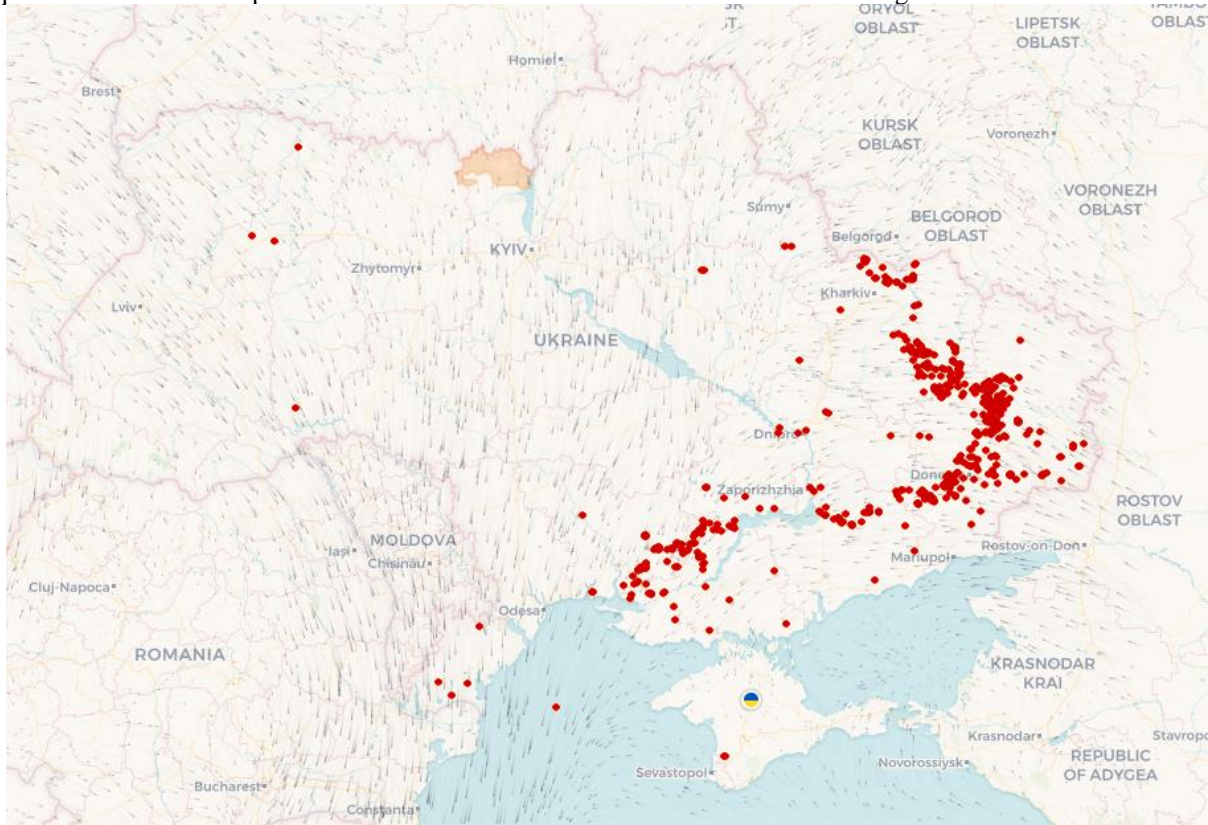


Fig.2. Centers of fires on the territory of Ukraine. (Source: SaveEcoBot fire map)

With the onset of spring, the fire-risk period begins and the risk of fires in ecosystems due to shelling increases. After the snow melts, last year's grass dries up, as a result of which it can quickly catch fire. In dry conditions, fires spread instantly and over large areas. In the territories occupied by Russian troops, the emergency services will not be able to work and eliminate fires. There are also favorable conditions for the spread of fires in monoculture pine plantations in the north and east of Ukraine.

In addition to forests, swamp ecosystems and peatlands are common in the north of the country, where active hostilities are taking place. Most of the peatlands of Ukraine are drained, and therefore there are favorable conditions for the occurrence of peat fires. Such fires are difficult to extinguish and, in normal times, therefore, the continuation of hostilities in the territory of the northern regions will have serious consequences for both the environment and people's health. During the burning of peatlands, such toxic substances as oxide and carbon dioxide, fine dust with a particle diameter of 2.5 microns (typical for burning), volatile organic compounds, which include acrolein and formaldehyde, are released into the air.

Consequences of fires at industrial facilities

Shelling of industrial facilities and infrastructure leads to fires, which cause additional pollution of air, soil and water. Combustion products that enter the air consist of toxic gases and solid particles. There will also be significant soil and water contamination at these sites. Where fire-fighting measures have been carried out, contamination may include residual fire-fighting foam.

Risks associated with damage to communications, enterprises, and other objects that pose an increased environmental hazard are of particular importance, because in the absence of control and opportunities to eliminate negative consequences, these phenomena potentially increase the scale of negative impact.

On February 27, 2022, the Russian military hit an oil depot in the Vasylykiv district of the Kyiv region with a ballistic missile. A fire broke out as a result of the missile strike. On the territory of the oil depot near the village of Kryachki, 10 tanks of 2000 m³ of gasoline and diesel fuel caught fire. Similar cases occurred in Okhtyrka, Luhansk, Chernihiv, Zhytomyr, Chernyakhiv. March 2022, in the village of Chayki near Kyiv, a projectile hit a warehouse with polyurethane foam, which caused a fire in the warehouse and in an office building adjacent to it. The combustion products of polyurethane foam cause poisoning of animals and people, and contribute to the appearance of acid rain. The danger of acid rain is that it causes burns to plants. This leads to a decrease in the biomass of agricultural crops, as well as to the weakening of wild plants and forest crops. Weakened forests can be quickly attacked by pests, which in turn contributes to the increase in the amount of dead wood in the forest and the spread of fires in ecosystems.

The vast majority of enemy shelling falls on peaceful territories, fields, settlements and industrial facilities. During the detonation of rockets and artillery

shells, surrounding soils, wood, turf are oxidized, and a number of chemical compounds are also formed:

- carbon monoxide
- brown gas
- nitrous oxide
- nitrogen dioxin
- formaldehyde
- a large amount of toxic organic matter.

During the explosion, all substances are completely oxidized, and the products of the chemical reaction are released into the atmosphere.

Every shelling, every explosion - the soil, water bodies, and air are contaminated with the remains of the combustion of fuel materials. These are not just explosives, but also fuel, detonators, so there is contamination with chemical compounds. First of all, heavy metals, lead. Lead compounds accumulate in the soil, in plants, and also in the human body and negatively affect mental development, the state of the bone system, and attention. Unfortunately, the lead compounds will continue to remain in the body, so we will have food contamination if we continue to try to grow in the fields where military action is taking place.

Chemical substances used in ammunition and explosives represent a long list of organic and inorganic substances, which can be divided into: potentially toxic elements (PTE), energetic compounds (EC) and chemical warfare agents (CWA). PTEs from war-affected areas are mainly Pb and its associated contaminants, including antimony, chromium, arsenic, mercury, nickel, zinc, and cadmium. Explosives contain a huge amount of Pb and Hg, in particular mercury (II) fulminate. Zn, Cu, Ni, Pb and Cr are used to coat bullets, missiles, gun barrels and military vehicles. Ba, Sb, and B are weapons charge compounds, and W is a kinetic bomb because of its high density (19.3 g/cm³).

The Dnipro River is also polluted, in particular because water supply and water purification systems have been destroyed in cities where active hostilities are taking place. Also, people are not only forced to take water from the natural sources they find, but, unfortunately, sewage discharges are not cleaned. In particular, discharges from sewage facilities in Vasylyvka have been flowing into the Dnipro for 9 months. This will also have a negative impact, in particular on the potential bacteriological pollution of the river. This, first of all, will concern the lower part of the Dnipro.

On March 14, there was a shelling of the water treatment facilities of the Vasylyvsk Water Supply and Drainage Works (the village of Verkhnya Krynytsia, Zaporizhzhia Region). As a result, the building of the sewage pumping station No. 1, which supplies wastewater from the city of Vasylyvka to the sewage treatment plant, was destroyed. Return water from the city now enters the Dnipro without any treatment. Untreated discharges contain a large amount of organic substances, helminth eggs, pathogenic bacteria, sulfates, chlorides. Such pollution could lead to large-scale water blooms in the Dnieper and Black Sea with the onset of warmer weather.

Marine ecosystems

A wide range of military activities on land and at sea threaten Ukraine's marine ecosystems, while vulnerable and ecologically sensitive coastal habitats are directly affected by hostilities. Further research will be needed to determine the true impact of war on the ecology of the Black and Azov Seas, estuaries and wetlands, however, as these waters have already experienced a number of stresses from human activities such as pollution, overfishing, alien species invasions and climate change. , the consequences of exposure can be significant.

Violation of natural habitats

War and occupation have resulted in or exacerbated damage and disruption to a range of coastal and marine habitats, many of which are vulnerable or highly sensitive. However, in most cases it is difficult to determine the exact impact on populations of specific species without field studies. The following examples illustrate the range of threats that war poses to coastal and marine habitats.

The construction of trenches and fortifications destroys vegetation and increases soil erosion, and garbage and military waste pollute the soil and groundwater. With the movement of the front line, the line of physical destruction of natural habitats also shifts, especially where they are subjected to intense shelling. An example of this is the ecologically sensitive wetlands along the Dnieper estuary in the south of Kherson Oblast, which were used for fortification by Russia after its withdrawal from Kherson. In Crimea, according to reports, important coastal biotopes have been turned into military training grounds. In addition to physical destruction, noise pollution has an impact on bird and mammal species.

The fighting also affected marine habitats. Zmiiny Island became the site of intense hostilities from February to July with the use of heavy explosive and incendiary weapons. Part of the island and the surrounding waters were declared a conservation area in 1998, its terrestrial biodiversity has certainly suffered serious damage, the impact on the marine ecosystem is more difficult to assess.

Conclusions. During the detonation of rockets and artillery shells, a number of chemical compounds are formed: carbon monoxide (CO), carbon dioxide (CO₂), water vapor (H₂O), brown gas (NO), nitrous oxide (N₂O), nitrogen dioxide (NO₂), formaldehyde (CH₂O), vapors of cyanic acid (HCN), nitrogen (N₂), as well as a large amount of toxic organic matter, the surrounding soils, wood, turf, structures are oxidized. From the first days, shelling and bombing of industrial and energy facilities, burning of forests, blowing up of oil depots, pollution of the Black and Azov Seas (primarily due to sinking of ships) were recorded. It will take a long time to restore the environment. If we talk about the restoration of forests to grow trees that are damaged, burned, then this is 30-20 years on average. Contamination of soils, for example by chemicals, as a result of explosions, conducting active hostilities, these are consequences for decades. The situation is similar to the restoration of marine ecosystems.

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**СИНТЕЗ S-БУТИЛКСАНТОГЕНАТОМЕТИЛДИАЛКИЛБОРАТОВ С ПОСЛЕДУЮЩИМ
ВЫЯВЛЕНИЕМ ЗАВИСИМОСТИ ИХ ПРОТИВОЗАДИРНОЙ ЭФФЕКТИВНОСТИ ОТ ДЛИНЫ
РАДИКАЛОВ, ВХОДЯЩИХ В БОРАТНЫЙ ФРАГМЕНТ**

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**SYNTHESIS OF S-BUTYLXANTHOGENATOMETHYLDIALKYLBORATES WITH THE
SUBSEQUENT DETECTION OF THE DEPENDENCE OF THEIR EXTREME PRESSURE
EFFICIENCY ON THE LENGTH OF RADICALS INCLUDED IN THE BORONATE FRAGMENT**

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АННОТАЦИЯ

Синтезированы новые S-бутилксантогенатометилдиалкилбораты, строение которых доказано определением их элементного состава, физико-химических свойств и ИК-спектроскопией. Изучение противозадирных свойств, синтезированных соединений, на четырехшариковой машине трения (ЧМТ-1) показало высокую противозадирную эффективность S-бутилксантогенатометилдиметил- и дибутилборатов. Выявлена зависимость противозадирных свойств боратов от длины радикалов, входящих в состав боратного фрагмента.

ABSTRACT

New S-butylxanthogenatomethylalkylborates were synthesized, the structure of which was proved by determining their elemental composition, physicochemical properties, and IR spectroscopy. The study of the extreme

pressure properties of the synthesized compounds on a four-ball friction machine (ChMT-1) showed a high extreme pressure efficiency of S-butylxanthogenatomethyl- and dibutylborates. The dependence of the extreme pressure properties of borates on the length of the radicals.

Ключевые слова: бораты, ксантогенаты, присадки, противозадирные свойства, смазочное масло
Keywords: borates, xanthates, additives, extreme pressure properties, lubricating oil.

Постановка проблемы

Производные тиоугольных кислот применяются во многих областях народного хозяйства, в частности они широко используются в качестве присадок к смазочным маслам.

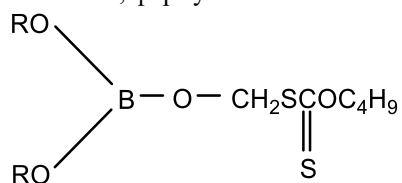
На современном этапе развития машиностроения большой спрос имеют трансмиссионные масла, наиболее дешевый в производстве класс трансмиссионных масел получается на основе перегонки нефтепродуктов, однако эти масла используются лишь при низких нагрузках и температурах. Трансмиссионные масла, используемые при высоких температурах и нагрузках создаются с добавлением пакетов присадок, одним из компонентов которых являются противозадирные присадки.

В основном противозадирные присадки представляют собой многосернистые соединения – ксантогенаты, тритиокарбонаты, сульфиды [1-5].

В настоящее время в республике Азербайджан используются в основном пакеты присадок с импортными противозадирными присадками, поэтому синтез и применение отечественных противозадирных присадок весьма актуален. Авторами настоящей работы синтезированы, новые борсодержащие ксантогенаты, которые могли бы быть весьма интересными продуктами в качестве противозадирных присадок, обладающих высокими противозадирными свойствами.

Борсодержащие соединения, представляют собой экологически чистые, беззольные присадки, которые не токсичны, отличаются высокой термической стабильностью и исключительной биостойкостью, они широко применяются в моторных, трансмиссионных маслах и смазках [6]. Так, известна высокоэффективная присадка представляющая собой борсодержащее алкилфенольное основание Манниха [7].

Авторами синтезированы новые борсодержащие ксантогенаты, формулы:



где R=CH₃; C₄H₉; C₇H₁₅; C₉H₁₉

Анализ последних исследований и публикаций

Литературный обзор статей и патентов показывает, что наиболее эффективными противозадир-

ными присадками являются серосодержащие соединения, однако не менее интересны как присадки к маслам и борсодержащие соединения.

Выделение нерешенных ранее частей общей проблемы

Многочисленные работы, посвященные синтезу новых органических соединений и исследованию их в качестве присадок к смазочным маслам показывают, что до настоящего времени не разработана стройная теория синтеза присадок, отвечающих определенным требованиям к смазочным маслам экологически чистых, отличающихся биостойкостью и термической стабильностью [8].

Цель статьи

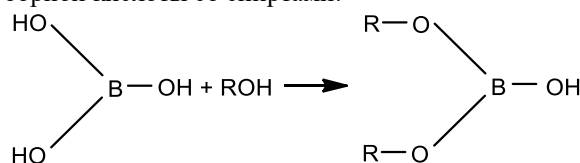
Целью настоящих исследований, является продолжение работ, в области синтеза новых соединений, содержащих в своем составе гетероатомы В и S, так как анализ работ в области синтеза присадок к смазочным маслам показывает что, они могли бы обладать высокими противозадирными свойствами, а также выявление влияния длины радикала в боратном фрагменте на противозадирные свойства.

Изложение основного материала

Продолжая исследования в области синтеза серо-бор содержащих соединений с целью увеличения ассортимента противозадирных присадок к смазочным маслам синтезированы борсодержащие ксантогенаты.

S-Бутоксиксантогенатометилдиалкилбораты были синтезированы с применением в качестве исходных реагентов диалкилборатов и гидроксиметилового эфира бутилксантогеновой кислоты.

Диалкилбораты получены взаимодействием борной кислоты со спиртами:



Где, R=CH₃; C₄H₉; C₇H₁₅; C₉H₁₉

Реакции проводили в колбе снабженной лопухой Дин-Старка при температуре 75-80°C в течение 7 часов.

Гидроксиметилловый эфир бутилксантогената получали взаимодействием бутилксантогената с формалином в кислой среде [9].

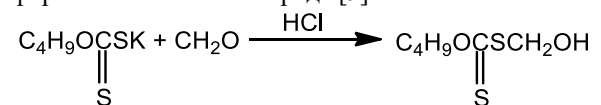
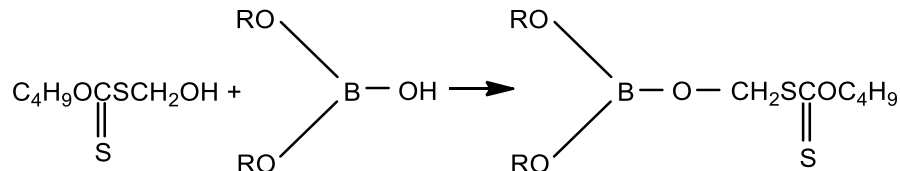
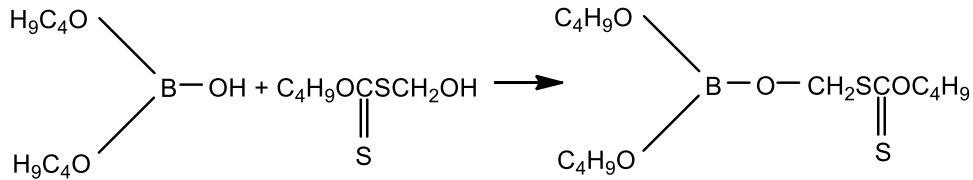


Схема реакции получения S-бутилксантогенатометилдиалкилборатов представлена ниже:



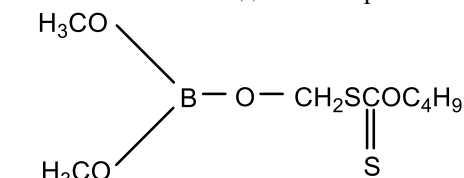
где R=CH₃; C₄H₉; C₇H₁₅; C₉H₁₉

Получение S-бутилксантогенатометилдибутилбората

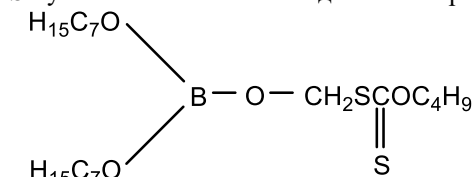


К 26,1г (0,15 моль) дибутилбората, добавляли 27г (0,15 моль) гидроксиметилбутилксантогената, 100 мл петролейного эфира и 2г толуолсульфокислоты в качестве катализатора. Реакционную смесь перемешивали при 50°C в течение 5 часов.

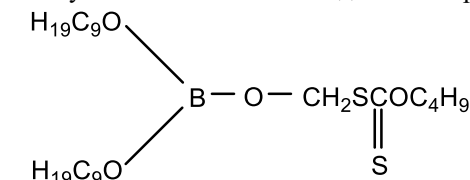
Аналогично получен S-бутилксантогенатометилдиметилборат:



S-бутилксантогенатометилдигептилборат:



и S-бутилксантогенатометилдинонилборат:



Состав и строение синтезированных соединений доказаны изучением их физико-химических

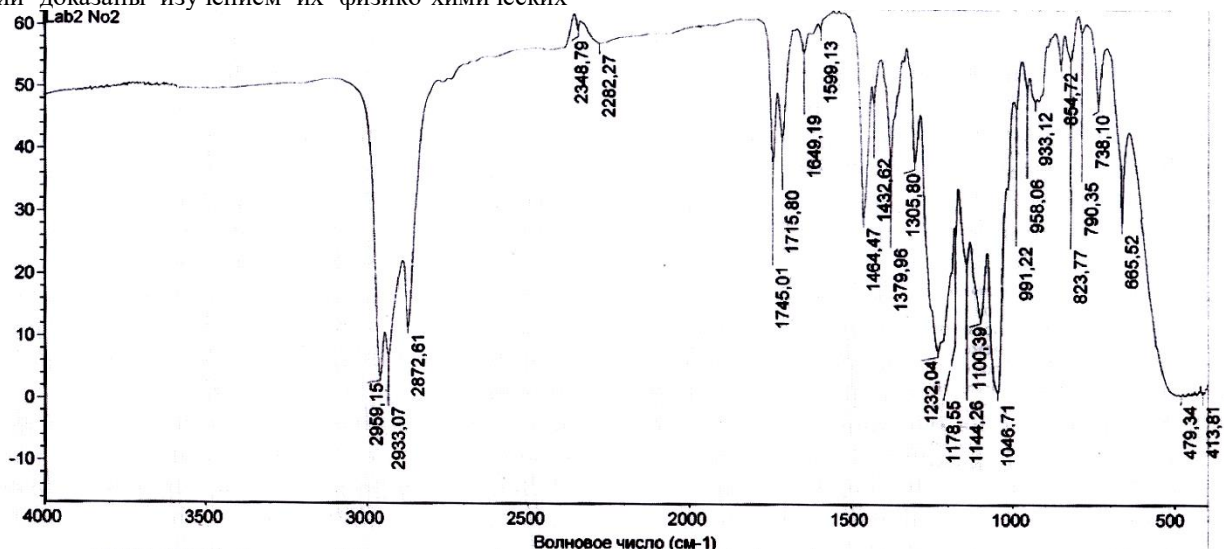


Рис. ИК-спектр S-бутилксантогенатометилдибутилбората

свойств, элементного анализа, а также ИК-спектроскопией.

Физико-химические показатели и элементный состав синтезированных соединений:

S-Бутилксантогенатометилдиметилборат:

n_D^{20} – 1.4990; d_4^{20} – 1.0335; MR_D найд. – 95.4; MR_D выч. – 94.6

C₁₄O₄S₂BH₂₉: Найдено, %: C – 49.85; S – 18.89; H – 8.74

Вычислено, %: C – 50.00; S – 19.07; H – 8.69

S-Бутилксантогенатометилдигептилборат:

n_D^{20} – 1.4348; d_4^{20} – 0.8860; MR_D найд. – 75.9; MR_D выч. – 76.0

C₂₀O₄S₂BH₄₁: Найдено, C – 57.29; S – 15.12; H – 9.65

Вычислено, %: C – 57.13; S – 15.25; H – 9.83

S-Бутилксантогенатометилдинонилборат:

n_D^{20} – 1.4450; d_4^{20} – 0.8882; MR_D найд. – 94.05; MR_D выч. – 94.3

C₂₄O₄S₂BH₄₉: Найдено, %: C – 60.28; S – 13.31; H – 10.27

Вычислено, %: C – 60.49; S – 13.46; H – 10.36

ИК-спектры сняты на ИК-спектрофотометре SPECORD-75 IR, фирмы Карл-Цейс (ГДР) с использованием призм KBr, NaCl и LiF в области 4000÷400см⁻¹.

В ИК спектре полоса поглощения связи ν_{C-S} находится в области 665 см⁻¹, а полосы поглощения валентных колебаний связей С-О и В-О наблюдаются между областями 1046 и 1232 см⁻¹. Полоса поглощения валентных колебаний связи ν_{CH_3C} находится в области 1379 см⁻¹.

Противозадирные свойства были исследованы на четырёхшариковой машине трения (ЧМТ-1) по ГОСТ 9490-75 на стальных шарах ШХ-15 диаметром 12,7 мм и скоростью вращения верхнего шара 1420 об/мин.

Оценочными показателями были индекс задира (I_z , Н), критическая нагрузка (P_k , Н), нагрузка сваривания (P_c , Н).

Синтезированные соединения исследовались в 5%-ной концентрации в авиационном масле МС-20, полученные результаты представлены в таблице, там приводятся также результаты испытаний, взятой для сравнения известной противозадирной присадки ЛЗ-23к, и базового авиационного масла МС-20.

Таблица

Соединения	Концентрация образцов в масле, %	Противозадирные свойства по ГОСТ 9490-75		
		Индекс задира, I_z , Н	Критическая нагрузка, P_k , Н	Нагрузка сваривания, P_c , Н
Масло МС-20	–	330	794	1568
S-Бутилксантогенатометилдиметилборат $\begin{array}{c} \text{H}_3\text{CO} \\ \diagdown \\ \text{B}-\text{O}-\text{CH}_2\text{SCOC}_4\text{H}_9 \\ \diagup \\ \text{H}_3\text{CO} \end{array}$	5	637	1120	3550
S-Бутилксантогенатометилдибутилборат $\begin{array}{c} \text{H}_9\text{C}_4\text{O} \\ \diagdown \\ \text{B}-\text{O}-\text{CH}_2\text{SCOC}_4\text{H}_9 \\ \diagup \\ \text{H}_9\text{C}_4\text{O} \end{array}$	5	568	1097	3479
S-Бутилксантогенатометилдигептилборат $\begin{array}{c} \text{H}_{15}\text{C}_7\text{O} \\ \diagdown \\ \text{B}-\text{O}-\text{CH}_2\text{SCOC}_4\text{H}_9 \\ \diagup \\ \text{H}_{15}\text{C}_7\text{O} \end{array}$	5	416	784	1960
S-Бутилксантогенатометилдинонилборат $\begin{array}{c} \text{H}_{19}\text{C}_9\text{O} \\ \diagdown \\ \text{B}-\text{O}-\text{CH}_2\text{SCOC}_4\text{H}_9 \\ \diagup \\ \text{H}_{19}\text{C}_9\text{O} \end{array}$	5	387	784	1960
$i\text{C}_3\text{H}_7\text{OCS} - \text{CH}_2 - \text{CH}_2 - \text{SCOC}_3\text{H}_7-i$ $\begin{array}{c} \text{S} \\ \parallel \\ \text{S} \end{array}$ Этиленбисдиизопропилксантогенат (ЛЗ-23к) (для сравнения)	5	519	1000	3550

Как следует из результатов испытания, синтезированные соединения по противозадирным свойствам значительно превосходят по всем показателям минеральное масло МС-20. S-Бутилксантогенатодиметил- и дибутилбораты превосходят по противозадирным свойствам также присадку ЛЗ-23к, взятую для сравнения, однако S-бутилксантогенатодигептил- и динонилбораты несколько уступают ей по данным свойствам. Механизм действия синтезированных соединений можно объяснить общепринятыми взглядами на механизм смазывающего действия ксантогенатов, в составе соединений имеется 1 полярная тиокарбонильная С(S) и 1 сульфидная серы, благодаря которым молекулы соединений легко адсорбируются, на поверхности металла, а затем под действием температуры на поверхности металла происходит процесс

хемосорбции в результате образуется защитный слой, состоящий из сульфидов металла, с другой стороны элемент бора находящийся в кристаллической и аморфной форме обладает большой твердостью, при определенной температуре его кристаллическая решетка разрушается и на металлической поверхности образуется твердый защитный слой. Из четырех синтезированных соединений наиболее высокими противозадирными свойствами обладают S-бутилксантогенатометилдиметил- и дибутилбораты, содержащие короткие радикалы в боратном фрагменте, что способствует более компактной адсорбции соединений на металлической поверхности, приводящей как известно к образованию более прочного защитного слоя.

Выводы и предложения

Синтезированы ранее не описанные в литературе S-бутилксантогенатометилдиалкилбораты, структура которых доказано изучением их элементного состава, физико-химических свойств и ИК спектроскопии.

Показана их высокая противозадирная эффективность.

Выявлена зависимость противозадирных свойств от длины радикалов, входящих в состав боратного фрагмента соединений.

Учитывая высокую противозадирную эффективность двух соединений – S-бутилксантогенатометилдиметил- и дибутылборатов их можно рекомендовать для создания трансмиссионных масел применяемых в коробках передач и других механизмах при высоких нагрузках и скоростях.

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CULTUROLOGY

BREAD AND MILK METAPHORS IN HEBREW AND ENGLISH

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ABSTRACT

The study's aim was to do identification, analysis, classification, and comparison of English and Hebrew metaphors with the words bread and milk (MBM) as important ingredients of people's nutrition from a conceptual perspective. In the background of the English bread metaphor investigation, the milk metaphor has not been studied in two languages. The pilot and limited study corpus consist of 54 MBM (34 English and 20 Hebrew) including various forms of figurative language. Three tables (full, partial equivalents, and ethnocultural metaphors in every language) presented the work results. The investigation of English and Hebrew bread metaphors confirms their meta-conceptual status. Between numerous symbolic meanings, the key bread meaning is urgent physical person's needs, food, and life. Bread is a dichotomy symbol of wealth, plenty vis hunger, poverty, and in a modern extension, it symbolizes providing for the family and making money. Checking the diverse sources of English and Hebrew MBM proves that Tanakh and the New Testament are the eldest and most important sources of equivalent and ethnocultural ones. These metaphors featured philosophical meaning, and a high level of symbolization and conceptualization, while the late metaphors characterized practical, pragmatical, or even cynic connotations. Hebrew milk metaphors are the concept of pleasure and enjoyment, while English ones demonstrated the negative connotations and inferior status of milk in opposition to bread. Because of meaning diversity, ethnocultural metaphors cannot be organized in microsystems.

Keywords: English, Hebrew, bread, milk, metaphors, figurative language, Tanakh, Bible, lingua culture.

Introduction Eating and drinking as vital needs and universal primal and basic activities (Gannon, 2002) according to Maslow's hierarchy of needs, are the English, and Hebrew figurative language sources. Food as an engine and source of metaphorical meanings that permeates our life (Newman, 1997; Korthals, 2008; Kay, 2016), reflects the material and spiritual culture in the language.

Our global world requires interacting with different cultures together (Arasaratnam, 2013:48). Since the 20th-century phraseology research concludes that idioms are effective instruments of communication consequently, must acquire metaphoric competence in second language learning and teaching as a part of grammatical, textual sociolinguistic competence (Littlemore & Low, 2006:268). This is a reason to analyze and compare MBM in English and Hebrew, unrelated and structurally distant languages, which are Israel's most popular modern languages.

Figurative language uses words in a way that deviates from their conventionally accepted definitions in order to convey a more complicated meaning or heightened effect (Figure of speech), to model the language world picture, and to build a communication algorithm and a metaphor is a figure of speech in which a word or phrase literally denoting one kind of object or idea is used in place of another to suggest a likeness or analogy between them (Definition of Metaphor).

The paper is made in the framework of conceptualization (Lakoff & Johnson, 1980: 1), Cultural Linguistics explores the relationship between a language and the nonlinguistic cultural behavior of the people who

speak that language (Ethnolinguistics), and the multilingual approach (Pirainen, 2012:62).

The Lakoff theory claimed that conceptual metaphor is a universal process of human thinking reflected in language structures and leads to the interaction of two cognitive structures or areas: the source domain and the target domain with complicated links between them and the essence of metaphor is understanding and experiencing one kind of thing in terms of another.

Differences in metaphors are the result of natural, geographical, social, economic, and cultural differences as well as thinking modes.

In recent decades, a large number of linguistic research focuses on food concepts and food metaphors in different languages.

An important contribution to the intensive development of food metaphors in European and non-European studies contributed works on English (Pinnavaia, 2010, 2018); Russian (Pomarolli, 2021); Mandarin and Shanghainese (Ye, 2010), Portuguese (Monteiro, 2011; Martins, 2015; Moore, 2017). In addition, there are studies comparing food metaphors in English with another language e.g. French, German, and Spanish (Pinnavaia, 2015); Romanian (Ionesco, 2017); Croatian (Majic, 2017); Spanish (Negro, 2019), and Hebrew (Kigel, 2022b, furthering).

Bread is the focus of special studies e.g., in Russian, English, and Italian (Yurina, et al, 2017); Portuguese, Spanish, and Chinese (Monteiro et al., 2018). The bread biblical symbolism in Russian and Italian languages is a theme of the special paper (Yurina & Pomarolli, 2017).

The conclusions of six languages research prove that bread is archetypal or meta symbol of life, food-stuff, means of subsistence, prosperity, and abundance, material wealth, the unity of labor, and its results in opposition to poverty, and misery. Bread metaphors remind us that humans require a combination of physical and spiritual needs for well-being.

Bread baked from flour and rich in carbohydrates, combined in one product animal and vegetable energy has been an important part of many cultures' diets, a basic food product that is common almost all over the world since the dawn of human civilization (Bread). It exists in every home (especially in the West, Africa, and Asia - typically rice), and plays an essential role in both religious rituals and secular culture.

Milk is a white liquid food produced by the mammary glands of mammals and is the primary source of nutrition for breastfed human infants) before they are able to digest solid food (Van Winckel, et al., 2011). The English bread metaphor has been the focus of scholarly attention, but the milk metaphor has not been studied either in connection with the bread metaphor or specifically. The purpose of the study is to compare the metaphors of bread and milk in English and Hebrew as important ingredients in human nutrition from a conceptual point of view and to fill a gap in the research on milk metaphors in English and Hebrew.

The results should be relevant for comparative and contrastive linguistics, psycholinguistics, lexicology, cognitive linguistics, ethnolinguistics, and intercultural communication theory. In practice, the results and conclusions of the work can be useful in compiling new and reissuing existing explanatory and phraseological English-Hebrew dictionaries, paremiological and phraseological corpora, in textbooks, and can also be used in teaching English as a foreign language, L2 classes, interpretation, human and automatic translation.

Materials and Methods

The study's aim is to compare English and Hebrew bread and milk metaphors as the important ingredients of people's nutrition from a conceptual perspective.

The study corpus comprises 117 metaphors (74 English and 43 Hebrew) with the words *bread and milk*.

The figurative metaphors corpus is a pilot and as complete as the possible version that comprises idioms, set expressions, phraseological units, and paremiological units as proverbs, maxims, and sayings collected from electronic explanatory and phraseological dictionaries, token searches on the Internet.

Below is the applied procedure: definition of words, the gathering of metaphors in the above sources; listing the bread and milk metaphors of each language, and the equivalents emphasizing making comparing. Partial equivalents were noted and ethnocultural metaphors were analyzed separately for each language. The systematic results were presented in five tables upbuild on the classification principles of English and Hebrew metaphors with an edible plant (Kigel, 2022).

Then the national-cultural comments and conceptual metaphors were formulated.

3. Results

The study results are presented in Table 1 and Table 2. The study corpus is 54 metaphors (34 English and 20 Hebrew) with the words bread and milk. This is a pilot version that comprises idioms, set expressions, phraseological units, and paremiological units as proverbs, maxims, and sayings collected from electronic explanatory and phraseological dictionaries, and token searches on the Internet.

Below is the investigation procedure: definition of words, gathering of metaphors in the above sources, and classifying the bread and milk metaphors of each language. The full and partial equivalents were noted and ethnocultural metaphors were analyzed separately for each language and the systematic results were presented in three tables upbuild on the classification principles of English and Hebrew metaphors with an edible plant (Kigel, 2022b). Then the national-cultural comments and conceptual metaphors were formulated.

3. Results

The study results are presented in Table 1 and Table 2a and 2b.

Discussion

English and Hebrew Equivalents of Bread and Milk Metaphors

In total, the corpus consists of 54 metaphors -34 English and 20 Hebrew metaphors and besides the total number of English metaphors is more than Hebrew ones. In English, the number of bread metaphors is twice as much as milk ones (23 bread and 11 milk); in Hebrew their number is almost equal (11 bread and 9 milk), indicating the value of these products in the nutrition and language.

12 English and Hebrew metaphors are full or partial equivalents. A variety of metaphors sources are Roman satire, a French saying, and Greek myth (**Milky Way Galaxy**) but the main one is the Tanakh or Hebrew Bible (Carr, 2011), the canonical collection of ancient religious Hebrew writings by the Israelites, the main sacred book of Judaism, written in Hebrew and partially in Aramaic that was compiled in 450 BCE (Tov, 2008).

According to Pinnavaia (2010; 71-72), bread, the most idiomatically productive *le* and *me*, represents survival, livelihood, and has been the archetypal symbol of food since the beginnings of Western literature, and especially since the translations of the Bible into European languages

The investigation of English and Hebrew bread metaphors confirms the symbolic meaning of bread as an expression of the most urgent physical person's needs (bread and water- the most minimal meal, לחם צר *lohem tsar* (narrow bread and pressed water). Both physical and spiritual needs are vital for the human being (man does not live by bread alone, bread and circuses). Bread, as a metaphor, becomes a vehicle of transition from grain to spiritual life (Ledwon, 2017) that concord with other language studies spoken above.

Table 1.

English and Hebrew Equivalents of Bread and Milk Metaphors

Hebrew	English
לחם צר ומים לחץ ישעיהו ל כ Narrow bread and pressed water A meager diet that is barely enough to sustain life	<i>bread and water</i> the most minimal meal
לא על הלחם לבדו יהיה אדם פסוק ג, דברים ח	<i>Man does not live by bread alone</i> people have spiritual as well as physical needs
לחם ושעשועים	<i>Bread and circuses</i> gaining public approval through superficial means such as diversion and distraction to hide fundamental flaws in society Jubanellis, a Roman poet and satirist 1st century BC
שלה לחמך על פני המים כי ברב הימים תמצאנו קהלת, פרק י"א	<i>Cast one's bread upon the waters</i> good behavior will be rewarded
בית לחם The Bread House פסוק י"ט, פרק ל"ה, ספר בראשית פסוק ז, פרק מ"ח	<i>Bethlehem</i> A city on Mount Hebron in the Judean Mountains, about 10 km south of Jerusalem
אם אין לחם תאכלו עוגות	<i>Let them eat cake</i> disregard or cynical attitude to the starving people Marie Antoinette phrase, the last Queen of France before the French revolution
ארץ זבת חלב ודבש במדבר, י"ג, כ"ז	<i>land of milk and honey</i> Land of Israel The modern extension: prosperity and abundance
שביל החלב	<i>The Milky Way</i> the galaxy that includes our Solar System
לא חלב, לא בשר No meat, no milk (without a clear character)	<i>Milk toast</i> a meek, submissive, or timid person
בכה על חלב שנשפך	<i>No use crying over spilled milk</i> (complain or regret something that has already happened if you can't change it)
למה לקנות פרה כשהחלב חינם	<i>Why buy a cow when (the) milk is free?</i>
לחם תמיד נופל על הצד המרוח בחמאה	<i>Bread always falls on the buttered side</i> things have a tendency to go completely wrong

The name of the city of לחם, Bethlehem (The Bread House in literal translation) needs special commentary. Bethlehem is a city south of Jerusalem, on the border of the Judean Desert, mentioned in the Book of Ruth that is read in synagogue on the Shavuot holiday which describes how Naomi from the Elimelech family and her daughter-in-law Ruth turned on widowed and destitute. Naomi decides to return to Bethlehem and her daughter-in-law Ruth goes with her, and they live as widows in Bethlehem. Eventually, Ruth becomes the great-grandmother of King David the greatest king in the history of Israel who moved the capital of Israel to Jerusalem (מגילת רות). This city is also mentioned in the New Testament and the Church of the Nativity located now in Bethlehem was built on the hill which in Christian beliefs is the birthplace of Jesus. The Old Testament (the first division of the Christian biblical canon, based primarily upon the Tanakh, or Hebrew Bible - Bandstra, 2004), together with the New Testament (collection of Christian texts originally written in the Koine Greek language and discusses Jesus, and early Christianity - Jones, 2000) is a Christian Bible, considered holy scripture by Christians.

The well-known and widespread metaphor a land flowing with milk and honey (land of milk and honey), ארץ זבת חלב ודבש is a Tanakh metaphorical name of the Land of Israel, the Promised Land, in which the Almighty promised to lead the Jewish people, with a hyperbolic description of its richness, abundance, and fertility (Cohen).

About two years after the Israelites left Egypt and wandered in the wilderness, Moses prepared to enter the land of Canaan and sent a leader from each tribe to inspect this land. After forty days, spies returned to the Israelites in the desert, and eight men carried a very large grape bunch on a pole. "And they said: We have come to the land to which you sent us and it flowing with milk and honey." The modern extension of this metaphor means abundance, prosperity, and serenity, and has even a humoristic connotation: unattainable carefree life.

The idioms לא חלב, לא בשר (without a clear character) and *milk toast* (a meek, submissive, or timid) are personal characteristics and partial semantic equivalents in meaning, lexica, and syntax.

Hebrew and English Ethnocultural Bread and Milk Metaphors

Ethnocultural metaphors result from different living environments, material, and spiritual cultures, thinking modes, and the values of the culture itself (Gannon, 2002: 3).

המוציא לחם מן הארץ (the one who brings bread out of the land) is a blessing that religious Jewish tell until eating (Ben Ami, 2015). Generally, this complicated global metaphor consisted of some small metaphors is an expression of deep gratitude for the food for a living, which makes it possible to function, it is a recognition that food, the human body, and the land are given by the hands of the creator and under his care. Brings bread is a metaphor for the Creator, bread is a symbol of food, and bread out of the land is a symbol of the complicated bread production process that begins from wheat cultivation and depends on nature (Creator).

לחם העוני (the bread of poverty, *matzah*) is unleavened bread eaten on the days of the Passover holiday.

Since the Israelites left Egypt in a big hurry, the bread dough did not have time to rise and they ate matzah, processed from only two ingredients - flour and water. Matzah eating for seven days is a symbolic reminder of the exodus from Egyptian slavery and the transition to a free life.

The Tanakh proverb עובד אדמתו ישבע לחם (works his land will be fed bread) is the conceptual metaphor for the results of human efforts: to enjoy the fruits of his work is promised to the farmer who cared for his field, seedlings, plantings, watering. Hebrew bread conception is in line with these ones in other languages (Monteiro et al., 2018; Yurina & Pomaroli, 2017).

Milk metaphors in Hebrew are connected to pleasure, enjoyment (ארץ זבת חלב ודבשה, land of milk and honey), and also with youngness, inexperience (יש לו חלב על השפתים, he has milk on his lips; טיפת חלב, a drop of milk, child, the mother, and the family consultation).

Table 2a.

Hebrew Ethnocultural Bread and Milk Metaphors

	המוציא לחם מן הארץ תהלים
<i>The one who brings bread out of the land</i> One of the most important and famous blessings is exempt from other blessings, but its obligation cannot be canceled by another blessing.	
<i>Works his land will be fed bread</i> Guaranteed the fruits of the man invested his efforts, the means to advance any cause	עובד אדמתו ישבע לחם משלי יב, פסוק יא
<i>Poor bread</i> A matzah pastry eaten on Seder night, Judaism	לחם העוני דברים טז, ג
<i>The outside bread</i> A total of twelve challahs made of semolina were placed in two sets on the table.	לחם הפנים פרשת תרומה שבספר שמות
Basic livelihood, sufficient for a person's living; an essential permanent thing	לחם חוק השולחן ערוך / כבוד מלך
A person who utters good, pleasant things, it's fun to hear them.	דבש וחלב תחת לשונו שיר השירים ד יא
<i>Milk slot</i> Cheese block	חריץ חלב
<i>He has milk on his lips</i> Youngness, inexperience	יש לו חלב על השפתים
<i>A milk drop</i> a network of medical consultation points for the health of the child, the mother and the family	טיפת חלב

English Ethnocultural Bread and Milk Metaphors

In two languages, exist the connection of bread as a symbol of food and life - human existence - the Creator. While the blessing (המוציא לחם מן הארץ) the one that brings the bread) is the gratitude of the eater to the Creator, in Christian prayer, Jesus himself begs from Lord "Give us this day our daily bread" (Matthew 6:11; Luke 11:3).

This important English bread metaphor and a number of others (*holy bread; bread and wine; I have broken the staff of your bread*) are connected to the Christian Bible. Holy bread, sacramental bread, and communion bread are metaphors of Jesus's body and blood used in the Eucharist Christian ritual that is linked to the Last Supper (Eucharist) when Jesus

blessed bread, broke it, and said to the disciples "Take, eat; this is My body" (Matthew 26:17-29). The metaphor to break the staff of your bread, to break bread is a symbol of welcome, of openness, a gesture signifying peace (Leviticus 26:70) and its modern nonreligious expansion - have a meal, eat, friendliness and informality.

In many English metaphors bread is a concept of living, wellness, and money (*breadwinner; bring home bread and butter, heavy bread*) and the absence of bread means poverty (below the breadline, take the bread out from people's mouths).

We found the source domain and the target domains:

bread - hospitality (*a bread-and-butter letter*);

bread - advantages, benefits(*to have bread buttered on both sides; know on which side your bread is buttered; bread always falls on the buttered side* (pes-simistic connotation); the best thing since sliced bread).

An unexpected source of the idiom *breadcrumb navigation* or a list of items used as navigation aids on a computer interface is a German fairy tale about Hansel and Gretel, in which the eponymous characters came back home on a trail of breadcrumbs.

Shakespeare's expression of 16th century *milk of human kindness* (kindness, compassion) is the only

milk metaphor with meliorative connotation and the rest are exceptionally negative:

milk - not practical (*it's no good/use crying over spilled milk; milk the bull / the pigeon/ the ram /a duck, milk dry*).

milk - uncomfortable (*be like a fly in milk*);

milk - tasteless, contentless (*milk and water*);

milk – dishonest (*to bring home the milk*), its an antonym to bring home bread and butter that has a positive connotation.

Table 2b.

English Ethnocultural Bread and Milk Metaphors

<i>daily bread</i> the petition Lord's Prayer from "Give us this day our daily bread" (Matthew 6:11) or "Give us day by day our daily bread" (Luke 11:3) The modern extension: living, food, and money.
<i>holy bread</i> sacramental bread, communion bread, and sacramental wine is used in the Eucharist Christian ritual to represent Jesus's body and blood
<i>to break bread</i> In the Last Supper Jesus said to the disciples "Take, eat; this is My body" after the blessing and breaking some bread (Matthew 26:17–29).
The modern extension: have a meal, eat, friendliness and informality
<i>to break the staff of your bread</i> to destroy the staff or the support which bread is to man (Leviticus 26:70)
<i>below the breadline</i> the poverty line
<i>breadwinner</i> main earner in a family
<i>bread and butter</i> main income, livelihood
<i>take the bread out from people's mouth</i> to deprive someone of money, wealth
<i>have bread buttered on both sides</i> to receive two separate benefits or advantages
<i>know on which side your bread is buttered</i> to understand what is to your benefit
<i>bread basket</i> an agricultural area where wheat etc. is grown
<i>bread money</i> , slang
<i>heavy bread</i> lot of money, slang
<i>the best thing since sliced bread</i> very good, useful how great something
<i>a bread-and-butter letter</i> a short, hand-written communication to thank someone who has recently provided the writer with hospitality, usually dinner or an overnight visit
<i>breadcrumb trail</i> a list of items used as navigation aids on a computer interface)
<i>milk of human kindness</i> compassion, empathy
<i>bring home the milk</i> disrespect on oneself
<i>milk and water</i> tasteless, faceless, contentless, foodless, inexpressive symbolizes dilution (weak, sentimental suggestions or ideas something valuable, possessing, low quality
<i>milk the bull / the pigeon/ the ram /a duck</i> to do something pointless or futile, old-fashioned
<i>milk dry</i> to try to get as much as possible from a person, thing, or situation
<i>be like a fly in milk</i> uncomfortable feeling

Conclusion

The investigation of English and Hebrew bread metaphors confirms its value as a meta-conceptual metaphor because of its numerous symbolic meanings while the key meaning of bread is - the most urgent physical person's needs as food for life. Bread is a dichotomy symbol of wealth, plenty that is opposite to hunger, poverty and in a modern extension, bread symbolizes a person that provides for the family, and made money.

The sources of English and Hebrew Bread and Milk metaphors are diverse (Rome satire, Greek Mythology, French phrase, German fairytale) but Tanakh and the New Testament are the eldest and most important sources of equivalent and ethnocultural ones. While Tanakh and Biblical Metaphors featured philosophical meaning, and a high level of symbolization and conceptualization, the late metaphors characterized practical, pragmatical, or even cynic connotations. We

found the Hebrew metaphor *המוציא לחם מן הארץ* (*The one who brings bread out of the land*) which is a complex number of metaphors and in such a way it express complicated universal meaning and two English metaphors featured antonym connection(*to bring home bread and butter - to bring home milk*).

This limited study found a range of equivalent and non-equivalent figurative meanings across the two languages. Hebrew milk metaphors are the concept of pleasure and enjoyment, especially when combined with honey, while English ones featured negative connotations and the inferior status of milk in opposition to bread.

Ethnocultural figurative language did not paint a picture of freely forming networks of meanings in any of the languages that cannot be organized in microsystems as already did with color idioms in two languages (Kigel, 2022).

Future directions are investigating cake and honey as English and Hebrew food metaphors, general attitudes to food and drink, and bread and milk metaphors in more languages.

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ENGLISH AND HEBREW METAPHORS WITH EDIBLE PLANT NAMES

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Abstract

The aim of the work is to study English and Jewish figurative language with the names of edible plants and culinary motivation from an interlingual and intercultural perspective. For the first time, we offer a systematic lexicographic description of this layer of Food metaphors, including the identification, analysis, and classification. The result of the corpus of 119 metaphors systematization (75 English and 44 Hebrew, are English and Hebrew tables with names of edible plants, biblical and widespread, full, partial equivalents, and ethnocultural metaphors. In quantitative terms English metaphors predominate over Hebrew ones, the English list of plant names is more extensive, although there are exclusive plants both in the English and Hebrew list. This study focuses on conceptual metaphors, linguacultural comments, lexical and semantic characteristics, similarities, and differences in English and Hebrew figurative language.

Keywords: food metaphor, conceptual metaphor, edible plants, figurative language, English, Hebrew, cross-linguistic perspective.

1. Introduction Metaphors with Edible Plants1. Introduction

Food is a universal human need and Food metaphors (a poetically or rhetorically ambitious use of words, a figurative, as opposed to literal use, Metaphor) are very productive in modern discourses because they are "a mirror of a linguistic community's historical, social, political, and cultural story"(Pinnavaia, 2015: 455). The names of botanical crops as highly productive edible plants such as trees, shrubs, and herbs, are semantic models of figurative language (Pamies, et al, 2015). Due to the fact that individuals and societies denote their ethnic, national, social, class, gender, and linguistic identity through food figurative language(Metaphor, FOOD A) metaphors are very important for multicultural communication as a symbolic, interpretive, transactional, contextual process, in which people from different cultures create shared meanings. (Lustig & Koester, 2007:46). Metaphoric Competence is acquired in second language learning and teaching as a part of

grammatical, textual sociolinguistic competence (Littlemore& Low, 2006:268).

The theoretical base of this work is Lakoff's theory concern the conceptual metaphor as a universal process of human thinking reflected in language structures and leads to the interaction of two cognitive structures or areas: the source domain and the target domain with complicated links between them (Lakoff, 1980)- and the ideas on the metaphor cultural dependence and the multilingual approach (Dobrovolsky& Pirainen, 2005; Piirainen, 2012:62).

In recent decades, a large number of linguistic research focuses on phraseology or figurative language (a set of set expressions), and, in particular, Food concepts and metaphors in different languages. An important contribution to food metaphors studies contributed books and studies on food Metaphors in English(Pinnavaia, 2018), Portuguese (Monteiro, 2011), Spanish (Pamies, 2011, 2014); and Russian (Pomarolli, 2021).

Intensive developing contrastive studies of English and European and non-European languages include research, i.e. Portuguese, Spanish and Chinese (Monteiro et al., 2018); French, German, and Spanish (Pinnavaia, 2015); Romanian (Ionesco, 2017); Croatian (Majic, 2017); Spanish (Negro, 2019); Russian, Italian (Yurina, et al, 2017); numerous languages (Pamies, 2015); Russian, German (Babaeva et al., 2020).

Thereby, the English food concept is described and presented at different levels but not find the study of Hebrew food metaphors like research of English and Hebrew metaphors with an edible plant (furthermore - MEP), and this study, aims to fill this gap.

Materials and Methods

The study corpus is 116 metaphors (74 English and 42 Hebrew) with the names of edible plants namely fruits, nuts, vegetables, starch, bulbous plants, herbs, and spices that can be used as food, raw or processed, parts or all. Cereals, mushrooms, and oil plants do not appear in this list because they require special deep study. A figurative metaphors corpus comprises idioms, set expressions, phraseological units, and paremiological units as proverbs, maxims, and sayings collected from electronic explanatory and phraseological dictionaries, token search on the Internet, Hebrew newspapers (Yediot Ahronot) and radio programs (Reshet B). This large sample is a pilot version that does not claim to be complete.

Below is the applicated procedure: definition of figurative language, gathering of metaphors in the above sources; listing the edible plant names of each language, and comparing the equivalents. The Jewish Bible (Old Testament) has been defined as the main source of ancient equivalents, late equivalents were divided into full and partial without diachrony and source research, and ethnocultural metaphors were analyzed separately for each language. The systematics results were presented in five tables upbuild on the color idioms classification principles (Kigel, 2022), namely, object and human characteristics, and finally human activity. Then the national-cultural comments and formulated conceptual metaphors were added.

The study contributes to further linguistic research in comparative, and contrastive linguistics, psycholinguistics, lexicographic, and lexicological lexicology, lexicography, language theory, cognitive linguistics, and ethnolinguistics. The research materials can be used in textbooks, for the compilation of educational and educational dictionaries, paremiological and phraseological corpora of each language, and parallel corpora of two languages. In practice, the English and Hebrew lexicology data are applicable for intercultural communication, L2 classes, interpretation, human, and automatic translation.

3. Results and Discussion

3.1 The names of edible plants

The list of English names includes fruits and nuts (apple, grape, fig, olive, lemon, banana, cherry, pear,

plum, oranges, melon); Berries (raspberries, strawberries); Vegetable (tomato, cucumber, cabbage); Legumes (lentils, beans, peas); Starch plants (potato, sweet potato, corn, turnip); Bulbous plants (onions, garlic); Spices and spices (carrots, peppers, parsnips, mustard). The list of names in Hebrew includes fruits (apple, grape, cherry, fig, lemon, banana, melon, olive etrog, pomegranate), vegetables (cabbage, tomato, reddish); Starch plants (potato, sweet potato); Bulbous plants (onions, garlic); Herbs and spices (carrots, peppers).

The unique plant names usually reflect the flora of the commune's country of residence. In the English list, among fruits exist berries, pear, plum, pineapple, orange, melon, strawberry, and raspberry appear, and among vegetables and other plants - beans, peas, celery, white root, parsley, cucumber, corn, turnip, parsnip and mustard, which are lacunar for Hebrew. Lacunar's names for English are etrog, pomegranate, and radish.

The English names represent native plants of English-speaking countries and former British colonies and consist of 31 names, while Hebrew names present plants cultivated in Israel with 21 names.

The following historical excursus tries to explain English metaphors' big quantitative prevalence in Hebrew ones.

English and Hebrew are geographically distant, genetically unrelated languages, and the developmental history of the two languages is very different. English is a West Germanic language of the Indo-European language family, and its earliest forms date back to the 5th century. As a result of consistent development, English has become the global lingua franca. It is estimated that about 1,750,000 people used English as their mother tongue, second language, or foreign language, it is the most important language in newspaper and book publishing, telecommunications, scientific publishing, international trade, mass entertainment, and diplomacy (Crystal, 1997). The modern status of the English language is a consequence of the colonial policy of the British Empire in the 19th and first half of the 20th century, as well as the global influence of the United States in the 20th and 21st centuries. Currently, English-speaking centers are located in England, America, Canada, Australia, and New Zealand (**English language**).

Hebrew, one of the oldest languages in the world, belongs to the Canaanite group of languages, and the earliest examples of a written Paleo-Hebrew language date back to the 10th century BC. After the destruction of the Second Temple in Jerusalem in 70 AD Jews scattered throughout the world. Having been the language of liturgy and literature for almost two millennia, but did not develop as a spoken language. As a result of the revival of Hebrew in the early 19th century, it became the spoken and written language, the main official language of the State of Israel. In 2013, about 9 million people in Israel, the United States, and other countries spoke Hebrew. countries (**Hebrew**). The English linguistic tradition also contributes to situations with more English metaphors than Hebrew ones.

Table 1.

Names of Edible Plants in English and Hebrew Metaphors

English	Hebrew
Fruit and Nuts apple, grape, fig, olive, lemon, banana, cherry, <i>pear, plum, oranges, melon</i>	תפוח, ענבים, תאנה, זית, לימון, בננה, דובדבן, תמר, שקד, אחרוג, לימון Apple, grapes, fig, olive, lemon, banana, cherry, date, almond, etrog, pomegranate
Berries <i>raspberry, strawberry</i>	-
Vegetable tomato, cabbage, <i>cucumber</i> Legumes lentils, <i>beans, peas</i>	עדשים, כרוב, עגבניה, צנון cabbage, tomato, lentils, reddish
Starch plants potatoes, sweet potatoes, <i>corn, turnip</i>	תפוחי אדמה, בטטה potatoes, sweet potatoes
bulbous plants onion, garlic, <i>leek</i>	בצל, שום onion, garlic
Herbs and spices carrots, <i>pepper, parsnip, mustard</i>	גזר, פלפל carrot, pepper

* italicized names are unique to this list

3.3 Biblical Metaphor Equivalents

The cultural and moral contribution of the Hebrew Bible (other names - Tanakh, Old Testament) to society and culture is generally recognized (Wiederkehr-Pollack, 2019) and, it is a source of borrowings in many languages including English (Van Hecke, 2020). Biblical Metaphors need lingua-cultural comments to explain the source and their use in modern discourse.

In the Bible story on Eden God commanded Adam and Eve to eat from every tree in the garden, but not from the "tree of the knowledge of good and evil". However, Eve, seduced by the serpent, ate the forbidden fruit and shared it with Adam. Having fallen into sin, the first men came aware of their "nudity" and make clothes from fig leaves. The metaphor *tree of the knowledge of good and evil and forbidden fruit* did not point out specific botanical kinds as the idiom fig leaf. Our analysis is consistent with the explanation that the generic name as a tree, fruit, flower, etc. are more conducive to conceptual metaphor, and potentially, more universal and the image of an apple in Bible illustrations appeared in the painters' imagination (Pamies, 2014, 100).

The metaphors *forbidden fruit, olive branch, and lentil stew* have modern extensions of the meaning that are evidenced that in the Jewish Bible described typical, universal, and time-lasting characters and situations. So, nowadays *forbidden fruit* is an illegal or immoral pleasure; *fig leaf* - covering a derogatory thing; *lentil stew (pottage)* is short-sighted wrong decisions because of an acute material need, an *olive branch* is a symbol of peace, and harmony and is drawn on the Emblem of Israel. These examples are evidence of semantic secularization when the metaphors lost their religious meaning and got updated meaning (Yadin &

Zuckermann, 2010:84) wherein Biblical expressions in Hebrew are a part of both religious and colloquial discourse.

The hypothesis that in English Biblical expressions are most often used in religious discourse while in Hebrew they are a part of both religious and colloquial discourse needs to be studied.

A number of English and Hebrew MEPs are widespread idioms with the source from Greek and French (myth, of Aesop and LaFontaine fabulous) e.g. the apple of discord, sour grapes, pull someone's chestnuts out of the fire) that prove the involvement of two languages in the world process of mutual language borrowing.

All the Biblical and Widespread Equivalent MEPs can be analyzed as conceptual metaphors according to the source domain and the target domain and it is evidence of their generalizing ability potential.

Conceptual Metaphors(the source domain vs target domain)

Tree with fruits > knowledge *The tree of knowledge of good and evil*

Fruit > results as A. Pamies figured out (Pamies et al., 2015) *He ate the fruit of his deeds*

Fruit > reproduction *the fruit of the belly*

Fruit > physical good vs spiritual ones *pottage, pull someone's chestnuts out of the fire*

Fruit > peace and agreement *olive branch*

Fruit > trouble, an uncomfortable situation difficult issue *forbidden fruit, sour fruits, an apple of discord*

All Biblical Metaphors, to our dismay, refer to fruits and not to vegetables or other kinds of plants, except lentils.

Table 2.

English and Hebrew Biblical and Widespread Equivalents with Edible Plant Names	
Biblical Metaphor	Meaning
עץ הדעת טוב ורע בראשית בי The tree of knowledge of good and evil	The tree of the knowledge of good and evil God forbade mankind to eat fruit from this tree in Eden
פרי אסור בראשית ג Forbidden fruit	A fruit not to be eaten to the command of God The modern extension - illegal or immoral indulgence, pleasure
פרי הבטן בראשית ל, פסוק ב the fruit of the belly	Embryo, woman's fertility
עלה תאנה בראשית ג, פסוק ז Fig leaf	The first people who had sinned realized theirs I was naked and covered myself with a fig leaf at the sight of God The modern extension - covering a derogatory thing
יונה עם עלה של זית בראשית פרק ח פסוק יא An olive branch	an offer or gesture of conciliation or goodwill The modern extension - a proposal of peace and agreement
אכל פרי מעלליו ישעיהו ג, י He ate the fruit of his deeds	A person bears the consequences of his actions The modern extension – the cause and consequence
תבשיל עדשים פרשת תולדות, פרק כ"ה, ספר בראשית For lentil stew	to sell, give up something for a petty temptation, at the cost of an insignificant profit The modern extension - short-sighted wrong decisions because of an acute material need
Nonbiblical Widespread Equivalents	
תפוח מחלוקת Greek Mythology Apple of discord	the core, or crux of an argument, or a small matter that could lead to a bigger dispute
פרי חמוץ Aesop's fable The Fox and the Grapes Sour fruits	an ungracious reaction after a loss or failure.
להוציא את הערמונים מהאש J. de la Fontaine Pull someone's chestnuts out of the fire	to do another person's difficult or dangerous work

3.2. English and Hebrew Equivalent Metaphors with Edible Plant names

English and Hebrew full equivalents with the same meaning and lexical-semantic structure in the source and target language e.g. hot potato, the apple never falls far from the tree, hard nut - are a few. However partial equivalents featured the similarity of content accompanied by variability in form (syntactic, semantic, or pragmatic aspects, inconsistencies between textual norms and linguistic forms) are widely represented. In these two languages and many of them are internationalism which means they are widespread in many languages and not only in English and Hebrew (Pirainen, 2012). The equivalents in different languages arose due to the similarity of the psychophysical experience of people living on Earth.

In recent decades, the main source language of borrowing is English as the leading language of cultural, social, technological, business, trade, education, and tourism in other areas (Crystal, 1997). A diachronic study of the mutual influence of English and Hebrew can be the task of a separate interesting work.

The most productive change in partial equivalents is the change of plant name: e.g. English-Hebrew pairs: the *cake* changed to *whipped cream* in the metaphor (*cherry on the cake/cherry on the cake with whipped cream*), turnip to cabbage or sweet potato; bean, potato, nut to garlic shell (not worth a *nutshell/garlic glove*).

In the full equivalent *When life gives you lemons, make lemonade* Hebrew and English meaning is similar but lemon in English is a symbol of everything bad, and in Hebrew lemon (*lemon adds a lot*) also has a positive connotation as a local fruit, which in the early 19th century was one of Israel's most exported goods.

The partial MEPs meaning have a few differences e.g. English expression *squeezed lemon/orange* is associated with extracting benefit from an object or situation, and in Hebrew, it is clearly associated with a human factor - namely, with a lack of human energy and, in addition, in Hebrew, there is no as synonym as orange.

As a consequence, the English idiom *spice of life* used the generalized name *spice* while in the Hebrew parallel is mentioned as a lemon. However, the partial equivalents of *Banana Republic/רפובליקת בננות/Republicat Banannot* create a rhyme because the Hebrew word for banana is plural.

Our analysis concurs with the conclusion that the source of one metaphorical model can use both fruits and vegetables, fruit can be a source domain and also the target domain (Pamies, 2014), and the same plant can have both positive and negative connotations and, in general, fruits feature more positive connotations and vegetables more negative ones (Pinavaia, 2018).

Table 3.

English and Hebrew Equivalent Metaphors with Edible Plant Names	
Full Equivalents	
Metaphor and Meaning	Hebrew
Banana Republic corruptive country	רפובליקת בננות
When life gives you lemons, make lemonade turning negative events into something positive, making the most of negative situations	כשהחיים נותנים לך לימונים, תכין לימונד
fruitful a tree, plant, or land, producing much fruit, products; fertile	פורה פרי עטור <i>The modern extension – the work result</i>
hot potato a controversial or difficult issue	תפוח אדמה לוהט
the apple never falls far from the tree (Offspring grow up to be like their parents in behavior or physical characteristics)	התפוח לעולם לא נופל רחוק מהעץ
hard, tough nut to crack difficult to understand or persuade tough nut to crack (a challenging problem)	אגוז קשה
Pepper energy, vitality Peppery: Hot-tempered	פלפל מפולפל
If life gives you a lemon, make lemonade (make the best of a difficult situation)	<i>If life gives you a lemon, make lemonade</i>
Partial Equivalents	
The cherry on the cake (the best and most enjoyable part)	הדובדבן שבקצפת <i>cherry on whipped cream</i>
the spice of life (makes life interesting, exciting, enjoyable)	לימון מוסיף המון <i>Lemon adds a lot</i> <i>A small addition greatly improves the thing or situation, advertising slogan</i>
in a nutshell (brief)	כקליפת השום
Fruitable producing good results; beneficial; profitable	פורה
not worth a hill of beans (worthless) small potatoes (insignificant)	שווה לקליפת שום <i>Not worth a garlic clove</i>
A stick and a carrot reward and punishment	מקל וגזר
squeezed lemon/ orange To make use of everything someone or something has to offer)	לימון סחוט <i>Lack of energy after reaching, exhausted from hard work</i>
A rotten apple, bad apple, one bad (or rotten) apple spoils the whole bunch, barrel a bad reputation, a negative person	תפוח אחד רקוב בערימה
No more brains than a turnip (foolish)	ראש, בטטה ראש כרוב

Ethnocultural Metaphors Ethnocultural Metaphors contain unique national and cultural information, and their semantics express unique environment, material, and spiritual cultures as customs, religion, philosophies, and other factors. The national differences are reflected in the English MEPs with beans, mustard, parsnip, and Hebrew MEPs as citron, and almond.

English Ethnocultural MEPs presented in this study belong to the group of Human external and internal personal characteristics, Human activity, and a big capacity Miscellaneous group will be the object of the special study.

Conceptual Metaphors(the source domain vs target domain)

Fruit> appearance - *as red as a cherry; a carrot top.*

Fruit> cognitive practice - *apples and oranges(comparison); from soup to nuts(order).*

Fruit>excellent - *bad an apple of the eye; the cherry on the cake; apple pie, a peach, real plum vs lemon.*

Fruit>effort and its results - *fruits of labor; to bear Fruit; cut the mustard; he that would eat the kernel must crack the nut.* This theme already presented deathly and with many examples in numerous languages(Pamies et al., 2015).

Fruit> an opportunity - *bite at the cherry; have a second bite of the cherry.*

Fruit> unexpected - *to upset the apple cart; how do you like them apples.*

Fruit> unreasonable behavior - *go bananas; nutty as a fruitcake.*

Fruit, Vegetable > negative characteristics - *rotten to the core; not the clean potato; worm in the apple.*

Vegetable > energy or lack of it - *full of beans; look as parsnips, veg out.*

The MEPs lexical-semantic characteristics

MEPs of *external similarity* (*peach fuzz*), and process similarity (*peel the onion*, low-hanging fruit) have an opaque motivation and MEP *go bananas*, *to drive bananas* have unclear motivation.

We found MEPs featured the antonymy (*cherry-lemon*; *squeezed lemon/ orange*), synonymy (*squeeze the lemon/orange*), variations (*not care/give/worth an onion a fig*).

In terms of parts of speech, except the derivation nutty (adjective) all plant name are nouns and in terms of stylistics, most MEPs present the literal lingual layer(The tree of knowledge of good and evil), neutral

style(apples and oranges), colloquial discourse (full of beans) and slang(go nuts).

Scholars noted that fruits have more positive connotations when vegetable has more negative ones (**Pinavaia, 2015**) and our corpus supports this thesis(apple pie, real plum vs hot potato, veg out). The added note is that the same plant can have both positive and negative connotations (an apple in my eye vs a bad apple; be nuts about vs go nuts) and in the same metaphorical model use the name both fruits and vegetables e.g. negative characteristics (worm in the apple, not a clean potato potato); appearance(smooth and pale skin with light pink cheeks, a carrot top).

Table 4.

English Ethnocultural Metaphors

Human characteristics
Appearance as red as a cherry (ruddy, blood with milk) peaches and cream (smooth and pale skin with light pink cheeks) peach fuzz (small amount of hair growth) a carrot top (a red-haired) smart as a new-scraped carrot(overdress) like two peas in a pod(almost identical in appearance)
Energy-Lack of Energy full of beans (full of energy and life) look as parsnips(sour and bad-tempered) veg out (to spend time idly or passively) to become a vegetable(physically disabled)
Negative characteristics rotten to the core (thoroughly bad, worthless) not (quite) the clean potato (suspicious personality) worm in the apple)(something very bad in the best)
Human activity Cognitive practice Comparing apples and oranges (to uselessly compare unlike things) Apples for apples(comparison between related and similar things) Method From soup to nuts (from the beginning to the end) cut the mustard (come up to scratch, expectations, required standard; succeed)
Excellent -bad an apple in the eye (favorite, loved) cherry condition(excellent condition) the cherry on the cake(the best part) apple pie (neat and tidy) cherry-pick (to select the best) life is a bowl of cherries (life is as easy and pleasant) be nuts about (enjoy very much()) a peach(beautiful, excellent) real plum(a good opportunity) lemon (unsatisfactory)
Effort He that would eat the kernel must crack the nut (to achieve your desire you must make the necessary effort) One that would have the fruit must climb the tree(to enjoy something, you should make first the effort) Get blood out of a turnip(achieve the impossible, especially money) Result of effort Fruits of labor To Bear Fruit (positive results of efforts) a tree is known by its fruit(characteristics determined on the results) Low-hanging fruit (easily achieved)
an opportunity a bite at the cherry)- an opportunity to achieve something) have a second bite of the cherry (a second chance or a second opportunity)
Unexpected To upset the apple cart(to ruin plans, upset people) How do you like them apples (the USA, surprise e or shock) Go pear-shaped (gone wrong, an and unwanted result)

<p>Unreasonable behavior go bananas (excited, crazed), to drive bananas (to annoy or irritate) nutty as a fruitcake(irrational or crazy) go nuts(excited over)</p>
<p>Flatter an apple polisher)a flatterer) To polish an apple) to) To feed on soft corn(be extremely polite with someone)</p>
<p>Secret spill the beans (to reveal a secret) Even the corn has ears and potatoes have eyes (Never tell your family secrets)</p>

Hebrew Ethnocultural Metaphors Jewish nation and language exist more than five a thousand years, enjoy the globalization era fruits and keep their national and cultural identity through language evidence of flora (citron, pomegranate), keeping traditions (*creator of the fruit of the vine*, the blessing on the wine every Friday night, and semantic secularization in modern meaning extensions (*full as a pomegranate*).

When Ethnocultural Hebrew Bible metaphors came from high discourse (*a righteous person like a date palm will blossom*), there are MEPs in colloquial discourse(*apple in honey*) and many metaphors connected to slang (*nonsense in tomato juice*).

Some ethnocultural Hebrew metaphors are distinguishing with humor as a multi-century Hebrew linguistics tradition. Metaphor *like citrons after Sukkot* /like citrons after Sukkot, emphasize the dichotomy of urgent need vs complete worthless depending on time. Nonformal greeting to girls/ בנות bananas emphasize the similarity of fruits and the beauty and cute young girls features).

Metaphors conclude the name of different plants, covering many themes, have both positive(as almond - diligent) and negative connotations(nonsense in tomato juice).

Borrowing from Yiddish (like citrons after Sukkot) and Arabic (once honey, once onion) demonstrate

effective methods for enriching a living and developing language. Although a number of Hebrew MEPs is not big, they add a very originality point of linguistic picture of the world.

Conceptual Metaphors (the source domain vs target domain)

Fruits > abundance, wealth, peace - *a man under our vine branch and under his fig tree; apple in honey;*

Fruits > the best part - *inside he ate his shell and threw it away*

Fruits > many talents and broad knowledge, hard-working - *full as a pomegranate; as almond*

Fruits > the material compensation for mental hardship - *nuts and raisins*

Vegetable > boring person - *dry as reddish*

Vegetable > disappointment - once a honey, once onion

(target domain vs the source domain)

A righteous person>a nice tree with plenty of fruits - a righteous person like a date palm will blossom

It found

English and Hebrew metaphorical models are a correspondence was in associating fruits with well-being, the best qualities of a person, object or situation, as well as with the productivity and results of persons labor.

Table 5.

Hebrew Ethnocultural Metaphors 8	
Ethnocultural Hebrew Bible metaphors	
מלא מצוות כרימון, מלא תורה כרימון ברכות נו full as a pomegranate Full of Torah, Torah scholar	Blessing during the Rosh Hashanah meal, promises to do many good deeds Modern extension – a person with many knowledge and new ideas
איש תחת גפנו ותחת תאנתו ד – פסוקים ג, מיכה ד A man under our vine branch and under his fig tree	A life of peace and quiet, and personal and financial security
אבות אכלו בוסר ושיני הילדים הושחזו ירמיהו, פרק ל"א, פסוק כ"ח Fathers ate unripened and the children's teeth were sharpened	Sons bear the punishment for the fathers' iniquities
תוכו אכל קליפתו זרק תלמוד בבלי, מסכת חגיגה – דף טו, עמוד ב Inside he ate his shell and threw it away	Choose only the best out of everything
בורא פרי הגפן משנה א, פרק ו, מסכת ברכות Creator of the fruit of the vine	The blessing on wine is one of the most important blessings
תפוח בדבש מנהג Apple in honey	A customary on the Rosh Hashanah eve to dip an apple in honey and say: ומתוקה כדבש ומתוקה: /may we have a good and sweet New Year
צדיק כתמר יפרח תהילים צב, יג A righteous person like a date palm will blossom	A good person will succeed in his ways
Ethnocultural Non Bible Hebrew metaphors	
איש אשכולות Eschalots' man	A man of many talents and very broad knowledge
שקדן As almond	hardworking
אגוזים וצימוקים Gift for children beginning to learn Torah טובים ומתוקים וצמיקים ושקדים, אך דברי תורה מהם מתוקים	Nuts and raisins Raisins and almonds are good and sweet, but the words of the Torah are sweeter than them
יבש כמו צנון Dry as reddish	Boring person
שיטת הבצל The onion method	The method of dressing in layers
(בנות)בנות Girls, bananas	girls, nonformal greeting, humor
שטויות במיץ עגבניות Nonsense in tomato juice	Absolute nonsense, slang
כמו אתרוגים אחרי הסוכות Like citrons after Sukkot	The very important thing in past but now no longer effective; totally worthless, from Yiddish
פעם עסל פעם בסל Once a honey, once onion	A day - a success, a day - disappointment, slang, from Arabic

4. Conclusion

The two languages' full equivalents are connected to the English borrowing from the Jewish Bible and mutual borrowing from widespread sources.

Hebrew retains a strong connection with Bible Metaphors and the Humor as ancient Hebrew tradition using various methods of modernization and adaptation.

English and Hebrew metaphorical models are strong correspondence in associating fruits with well-being, the best qualities, as well as with the productivity and results of person's labor.

Among the later equivalents, there are an equal amount of full and partial ones with the change of phytomy as the most common method.

Ethnocultural Metaphors demonstrate big difference and very strong national identity.

Most figurative language units refer to fruits and, to lesser to vegetables and other plants.

In the future, it seems necessary to the generalization of Food Metaphors in two languages to investigate the drink, culinary metaphors, and diachronic side.

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39. מילוג -מילון עברי-עברי

ECONOMIC SCIENCES

THE NEED FOR INNOVATION IN THE SPHERE OF HOUSING AND COMMUNAL SERVICES IN UKRAINE

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ABSTRACT

The continuous growth of prices for energy resources, determined by their growing scarcity, makes inevitable the transition of housing and communal services to innovative and resource-energy-saving technologies. The unsatisfactory condition of the housing stock, the high level of wear of engineering networks and equipment, inefficient management structure determine the need for modernization of the industry based on innovative technologies.

Objective.

Development of methodological approaches to the implementation of innovations in the sphere of reforming housing and communal services in Ukraine.

Results.

Determined indicators to assess the impact of the results of innovations on the quality of services in the system of housing and communal services. The stated theoretical generalizations and practical information contribute to the formation of a system-structural model for the introduction of innovations in the sphere of housing and communal services in Ukraine.

Conclusions.

Based on the carried-out research it is defined, that actions on formation of innovative strategy should be focused on well formulated strategic purposes of reforming housing and communal services. The received results can serve as a basis for the further introduction of innovations in the context of reformation of the sphere of housing and communal services.

Keywords: Housing and communal services; innovations; implementation; technology, housing and communal services, communal infrastructure, management of innovation, mutually beneficial relations.

1.1. Introduction

Analysis of the activity of Ukrainian enterprises revealed the potential of energy saving, accounting for a quarter of the annual consumption of energy resources in the country. However, the used outdated technologies and lack of motivation to save resources do not allow to realize this potential. The poorly developed system of economic relations between the entities of the housing and communal sector today does not allow for the effective use and introduction of innovative technologies and energy-saving principles. Based on methodological and empirical aspects of system factors, based on domestic experience, and applied approaches of already tested results, the author's conceptual vision of the prospects for further research into the problem of reforming the housing and communal services through the introduction of innovation is presented.

1.2. Materials and methods

Application of methodical approach to the measurement of innovation potential of housing and communal services using the analytical method.

1.3. Results

The housing and communal economy (HCS) of Ukraine is a multi-branch economic complex, which includes more than 25 sub-branches and more than 70 types of economic activity. The housing and utilities sector takes 26% of the national economy's fixed assets, which is just behind the transport sector (29.5%) and industry (27.4%).

The wear and tear of utility infrastructure is over 60%, about 25% of fixed assets have fully served their useful life. Wear and tear of engineering equipment have reached 73%, engineering networks - 65%. The reliability of heat supply systems is 2.5 times lower than in European countries. Every year less than 1% of networks are overhauled instead of the minimum allowable 3%. The number of technological violations and accidents in the work of communal facilities has increased fivefold over the past 10 years. Every year there are on average 70 accidents per 100 km of water supply networks and 200 accidents per 100 km of heat supply networks. Scheduled repair of engineering networks and equipment of water supply and municipal

energy systems almost completely gave way to emergency recovery works, the cost of which is 3 times higher than the cost of scheduled and major repairs of similar facilities. The financial condition of housing and utility organizations continues to deteriorate, more than 60% of organizations are unprofitable, so the housing and utilities sector is one of the underdeveloped and underinvested areas of entrepreneurship.

That is why the reform of housing and communal services has become one of the priority issues of state socio-economic policy, which should combine the adoption and implementation of economically justified administrative, personnel, technical, technological, institutional, financial, social, political, and other decisions, and must make the population participants of the reform processes of housing and communal services, as one of the vital areas of the national economy [1].

Several contradictions have accumulated that require urgent solutions: market development in the housing and utilities sector and outdated regulatory framework, high stock intensity and low productivity in the housing and utility sector, stagnation in the structural development of the housing and utility sector, and accelerated growth of the entrepreneurial environment in the economy in general, rising tariffs on housing and utilities and deteriorating financial status of enterprises, lack of public participation in creating new organizational-legal forms of homeowners associations and the need for active involvement in the housing and utilities sector [2].

Thus, the need to resolve these contradictions makes it imperative to bring the housing and utilities sector into a form that would be adequate to the dynamics of the modern business environment and consider the interests of homeowners, suppliers, service providers, and the state.

The system of housing and communal services (HCS) is the result of interaction between the consumer and the service provider, as well as the activity of the provider, which is aimed at maximizing the satisfaction of the desires, needs, and preferences of the consumer.

In this regard, the formation of a structural model of innovation management in the system of housing and communal services based on considering the totality of the requirements of all participants in the process of implementation of housing and communal activities is an important task. In addition, the model based on the principles of the quality management system and innovation management, in modern conditions of development of the domestic economy is one of the factors in ensuring the efficiency and competitiveness of the utility enterprise.

The quality management system of housing and communal services enterprises can be considered as a complex of administrative, technological, social, and legal processes that ensure the organization's ability to provide guaranteed services that meet the requirements of the consumer in accordance with current legislation and state regulatory documents governing the provision of housing and communal services (HCS).

The innovation management system of housing and communal services enterprise can be considered as

a complex of innovative developments, modern technologies, ideas to optimize the management process of the communal enterprise.

The efficiency of the enterprise as one of the economic entities in the economic system depends on the relationship with all parties involved in one way or another in the provision or consumption of housing and utility services, as well as services that regulate in the field of housing and utilities, among them can be distinguished:

- homeowners; tenants of housing; tenants of premises;
- creditors;
- representatives of insurance companies;
- suppliers of communal resources;
- employees of service organizations;
- State Housing Inspectorate;
- municipal inspection.

In market conditions, a partner (contractor) is chosen depending on the expectations of quality, price, and timing of obligations. Ensuring a stable level of quality of service (supplied products) is provided by the implementation of quality management system [3].

The approach to improving the efficiency of management of innovative activities of housing and communal services based on the implementation of innovative measures includes two important processes: the process of development and implementation of the principles of management of innovative activities of housing and communal services and the process of standardization and certification of the services provided.

Organization of the process of development and implementation of the principles of management of innovative activity in the system of housing and communal services requires addressing two types of factors:

housing and communal services provided within the complex of housing and communal services, as well as any other services, should be subject to the principles of service quality management system;

innovative development of housing and communal services, must comply with the principles of innovation management.

In this regard, it is advisable to define a set of principles of innovation management in the system of housing and communal services, based on the system of quality management and innovation management:

- Principle of state stimulation.
- The principle of consumer interests.
- The principle of multifaceted results.
- The principle of substitution.
- The principle of effective control.
- The principle of mass innovation.
- Correct Assessment Principle.
- Principle of a prompt response.
- Principle of loss minimization.
- The principle of payback in perspective.
- The principle of environmental safety.

The process of implementation of principles of management of innovative activity in housing and communal services system is based on development and description of certain rules and algorithms of work of the

managing company and accountable persons in conditions of innovations implementation. This process implies that the operations performed in the provision of services based on the introduction of innovations should be placed under the control of responsible persons and that orders, decisions, and orders, will be brought to a specific performer, and executed at the required level.

The presented principles and factors of innovative development must be considered in the development of an innovative approach to improving the effectiveness of the management of the utility enterprise. In addition, it is necessary to consider the principles of implementation of innovative housing and communal services, which allow ensuring the proper quality through compliance with a certain set of established requirements.

The first group of requirements, public services based on the introduction of innovations must strictly meet the system of quality standards, standards, technical and sanitary requirements, conditions of the concluded contract.

The second group of requirements, public services based on the introduction of innovations must meet the needs and expectations of the consumer, the requirements dictated by the charter of the enterprise, rules, codes, norms for the protection of the environment, and the welfare of the housing stock. And it is the consumer (homeowner or initiative group) who must evaluate the impact of innovations on the quality-of-service provider.

To make a full-fledged comprehensive assessment, it is necessary to develop a methodical approach and a system of indicators to assess the impact of the results of innovation on the quality of services in the housing and communal services system. This system should be based on the following groups of indicators (Table 1). Calculation of these indicators makes it possible to determine the state in which the company is and assess the quality of services provided.

The third group of requirements, public service must be built based on an economically justified tariff that can satisfy all parties to the utility relationship and be beneficial to them.

Table 1.

Indicators for assessing the impact of innovation results on the quality of services in the housing and communal services system

Group of indicators	Indicator
Environmental Performance Indicators.	Dynamics of changes in water quality. The level of realization of solid domestic waste. Assessment of changes in the level of contamination of adjacent areas.
Technical and operational indicators.	Assessment of changes in the speed of processing the application, and the quality of its execution. Assessment of the condition of the residential facility. Assessment of the condition of the engineering equipment. Degree of uninterrupted supply of housing and communal services and their compliance with the normative values.
Indicators of resource conservation.	Reducing electricity consumption. Reduction of gas consumption. Decrease in water consumption. Grid water losses. Grid power losses. Grid gas losses.
Organizational and economic indicators.	The level of transparency of tariff policy. The level of transparency of economic relations. Dynamics of the solvency of users of Utility and housing services. Degree of residents' confidence in the managing company. The level of complaints about the provision of services.

Further reform of housing and communal services becomes impossible without the application of new forms and methods of management of the housing stock of Ukrainian cities for this purpose it is necessary to create mechanisms to stimulate the creation of associations of owners of apartment buildings (condominiums) and other organizations that unite them:

- to legally oblige the authorities to carry out major repairs of residential premises when they are transferred to condominiums;
- to develop and adopt simple mechanisms of crediting owners of apartment buildings to pay for capital repairs of the property in shared ownership;

- cancel the registration procedure for condominiums as non-profit organizations, due to the fact that it complicates the registration procedure, but does not provide tax benefits;

- oblige authorities to provide financial assistance to housing and communal enterprises (if necessary) only after consultation with condominiums.

Successful reform of the housing and utilities sector requires the creation of a unified regulatory and legal framework based on interconnected and well-thought-out legislative initiatives and regulatory legal acts. Information support is one of the priorities of the reform of the housing and utilities sector. As a result of

analysis of the state of information support of the management system of housing and communal services in the cities of Ukraine revealed several significant problems:

- the constant need for residents to address each of the participants in the sphere of housing and communal services separately, entails unreasonable psycho-physical and time costs;
- the lack of a unified approach to management, taking into account the interaction of all managed processes occurring with the subject under management;
- absence of a unified and accessible information database on the subjects and objects of the housing and communal services;
- unreasonable and multiple duplications of data in different information systems.

To implement the main directions of reforming the housing and utilities sector, it is necessary to solve the tasks determining the content and successful functioning of the information support of the housing and utilities sector management system and the city economy automation system inseparably connected with it.

A sound innovation policy presupposes both introductions of innovations at the enterprises of the sector and the creation of mechanisms for their adaptation and development in the existing structure of production. Innovations are the main mechanism that provides effective development of production and maintenance of economic potential [4].

In this connection, it is advisable to create sectoral regional innovation centers for reforming the housing and utilities sector, whose main activities may include the following:

- testing and testing of innovative developments in conditions similar to the operating conditions of these systems in the housing and utilities sector and implementation of these developments in practical activities;
- organization and conduct of research to assess the status and prospects of development of the quality management system in the housing and communal services sector in large cities
- certification of the quality of services provided by housing and communal economy enterprises;
- training and skills upgrading of the staff of the housing and communal economy enterprises.

The creation of such Centers on their basis of educational, scientific, and administrative resources will make it possible to create a system of quality management in the sphere of housing and communal services and thus start the implementation of the housing and communal services reform. In general, we can state that the following changes are needed in the housing and utilities sector:

- radical renewal of obsolete equipment for modern and more efficient ones;

- competent personnel selection and retraining of the existing staff;
- increase of investors' interest in the sphere of housing and communal services and support of the state for implementation of innovative management systems.

Implementation of these measures will make it possible to apply technological developments of Ukrainian engineers, replace worn-out and obsolete equipment and network communications with long-term qualitative developments, which will lead to significant savings of taxpayers' financial resources, improve the quality of life of the population, especially those living in the worn-out housing stock.

The structural model of innovation management in the housing and communal services system implies control over technical, organizational, economic, environmental, and human factors. Controls are measures of measurement, examination, or evaluation of one or more characteristics of a product or service and comparison of the results with the established requirements to determine their compliance with these requirements. [5].

Such control with the purpose of preventing, reducing, eliminating failures and excessive interruptions in the provision of public services should be the basis of the control system, which includes the following methods:

- instrumental control (measuring the condition of utilities with various testers, devices; measuring consumption volumes with meters; checking water quality with appropriate tools; humidity and temperature in rooms with thermometers);
- audit control (inspection and analysis of documents, acceptance reports of installation and commissioning works, maintenance logs, certificates of materials used);
- visual inspection (examination of the engineering networks, the building, the adjacent structures, the quality of the installation work);
- sociological control (questioning, interviewing a focus group consisting of consumers of utilities).

In addition, a significant part of control in the housing and utilities sector is impossible without consumer participation. Therefore, the structure of consumer control in the quality of services provided can be presented in the form of three elements, guaranteeing the independence and completeness of control: (Figure 1) [6].

- regional control, based on the principle of one-time inspections - planned or upon requests of citizens and enterprises;
- control at the level of a municipality, based on the systematic work on control and prevention of violations;
- control of owners (society of consumers, public chamber of the city).

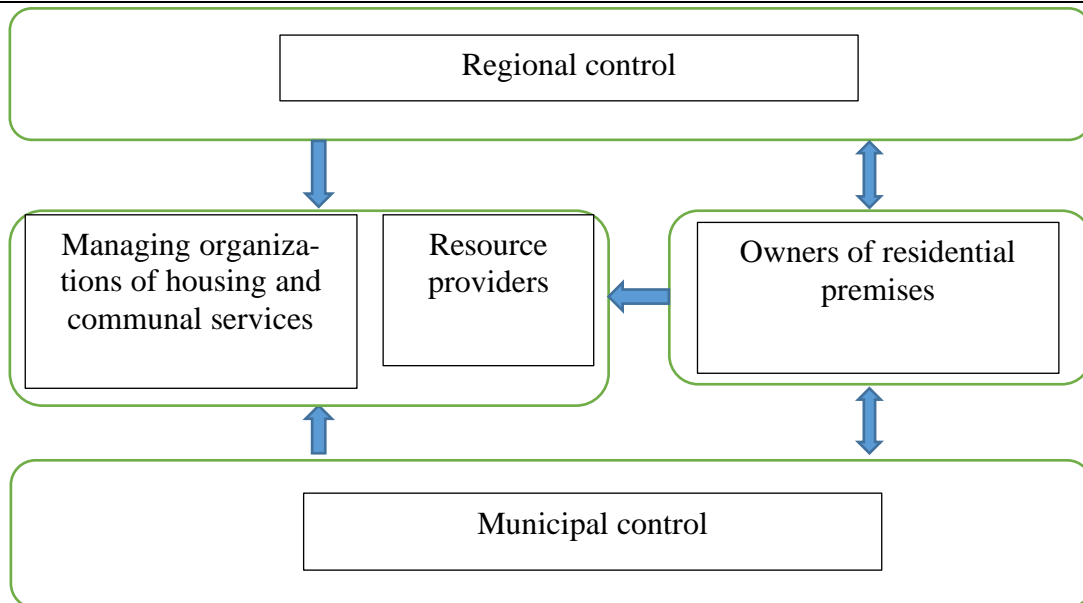


Fig. 1. Structural model of innovation management in the system of housing and communal services.

The main advantages of the proposed structural model of innovative activity management in the housing and communal services system are:

- formation of more effective management by taking into account the principles of innovative development of housing and communal services and taking into account a variety of factors affecting this process;
- the management process is built according to the requirements of the system of existing standards for the quality of housing and communal services;
- investment of innovative measures aimed at reducing costs for the provision and consumption of public services that have been carried out under the housing and communal services modernization program;
- improvement and informatization of the accounting system for financial and other costs and making this information freely available to all participants in housing and communal relations.

As shown by the analysis, the investment policy of housing and communal services in the subjects of Ukraine is ineffective. To improve the efficiency of housing and communal services we propose a program aimed at increasing investment activity in the housing and communal services.

In modern conditions, Ukraine cannot allow blind copying and application in the Ukrainian practice of national economy management theories and concepts that are effective in Western Europe and the United States. Undoubtedly, it is necessary to use the achievements of advanced world economic thought, but with the obligatory account of Ukrainian national characteristics, mentality, customs, and way of life. That was developed by scientists-economists and successfully implemented in other countries, cannot and should not be applied in modern conditions of Ukraine without considering Ukrainian features, because the way of life of peoples of many foreign countries and Ukrainians, including in the sphere of housing, simply not comparable.

1.4. Discussion

Given the analysis of the specific functioning of the system of housing and communal services in Ukraine requires the development of a special strategy to overcome the crisis of housing and communal services and the transition to the solution of the accumulated socio-economic problems in the framework of the development of innovative economy in Ukraine. This is possible through the implementation of effective innovation and investment policy.

The reform of the housing and utilities sector is complex, large-scale, and affects all spheres of activity: investment, credit, economic-financial, organizational-legal, social-political, environmental, technical, and others. The reform of the housing and utilities sector must improve the performance of its sectors and their reliability for consumers. As a practical result of the previously conducted research, the author proposes a program for reforming the housing and utilities sector at the present stage. This program includes several necessary measures in some areas of the housing and utilities sector.

1.4.1. Necessary measures in investment activity:

1.4.1.1. To solve the problem of attracting investments in the housing and utilities sector of Ukraine, an effective investment policy, which is a set of approaches and decisions determining the volume, structure, and directions of the use of investments, is necessary. Until recently, the policy in the field of investments was the prerogative of the state, making decisions on "horizontal" and "vertical" redistribution of investments. Investment crises proved the inefficiency of such a system, and the regulation of investment activity is gradually shifting to the level where the current development tasks and possible methods of stimulation are better visible. In general, the investment policy of the housing and utilities sector should be focused on:

- to create a favorable investment climate;
- determination of the volumes and structure of investments which are reasonable for each period;

- for the choice of priorities;
- to increase the efficiency of investments. To effectively solve the problems of formation and implementation of the investment policy of Ukraine should first:

a) determine the principles of formation and implementation of the investment policy of housing and communal services, the peculiarities of the development of investment activity of housing and communal services, which are formed under the influence of factors of both endogenous and exogenous nature, and methods of management of investment activity of housing and communal services: administrative and administrative, economic, social and psychological, innovative, etc.;

b) to form the functions of the management of investment activity of housing and communal services: planning, organization, motivation, coordination, and control, as well as effective interrelations in the sphere of housing and communal services between the subjects and objects at all levels of management. In addition, it is necessary to clearly understand the essence of investment relations of participants in the sphere of housing and communal services in the context of interaction and implementation of their investment needs and interests.

The tasks of the mechanism of formation and implementation of the investment policy of housing and communal services are, firstly, the formation of strategy and tactics of management of investment activity of housing and communal services and, secondly, the introduction of new forms and methods of management, improvement of the organization of management of investment activity of housing and communal services, development of competitive relations.

The effective investment policy will allow ensuring:

- implementation of long-term investment objectives of socio-economic development of the housing and utilities sector of Ukraine;
- assessment of investment opportunities of the housing and utilities sector, as well as the maximum use of internal investment potential and the ability to actively maneuver investment resources;
- possibility of fast implementation of new perspective investment decisions, which appear in the process of dynamic changes of the external environment factors;
- determination of investment activity to specify managerial decisions of investment nature.

1.4.1.2. The negative trend of an increasing discrepancy between the growth rate of prices for housing and communal services and their quality, as well as the level of income of the population requires the implementation of such state policy (investment, tariff, and pricing), which would consider the interests of specific producers and consumers of housing and communal services, as well as the state and society in this area.

1.4.1.3. As shown by the results of the study, first, it is necessary to eliminate the following main problems that negatively affect the formation and implementation of the investment policy of housing and communal services:

- administrative barriers, affecting issues of regulatory and legal regulation, the formation of an effective mechanism of interaction between state authorities at the state level and local levels between themselves, business, the population, as well as economic incentives and responsibility for the inefficient use of the services provided;

- absence of mechanisms and tools for investment. Today we need large investments from various economic entities, money at low-interest rates, minimization of investment risks;

- inefficient management, contributing to the formation of the unattractiveness of the sphere of housing and communal services for investment [7]. Search for investment resources, optimization of investment structure, effective investment of investment funds in areas that ensure socio-economic growth of the industry - these are the challenges facing managers, whose work should use modern management tools;

- information disclosure. Currently, there is no information for investors about the objects of possible investment in the public domain. Managers of most utilities have no information related to the issues of organizing investment, about possible mechanisms of co-investment, and have no experience in organizing the investment process.

1.4.1.4. Currently, there is a need to establish realistic rates of development of the investment sphere, to determine planned indicators of investment, to form their structure, the list of target programs, and investment projects to be practically implemented in a particular planning period based on multivariate forecast calculations. Investment forecasting is a complex, multi-stage process of studying the probabilistic aspects of capital investment in one or another sphere of the economy in the future [8].

1.4.2. Necessary measures to improve legislation:

1.4.2.1. Currently, regulation of prices and tariffs for certain housing and communal services is performed by executive authorities, but Ukrainian legislation stipulates that local self-government bodies independently manage the municipal property and have the right to independently set tariffs (prices) for services provided by municipal enterprises.

Now local governments do not have sufficient financial independence, and revenues of local budgets do not correspond to the volume of spending powers of local governments. In this connection, the latter are not always interested in effective management of investment activities, creation of favorable conditions for development and modernization in the sphere of housing and utilities, and do not have the ability to implement an effective long-term policy in this area.

Only the independence of municipalities can serve as a basis for the real responsibility of local governments for the results of activities in the sphere of housing and communal services. That is why it is necessary to prepare a draft law stipulating the procedure of state regulation of tariffs and prices for housing and communal services with a clear indication of those housing and communal services, in respect of which the state regu-

lation is carried out. In addition, it is necessary to delineate the powers of state and local authorities in this sphere.

1.4.2.2. Regulatory and legal support of the housing and communal sector development shall be carried out at the state, regional and municipal levels.

1.4.2.3. Reform of the housing and communal sector should be aimed at forming a budgetary system that would allow an optimal distribution of investment resources between the levels of the budgetary system and a balance of budgets at different levels. That is why budgetary and tax legislation should provide for:

- clear assignment of revenue sources and spending powers to the budgets of different levels;
- creation of specific mechanisms for investment support to local budgets;
- reducing the number of financial obligations imposed by legislation on local budgets without the provision of funding sources.

1.4.2.4. The most important promising sources of investment in projects to modernize and develop the housing and communal complex should be private investment. The need to attract non-state investment to eliminate the crisis in the housing and utilities sector is undoubted. In this connection, it is necessary to prepare a draft law envisaging measures aimed at attracting investments from various sources to the housing and utilities sector and establish a most favorable investment climate there. For this purpose, the draft law should define the basis, forms, and procedure for encouraging investment activities, as well as the conditions and principles of state support of this sphere.

1.4.2.5. It is necessary to introduce amendments into the Housing Code of Ukraine concerning:

- provision of discounts by the supplier of housing and communal services in case of regular advance payments for these services;
- toughening responsibility for dishonest payers for housing and communal services;
- introduction of fines for managing companies or resource supplying organizations for the low-quality provision of housing and communal services and (or) in cases of presenting wrong bills for these services in favor of consumers of housing and communal services.

1.4.3. Necessary measures in the issues of interaction with innovative and other spheres of the economy of Ukraine:

1.4.3.1. It is necessary to introduce innovative technologies in the activities of housing and communal enterprises, providing waste-free disposal of domestic and industrial waste, primarily in the territories of Ukraine with a special regime of nature management, and (or) using special management regimes, including more advanced treatment facilities, the introduction of water recycling systems, reconstruction and modernization of industrial production, development, and implementation of environmentally safe technologies.

1.4.3.2. The funds released by the reduction of state subsidies in housing and communal services due to the transition to 100% payment for housing and communal services by the population of Ukraine should be directed to the creation of new or reconstruction of ex-

isting industrial areas, including engineering and communication infrastructure (boiler houses, water intake, purification stations, etc.) of the industrial territory, on which technoparks, business incubators will be created to accommodate small innovative enterprises specializing primarily in the development of the industrial sector.

There is an urgent need for technoparks to provide system innovations in the field of technological and organizational modernization of enterprises in the housing and utility sector, energy-saving and energy efficiency in the housing and utilities sector, etc. "Cultivation" in business incubators of small companies will promote the introduction of new technologies, the use of innovations to solve the problems of housing and communal services, medicine, ecology, and other areas within the area of responsibility of public administration of housing and communal services, increasing the innovative activity of business in Ukraine as a whole [9].

1.4.3.3. It is necessary to create in Ukraine information systems that are information and technological environment of storage, processing, analysis, and dissemination of information in the field of innovations and investments in the housing and utilities sector in the interests of state bodies, economic entities, and citizens, first to implement effective innovation and investment policy in the housing and utilities sector.

The creation of such an information system requires, first, uniting all existing data storage in the housing and utilities sector into "one window" that will exclude duplication of information flows and create a basis for the further transition to a qualitatively new level of providing public authorities and management activities. This is especially important in view of the key, connecting role of information in the implementation of innovation and investment cycles, which consist of separate functionally isolated stages: fundamental and applied research, experimental development, preparation for pilot production, serial production, sales. All this will ensure the synergistic effect of interrelated and highly effective joint implementation of innovation and investment cycles. It is suggested to place information about the situation in innovative and investment spheres of this sector on websites of ministries and departments supervising the housing and utilities sector.

1.4.3.4. Overcoming the crisis in the housing and utilities sector should be linked to a comprehensive solution of socially important problems: raising the population's incomes; taking measures to ensure timely payment of wages, and strengthening control over the observance of people's labor rights.

1.4.3.5. There is a need to set up a system to register the actual volumes of services consumed by the population, define a minimal set of services, without which payment for communal services can't be collected.

1.4.3.6. Reform of the housing and utility sector should be carried out in the interests of the poor through an effective system of targeted state assistance to them to pay for housing and utility services.

1.4.4. Ways to achieve the main objectives in the sphere of reforming the housing and utilities sector.

The main objectives in the sphere of the housing and utility sector are the provision of the population with living conditions that meet quality standards; reduction of costs of service producers and, accordingly, tariffs while maintaining quality standards of services provided; mitigation of the process of reforming the housing and utilities payment system for the population while transitioning to a break-even operation; transition to self-sufficiency in the industry. To achieve these goals, it is necessary to use the following methods:

- improvement of the management, operation, and control system;
- transition to self-financing of sectoral organizations by reducing, and in the future end, the budgetary allocations for grants, and eliminating cross-subsidies;
- raising housing and communal services rates for the population to an economically sound level based on a competitive selection process for the organizations that provide these services.
- In addition, to achieve the goals, set, it is necessary to solve the following key tasks:
 - to create and improve economic and organizational mechanisms to reduce the cost of housing and communal services while maintaining and improving their quality and sustainability of the industry;
 - improve the tariff policy for housing and communal services in order to achieve a balance between the financial needs of service providers and the solvency of consumers [10];
 - reduce budgetary subsidies to the industry and use the released budgetary resources for social purposes.

In conclusion, it should be noted that the goal of the proposed program of housing and communal services reform at the present stage is to improve the reliability and sustainability of the sector enterprises and improve the quality of housing and communal services with a simultaneous relative reduction of costs for their provision, which is the optimal solution to the problem.

1.5. Conclusions

Innovations allow the introduction of new equipment, machines, and mechanisms, considering the current technical requirements, standards, and regulations. Of course, the effective operation of all systems requires competent and qualified specialists who have vast experience in this area of activity. Only in this case, it is possible to implement innovations without difficulties, as well as to carry out their maintenance, which is necessary for their full operation.

The role of information technology in the implementation of socio-economic development in the whole country has increased. The use of innovations will

change the principles of interaction of government agencies with organizations and citizens and increase the efficiency of interaction and information transfer. Without the creation of comprehensive software, it is impossible to organize the rational management of government agencies at all levels. Information technology is becoming an important tool for solving problems in the transition of housing and communal services of Ukraine on the path of innovation. The introduction of innovative technologies in the organization of housing and communal complex will provide an opportunity to form operational and reliable information about the state of housing and communal services. Also make it possible to make effective management decisions, for example, in regulating the cost of housing and communal services. It is necessary to help in the implementation of innovative technologies in the activities of economic entities of the sphere of housing and communal services.

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HISTORICAL SCIENCES

REFLECTION OF SOCIAL AND POLITICAL LIFE OF NORTHERN AZERBAIJAN IN THE END OF XIX AND BEGINNING OF XX CENTURY IN SOURCES AND HISTORIOGRAPHY

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ABSTRACT

The reactionary policy of the ruling circles of the Russian Empire, the development of capitalist relations after the bourgeois reforms gave impetus to the formation of the Azerbaijani nation and the beginning of the national movement in Northern Azerbaijan, at the end of the XIX century. At the end of the XIX century - the beginning of the XX century, the period of the rise of national thinking in Northern Azerbaijan is the period when a number of public organizations, charitable societies, press agencies and the development of art and dramaturgy were established.

The period of the XIX-early XX centuries was a turbulent but proud period of Azerbaijani historiography, which was the focus of researchers' attention, and valuable scientific works were created.

Keywords: socio-political situation, public organizations, national press, national thinking, Azerbaijani historiography.

Beginning with the second half of the XIX century, progress was observed in the public thinking of the people in Northern Azerbaijan, the spread of enlightenment, and drama and art became widespread. It was at this time that the first schools for education and science were opened in cities and villages, newspapers and journals, and books were published. Although the intellectual representatives of Azerbaijan were persecuted and insulted by the reactionary forces, they mobilized all their forces in the way of educating the people. The first Russian-Tatar (Azerbaijani) school was opened in Baku as a result of the efforts of intellectuals. This was the period of the awakening of national-democratic thinking in the history of the Azerbaijani people. Following the change in the public worldview, tsarist Russia did not miss the strict control of the democratic-minded national press, and tried to limit the rights and opportunities of the masses. Many leading representatives of national-democratic ideas - educators, teachers, especially press workers - were persecuted, punished and fined. The struggle of prominent intellectuals and public figures of the time, Mirza Fatali Akhundov, Hasan Bey Zardabi, and other well-known figures for public education revealed the need to change the eastern education system and create modern educational schools. As a result of H. Zardabi's initiative and principled action, in 1871, the foundation of the first national-public society in the field of education in Azerbaijan - "Society to help Muslim children who are studying" was established. "Akinçi", which gives a strong impetus to the development of national thinking, and has a power that cannot be compared with any other means in this sense, began to be published.

In the study of the important stage of the history of Azerbaijan at the end of the XIX century and the beginning of the XX century, which was accompanied by serious economic, social and political changes sources of the period, archives of press bodies, as well as scientific works published in different years are of great importance.

The collection of laws of the Russian Empire prepared at the beginning of the Nicholas period under the leadership of M.Speransky and republished several times until the October Revolution, is an important source in creating a broad image of the social and political life of Northern Azerbaijan, which was a part of the empire in the XIX and early XX centuries. In that source, social relations, public education under state control, administration in governorates and districts, judicial system and many other important issues were reflected. [15]. Although pre-revolutionary researchers wrote about many loopholes in civil legislation in the collection (rights and obligations in family relations, police and financial violations), in general the corpus provides valuable facts about the period.

Tsarist Senator A.M. Kuzminski's reports on Baku and Baku Governorate occupy a special place in the collection of social and political information from the beginning of the 20th century [16]. The reports provide information about the national bourgeoisie of Azerbaijan and its activities in public life. A number of interesting facts on the subject were included in the collection [18] of documents on the policy of tsarism in the South Caucasus.

In the learning of the topic, the documents of the State Historical Archive of the Republic of Azerbaijan, the archival materials of the newspapers "Kapsiy", "Baku", "Taraqi", "Iqbal", "Nijat", "Irshad", "Basirat", "Açıq Soz" which played a special role in the development of the Azerbaijani press at the end of the XIX century and the beginning of the XX century are also irreplaceable. Although the communist ideology, which ruled for many years, did not allow us to reflect the social and political life in North Azerbaijan in the late XIX and early XX centuries, a large number of rich social and political events were covered in the press. For this reason, taking advantage of the opportunities provided by independence, the objective study of press organizations remains an important task for scientists.

It is clear from the documents of the State Historical Archive of the Republic of Azerbaijan that at the end of the XIX and the beginning of the XX centuries, public organizations played an important role in the formation of national thinking in Azerbaijan, and the opening of branches of such organizations was supported by the masses of the people. For example, in January 1907, amendments were made to the Charter in order to satisfy the request of the residents of Shamakhi to open a branch of the "Nashri maarif" organization in Shamakhi. The project was prepared by Ahmed Bey Agayev, a member of the management board of the organization, and submitted to the state authorities in order to obtain permission [2]. In the documents of the State Historical Archive of the Republic of Azerbaijan, there are numerous facts about the national awakening of the people and the opening of centers of enlightenment at the request of the people in Shamakhi, Goychay, Guba, Ganja, Astara, Neftchala, Zagatala, Agdash, Shusha, Devechi and other regions.

Some information related to the research topic was collected in the Archive of the National Library of Azerbaijan. Among them, the existing materials about the charter, founders and activities of the "Baku Muslim Unas Society-Charity" adopted in 1914 contain valuable information about the social and political life of Azerbaijan. It is clear from the archival documents that the funds of the organization were mainly collected from membership fees, funds received from official offices, interest of bank investments owned by the organization, properties of the organization and other such sources of income [6].

Until 1896, the charters of public organizations such as education, science, enlightenment, and charity operating in the Russian Empire were based on uniform legislative rules in accordance with the requirements of the time. The charters of organizations registered with the state on the basis of official permits by local governing bodies - the governor-general or the mayor are sources of information about the social and political problems of the Azerbaijani organization and government-people-philanthropy relations. In the Charter of the "Baku Muslim Charitable Organization", the establishment of a special press body was not only aimed at educating and informing the population. One of the main goals here was charity. Thus, during the years of the First World War, the organization that supplied food and other necessary products to the Turkish-Muslim population who became refugees in the war and suffered losses, needed the financial resources obtained from the sale of the newspaper. In the spring of 1917, Muslim and non-Muslim refugees from Turkey and the Caucasian front were also able to benefit from the charitable activities of the organization [7].

As is known, the national press has played an important role in the history, culture, and social-political thinking of the people, including the people of Azerbaijan. For the first time in the Middle East, the national press in North Azerbaijan tried to make its contribution to the evolution of public organizations, and devoted space on the pages of the newspaper to issues that would ensure development in the field of education, science, culture, as well as in the everyday life of the

people. When the press of the time talked about the socio-political events taking place in the society, it contrasted the attitude of the national bourgeoisie and the intellectuals, and conveyed to the readers the support of the national bourgeoisie for the existing regime - tsarism, and the desire of the intellectuals to replace the monarchy with democracy in a unique way. In 1907, M.A. Rasulzade's article published in "Takamul" newspaper was about "five freedoms", where the author's press was called "second freedom" [11].

At the beginning of the XX century, the press agencies of Azerbaijan played the important role in the study of social activity and in conveying the political landscape to future generations. In the materials of the newspapers related to "Baku Muslim Charitable Society", the participation of members of the organization's board of directors, government representatives and intellectuals in the groundbreaking ceremony of the historical "Ismailiyya" building was covered in detail. According to the information, the "Ismailiyya" building was supposed to consist of three floors. On the first floor - a commercial sales center (shop) for the income of the organization, on the second floor - a school for poor and deprived Muslim children, on the third floor a library-reading room, where the population could use books, newspapers and magazines free of charge [12].

A certain part of the information related to the study of the social and political life of the period is stored in the archives of the "Baku" newspaper. It is clear from the 1906 issue of the "Baku" newspaper that at the beginning of the XX century, the "Nicat" Baku Muslim educational organization, operating on the basis of the Charter approved by the state authorities, had important activity in the national-cultural development of the people and the formation of educational ideas. The "Irshad" newspaper is full of valuable information about the powerful staff potential of "Nijat" Baku Muslim educational organization, which unites big entrepreneurs and intellectuals.

The development of capitalist relations led to the selection of Baku, as a major economic, financial and cultural center in the South Caucasus region at the beginning of the XX century. Large banks were opened in the city, the Baku-Tbilisi railway began to operate, Caspian shipping developed. Against the background of new social relations, tsarism had to make compromises, therefore the "Manifesto" signed by the government recognized ordinary human rights such as personal integrity, freedom of speech, freedom of conscience, and allowed events and gatherings.

"Taraqqi" newspaper published articles about the great importance of "Nicat" society to national moral values, the development of Azerbaijani language and literature, and wrote information about the internal rules of the organization, which are not reflected in the Charter. The most important of the internal rules was that the meetings of the board of directors should be conducted in the Azerbaijani language, and regardless of the identity of the participants, they should speak only in the Azerbaijani language. From the materials of the "Baku News" press, it is known that "Saadat", which operated in the early XX century, fought against religious superstition in its organizational activities,

and rendered special services in the spread of true, healthy religious literacy. Referring to the 1907 issues of the press, it is known that the program project was developed by the organization's management board for the purpose of real religious education, and this project was reflected in the Charter. According to that program, the organization plans to open a public reading room, a library, as well as publish books for children studying in schools and madrasas, publish its news in the Azerbaijani language, open a library for free distribution and free sale of books, create pedagogical courses, hold a teachers' congress, and organize spiritual it meant sending worthy students who had graduated from school to foreign countries to continue their education, organizing evening courses, scientific talks and literary evenings, opening boarding houses near schools and madrasas [14; 20; 3; 4]. The campaign of financial assistance to the "Saadat" organization, which plans to implement important projects, and the active participation of Baku millionaires in this campaign were reflected in the materials of the "Yeni Iqbal" newspaper.

In the second half of the XIX century - the beginning of the XX century, the socio-political situation in Azerbaijan was investigated both in the Soviet historiography and in the modern historiography of the homeland, the national awakening, the enlightenment movement, the development of school education were studied, and the attitude to the literary environment of the time and the activities of social and political parties was reported in the scientific literature. The socio-political landscape of Azerbaijan at this time found its place in the works of Muhammad Amin Rasulzadeh, Hasan Bey Agayev, Dadash Bunyadzadeh, Huseyn Naseh Alizadeh, Haji Ibrahim Gasimov, Hanifa Khanum Malikova and other intellectuals.

In the period after the independence of Azerbaijan, the study of the history of the early XIX and XX centuries became prominent. S. Aliyarli, D. Seyidzade, D. Huseynova, I. Baghirova, I. Musayev, M. Ismayilov, S. Talibova and other historians have become the object of research. One of the researchers who first paid attention to the topic, S. Aliyarli, in his article entitled "The first stages of the national movement", refused to count the beginning of the national movement in Azerbaijan from 1905, and called the years 1875-1905 the first stage of political ideological foundations - the "Akinchi stage".

In the monograph "Social and political movement in Azerbaijan (end of the XIX century - beginning of the XX century)" published in Baku at the end of the last century, researcher S. Suleymanova conducted valuable research directly related to the topic and obtained important results. Thus, when S. Suleymanova spoke about the reasons for the creation of the "Muslim charity organization", she connected it not only with helping the poor, but also with the purpose of caring for those who suffered from inter-ethnic conflicts (in 1905-1906) and brought interesting archival documents into scientific circulation [10].

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Among the researchers of the 1990s who paid attention to the topic, we can name the prominent historian M. Ismayilov. Valuable scientific facts about social and political movement in Azerbaijan are reflected in M. Ismayilov's work dedicated to the philanthropic activities of the representative of the national bourgeoisie of Azerbaijan H.Z. Taghiyev at the beginning of the XX century. [8] M. Ismayilov, who chose the activities of patron Z. Taghiyev in the socio-political life of Baku as an object of research, showed the traces of a prominent personality in various fields of the national economy, and highly appreciated his activities in the Baku Duma as a political figure.

Historian-scientist D.S. Huseynova's research work dedicated to the activity of Azerbaijani intellectuals in the late XIX and early XX centuries highlights the service of intellectuals in the formation of national-social consciousness. [17] The author evaluates the role of graduates of Russian universities, as well as French, German, and English universities in the formation of Azerbaijani intellectuals, and confirms that those intellectuals are the leading force in the social and political life of the country. D. Huseynova sees Azerbaijani intellectuals as products of European and traditional Islamic civilizations and calls them catalysts of fundamental changes in Azerbaijani society.

The researches of D. Seyidzadeh in the historiography of the homeland also made important contributions to the study of the investigated problem. In the research work of D. Seyidzade, the struggle of the national bourgeoisie of Azerbaijan, prominent ideologues of Azerbaijan in terms of the development of science, education and national culture was extensively discussed at the beginning of the XX century. The research work is important in terms of examining the initial conditions of the activity of national-public organizations [9]. The researcher, who focuses on the political direction of the subject, in his other work talks about the unity of representatives of the national bourgeoisie against riots, the creation of a committee under the name of maintaining order, highlights the measures against the labor protests of 1905, as well as the activities of the Baku City Duma [19].

Historian-scientist I. Baghirova's monograph dedicated to the activities of Azerbaijan's political parties and organizations is also important in terms of the investigation of socio-political processes and the characterization of the political environment in which national-social organizations operate in the studied period [13]. At the beginning of the last century, the author conducted serious research in the direction of reflecting the full picture of the political life of Azerbaijan, and turned important issues such as the formation of existing parties, their activities, and their relationship to the

existing regime into the object of research. In the monograph, not only Muslim, but also Christian (including Russian, Armenian) parties, Zionist and anarchist organizations were analyzed, and the impact of the collapse of the monarchy in Russia on the socio-political life of Azerbaijan was studied.

One of the valuable works related to the investigation of the problem is A. Bayramoglu's study entitled "Education and Enlightenment in Shamakhi (literary environment from the middle of the 19th century to March 1918)" published in 1997 [5]. The book examines the emergence and development of education and culture, including the literary movement of enlightenment in Azerbaijan from the middle of the 19th century to the March massacres of 1918, on the example of Shamakhi, which has an ancient history and rich literary traditions, and gives a scientific assessment of socio-political events. With reference to scientific-historical sources, archival materials and literary-artistic examples, the author illuminates the landscape of our social-literary and national cultural thought history for the first time in a regional aspect.

One of the attention-grabbing works related to this important period of Azerbaijani historiography belongs to J. Allahverdiyev. The author's "IraVan Literary Environment" published in 2010 helped to illuminate one or another aspect of the investigated problem. In his work, the author talks extensively about the activities of prominent Azerbaijani intellectuals who played a major role in the formation and development of Azerbaijan's literary environment in Yerevan and demonstrated national will, the problems faced by Azerbaijani Turks in the context of Armenian chauvinism, the role of the native language press, and educational and educational issues [1].

The reactionary policy of the tsarist ruling circles and the development of capitalist relations after the bourgeois reforms gave impetus to the formation of the Azerbaijani nation and the beginning of the national movement in Northern Azerbaijan at the end of the XIX century. At present, the in-depth study of the socio-political landscape of this period based on the new national theory is one of the important issues of Azerbaijan's history. The relevance of the problem should not be measured only by looking at the topic from new positions, by conducting a critical analysis. This is also important from the point of view of laying the foundations of the initial conditions for the creation of the

democratic model of the national state in Azerbaijan at the beginning of the XX century.

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MEDICAL SCIENCES

PECULIARITIES OF PHYSICAL REHABILITATION IN PARKINSONISM

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ABSTRACT

The main stages are considered in the article are elements of physical rehabilitation in Parkinsonism. Also described and analyzed in detail causes, main signs and stages of Parkinson's. The influence of physical exercises has been studied and briefly described, physiotherapy, various rehabilitation techniques (active and passive therapy options) as well as massage for patients with Parkinson's disease.

Keywords: Parkinson's disease, rehabilitation, parkinsonism, physical exercises, physiotherapy, massage.

The aim of the study: determine the main aspects and features of physical rehabilitation of patients with Parkinson's disease.

Materials and methods. Traditionally, rehabilitation methods for Parkinson's disease can be divided into: 1) a complex of various methods of restoration and

maintenance of differentiated motor functions (motor rehabilitation); 2) technologies with virtual reality; 3) cognitive training to improve cognitive functions; 4) social support and psychotherapy; 5) occupational therapy that supports and restores daily life skills; 6) speech correction.

Table 1.

An example of the effectiveness of motor rehabilitation according to research data and a general meta-analysis in the period from 2001 to 2019.

Research in the period 2001-2019. (Held in Germany, France, the Czech Republic) [26-30]	Number of patients	The technique used during the observation	Performance evaluation criteria	Effectiveness of the technique
7 (3- RKD)	132	Active FT, physical therapy with elements of stretching and stretching exercises, increasing flexibility and stability.	Reduction of stiffness of movements, reduction of fear of falling, confidence of movement	There is insufficient evidence for the effectiveness of stretching ratio, increased flexibility, and correction of patient movement.
23 (19 – RKD)	1065	Therapeutic gymnastics, corrective gymnastics, active FT classes.	Motor functions, walking, balance, movement.	A moderate effect of physical exercises on stable position in space, balance and movement, the main effect was recorded on walking and improving the general physical condition of patients.
29 (23- RKD)	1137	A combination of therapeutic gymnastics and alternation during a cycle of 4 classes of active and passive FT	Motor functions, amplitude of movement in joints, walking, balance, movement.	Positive influence on the dynamics of stabilization and restoration of normal movement and walking. Not intense increase and partial restoration of normal movements in the joints (approaching the physiological norm)
12 (12- RKD)	203	Classes on the treadmill	Walking parameters	Positive influence on walking
15 (9- RKD)	369	Combination of corrective gymnastics, static and dynamic dosed strength loads, classes in water	Movement, muscle tone, muscle strength, walking, balance.	Positive dynamics of improving balance after water classes and improving muscle strength after combining exercises have been recorded

Materials and methods of research. Examination of 19 patients with Parkinson's disease. The average age of the examinees in the general group is 62.1 ± 10.9 years old. A general clinical and neurological examination was performed, assessment of motor functions according to the Unified Parkinson's Disease Assessment Scale, neuropsychological testing (MMSE, Montreal Cognitive Test MoCA, depression scale and Beck anxiety scale, Cloninger-TCI psychological questionnaire, scale Berg's equilibrium). All examinations were divided into 2 groups: the first group consists of 10 patients who received standard medical treatment. 9 other patients of the second group were additionally prescribed physical therapy includes exercises for the development of balance and coordination, which was evaluated by using the Berg balance scale. The groups were matched by age, sex, and duration of the disease.

Research evidence has shown that using a series of balance exercises can reduce the number of falls, improve balance control, and reduce stiffness during

walking. The superiority of one complex of balance correction exercises over another complex, their combination is difficult to assess, since the studies differed in the duration and intensity of the classes. In addition, studies have used different scales to assess balance. In one study, balance was improved by reducing the severity of axial movement disorders when a series of exercises to increase the range of motion of the trunk with gradually increasing amplitude was applied. A combination of strength training, massage, and balance training was more effective in reducing postural instability than balance training alone, and water training helped improve muscle strength and joint range of motion. Recently, the effectiveness of combining a complex of physical exercises and balance training with the use of stabilometric platforms for restoring the correct balance to the limits of the physiological norm in Parkinson's disease has been proven.

According to the stage of Parkinson's disease, each of them has certain tasks of physical therapy

Table 2.

Patient management algorithm.

Model A	Hen-Yar Scale 1-2	Tasks: prevention of a sedentary lifestyle, work with the fear of falling, maintenance or improvement of physical activity
Model B	Hen-Yar Scale 3	Tasks: movement, range of motion, walking, muscle strength.
Model C	Hen-Yar Scale 4	Tasks: Minimization of external assistance in movement, improvement of balance, independent walking
Model D	Hen-Yar Scale 5	Tasks: prevention of bedsores, preservation of vital functions of the body, prevention and development of contractures, prevention of pneumonia, prevention of venous thrombosis.

Conclusions:

1. As of today, Parkinson's disease still not studied enough.
2. Physical rehabilitation for this disease can only be complex and developed in a multi-disciplinary team.
3. Massage is considered one of the main means and element of passive influence on muscle tone. Which course should be followed, taking into account concomitant diseases and pathologies of each individual patient.
4. The active part of physical therapy should be started immediately after the initial diagnosis of the pathology. The initial stages do not require a large amount of equipment or simulators.
5. Active physical therapy, depending on the manifestations of the disease, can begin both with working out and restoring the normal walking pattern and increasing the amplitude of movements and mobility of the joints of the upper and lower limbs.
6. Breathing exercises can be used both for general health purposes and for speech and voice correction.

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EFFECTIVENESS OF THE APPLICATION OF MIRROR THERAPY AND KINESIOTAPING IN THE COMPLEX RESTORATION OF THE MOTOR FUNCTIONS OF THE UPPER AND LOWER EXTREMITIES AFTER ISCHEMIC STROKE

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ABSTRACT

The article is devoted to the study of the effectiveness of the use of mirror therapy and kinesiотaping in the restoration of motor functions of affected limbs after an ischemic stroke.

Keywords: ischemic stroke, mirror therapy, kinesiотaping, rehabilitation.

Formulation of the problem

Stroke was and remains a global medical, social and economic problem in Ukraine and the world, because it leads to serious physical and mental consequences, disability and mortality of the population. According to the data of the Public Health Center of the Ministry of Health of Ukraine, about 17 million cases of stroke occur in the world per year, this is approximately one case every two seconds, in Ukraine - about 140,000 per year, and this is one case every four minutes. As for mortality, approximately six and a half million people die from stroke in the world, and in Ukraine about 50,000 per year [8]. In addition, it is worth noting that millions of people around the world, including in Ukraine, live with the consequences of strokes.

A stroke, as defined by the World Health Organization, is "rapidly developing clinical signs of localized (or general) brain dysfunction with symptoms lasting 24 hours or more or leading to death, with no obvious etiology other than vascular origin" [4].

Ischemic stroke is one of the most common cerebrovascular diseases [5]. Ischemic stroke is an acute violation of cerebral blood circulation that occurs as a result of acute ischemia of the brain and is accompanied by structural and morphological changes in brain tissues and persistent organic neurological symptoms [9].

Ischemic strokes, characterized by blockage of blood vessels in the brain or neck, cause about 80% of all cases of the disease. Three conditions lead to this blockage: 1) thrombosis — the formation of a clot in a blood vessel of the brain; 2) embolism — the movement of a clot from another part of the body (for example, from the heart) to the brain; 3) stenosis — serious narrowing of an artery in the brain [11]. With the aging of society, personal underlying diseases (such as hypertension, diabetes, heart disease, and hyperhomocysteinemia), smoking, alcohol consumption, and other factors, the incidence of IS has been continuously rising [5].

The main stroke risk factors are:

- Age. Stroke occurs in all age groups, but the risk of the disease increases between the ages of 55 and 85.
- Sex. Men have a higher risk of stroke in young and middle age, but more women die of stroke in old age.
- Family medical history. Family members may have a genetic predisposition to risk factors for stroke: diabetes, hypertension, etc.

- High blood pressure / hypertension. Hypertension leads to a 2-4 times increase in the risk of stroke under the age of 80.

- Smoking. Cigarette smoking doubles the risk of ischemic stroke and increases the probability of hemorrhagic stroke by 4 times.

- Heart diseases. Coronary heart disease, valve defects, atrial fibrillation, and enlargement of one of the heart's chambers can lead to blood clots that can rupture and block blood vessels in the brain.

- Presence of transient ischemic attacks.

- Diabetes. Causes destructive changes in blood vessels throughout the body, particularly in the brain. If the blood glucose level is high during a stroke, then the brain damage is usually more severe than when the blood glucose is normal.

- Cholesterol imbalance. When cholesterol accumulates in the blood vessels, it leads to atherosclerosis. Atherosclerosis is the main cause of narrowing of blood vessels, which leads to both heart attack and stroke.

- Physical inactivity and obesity. Obesity and inactivity lead to hypertension, diabetes and heart disease [11].

The high level of stress in the population in connection with the full-scale war is also a provoking factor in the occurrence of strokes in Ukraine.

The purpose of the study: to substantiate the need for mirror therapy and kinesiотaping in the complex restoration of motor functions of the limbs after an ischemic stroke.

Research goals:

1. Determine the features of ischemic stroke and its consequences.

2. Compile an algorithm of rehabilitation measures for people with an ischemic stroke.

The main manifestations of a stroke: sudden deterioration of vision in one or both eyes, confusion with the pronunciation and understanding of words, sudden numbness in the body, face, limbs mostly on one side of the body, loss of coordination and balance of the body, severe headache for no apparent reason, loss of control over limbs, inability to raise both arms at the same time [1].

Symptoms and signs of an ischemic stroke depend on the affected part of the brain. Patterns of neurologic deficits often suggest an involved artery, but the correlation is often imprecise (Table 1) [7].

Table 1

Selected stroke syndromes	
Symptoms and signs	Syndromes
Contralateral hemiparesis (maximum in legs), urinary incontinence, apathy, confusion, poor judgment, mutism, grasping reflex, apraxia of gait	Anterior cerebral artery (infrequent)
Contralateral hemiparesis (worse in arms and face than legs), dysarthria, hemianesthesia, contralateral homonymous hemianopia, aphasia (if dominant hemisphere affected) or apraxia and sensory non-recognition (if non-dominant hemisphere affected)	Middle cerebral artery (common)
Contralateral homonymous hemianopia, unilateral cortical blindness, memory loss, unilateral 3rd cranial nerve palsy, hemibolism	Posterior cerebral artery
Monocular vision loss (amaurosis)	Ophthalmic artery (branch of the internal carotid artery)
Unilateral or bilateral cranial nerve deficits (eg. nystagmus, vertigo, dysphagia, dysarthria, diplopia, blindness), trunk or limb ataxia, spastic paresis, cross-sensory and motor disturbances*, impaired consciousness, coma, death (if basilar artery occlusion full), tachycardia, labile blood pressure	Vertebrobasilar system
Absence of cortical deficits plus one of the following:	Lacunar heart attacks
* Ipsilateral loss of facial sensation or motor weakness with contralateral hemianesthesia or hemiparesis of the body indicates involvement of the pons or medulla oblongata.	

Secondary post-stroke complications after a stroke are pneumonia, pulmonary embolism, post-stroke epilepsy, apalic syndrome, pelvic dysfunction, contractures, tendency to falls, mental and social maladaptation, sleep disorders, isolation syndrome[6].

Physical rehabilitation is an integral component in the process of restoring functioning, maintaining health, restoring functions, forming compensations, improving self-care, reducing dependence on outside help, and returning to a full life.

The main method of rehabilitation of stroke patients with movement disorders is physical therapy (kinesiotherapy), which aims to restore (full or partial) range of motion, strength and dexterity in the affected limbs, balance function, and self-care skills [10].

It is advisable to use kinesiotherapy in combination with kinesiotaping and mirror therapy.

Based on research results Azici G., Guclu-Gunduz A., Bayraktar D., Aksoy S., Nazliel B., Kilinc M., Yildirim S.A., Irkec C [2]. kinesio taping improves the transmission of sensorimotor signals, when applied to the ankle joint an improvement in postural stability was observed. The advantages of kinesio taping are non-invasiveness and duration of action. This method is effective in the treatment of paralysis and paresis, it changes the bioelectric activity in the muscles, thereby reducing spasticity in the affected limb due to neuroreflex mechanisms.

Various mirror neuron-based approaches can be used to restore hand function, namely mirror therapy (MT), action observation (AO), and motor imagery (MI)[12].

MI is a mental rehearsal of the physical movement of a body part. MI-based neurorehabilitation can be used at all stages of stroke recovery and is an adjunct to traditional rehabilitation that improves motor function[3,12].

MT is widely used as a method of rehabilitation. A mirror in the patients' midsagittal plane can reflect the movements of the patients' unaffected limbs super-

imposed on the position of the affected limbs, and create the visual illusion that the affected limbs of the patients can move normally [13]. MT is used to reduce pain, as well as to restore motility of affected limbs. AO is the therapy of observing the everyday actions of others, then the observer's own neural networks react as if a physical action is being performed.

Comprehensive rehabilitation aims and includes:

1. Early start of rehabilitation measures, individual approach and selection of exercises for each patient, continuous and phased use of rehabilitation means, their complex combination, control over performance and control of adequacy of physical load.

2. The rehabilitation program includes the use of kinesiotherapy, breathing exercises, massage, kinesiotaping and mirror therapy.

3. Exercises are performed under the supervision of a physical therapist.

4. Physical activity is dosed according to the patient's condition, his well-being, movement regime and stage of rehabilitation.

5. Positioning of the patient and changing the position of the body is used to avoid pathological postures and bedsores.

6. The main tasks of rehabilitation are: reducing the tone in spasmodic muscles, increasing muscle strength, expanding the amplitude of movements in the joints of the affected limbs, improving the clarity of the execution of movements, training balance and coordination from different starting positions, training the grasp of objects and their movement. support and improvement of basic motor skills and self-care skills. In order to perform these tasks, passive exercises, passive-active exercises, stretching exercises, active exercises, physical exercises from different starting positions, exercises for balance and coordination of movements, exercises for training fine motor skills are performed.

7. Respiratory gymnastics is used to improve the functional state of the respiratory and cardiovascular systems, engages the body's reserve forces, improves

microcirculation and exchange processes, thereby preventing pulmonary complications and stagnation in the body.

8. Performing exercises with a healthy limb while looking at its reflection in a mirror (mirror therapy) helps restore motor functions by forming the principle of feedback.

9. Kinesio taping is effective for stabilizing the muscles and ligaments of the affected limbs and for reducing the tone of spasmed muscles.

10. An important aspect in recovery is the active participation of the patient in the rehabilitation process, personal motivation and desire to work for the result.

Conclusions: So, we can say that movement is the basis of recovery of lost motor functions after an ischemic stroke.

Involvement of mirror therapy contributes to the transmission of impulses to the central nervous system and vegetative centers, as a result of which metabolic and redox processes are improved, the so-called mirror neurons are included in the work, motor activity improves. Kinesio taping helps to stabilize the musculoskeletal apparatus, reduces pain syndromes, normalizes blood circulation and lymph drainage, facilitates the performance of movements in the limbs and increases their amplitude.

The use of mirror therapy and kinesiotopeing in complex rehabilitation after an ischemic stroke has a positive effect and accelerates the recovery of motor functions of the affected limbs.

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FUNCTIONING OF DENTAL PRACTICES IN A COMPLICATED EPIDEMIOLOGICAL SITUATION

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ABSTRACT

The COVID pandemic and the global economic crisis have had a profound impact on the organization, functioning, economic well-being, and professional prospects of dental practices, as well as on the dental health of patients in Bulgaria. In the first months of the COVID pandemic, dental practices faced the difficult task of obtaining scarce personal protection equipment (masks, gloves, overalls, safety goggles, etc.) In addition to their lack, the price at which they could be purchased was also a problem. Dental professionals report a reduced flow of patients for prophylaxis and standard manipulations.

Keywords: dental practices, patients, dental health, COVID pandemic.

At the beginning of the pandemic, one of the main problems was the lack of information about the pathogen - clinical picture, mode of spread, ways to protect, and treatment. For several months, this information was selected by scientists and doctors around the world. The scientific and clinical data on the COVID pandemic are being updated, supplemented, and analyzed to this day. Based on this scientific information, guidelines are being created to prevent infection with the virus, methods to limit the spread of the infection, treatment regimens for the disease, vaccines, and pharmaceutical treatments are being developed.

Impact of the COVID pandemic on dental practices

In relation to the topic, a survey was conducted using a direct anonymous survey method. Data were collected online, using Google forms for the period 2020 -

2021. The sample was typological, collecting data on patients, and dentists. Descriptive and analytical statistical methods were applied: data are presented as absolute numbers and relative share of each category, and age (the only quantitative variable in the survey) as mean and standard deviation. Of the analytical statistics methods, chi-square analysis was applied. Values of $p < 0.05$ were considered significant.

Results:

Data were collected on 206 patients and 193 dentists (dental practitioners). The sample as a whole was predominantly female (77.4%), and this was also true for each of the study groups (71.0% among dentists, and 83.5% among patients). The study subjects were 46.3 years old on average. Table 1.

Table 1.

General characteristics of respondents

Variables		Total		Dentists		Patients	
		N	%	n	%	n	%
Gender	Male	90	22,6%	56	29,0%	34	16,5%
	Female	309	77,4%	137	71,0%	172	83,5%
Age (arithmetic mean±SD)		46,3±11,2		46,0±11,6		46,4±11,0	

Dental practices have been affected by the COVID pandemic in several ways that have had a major impact on their economic status and active functioning. As initially reported, the problem was the lack of information about the pathogen, its spread, methods of prevention, as well as the clinical picture of the disease, and, above all, the lack of clearly defined treatment rules. The many unknowns, as well as the strict restrictive measures that were initially introduced by the government, have led to the closure of a huge number of dental practices. Dental practices were therefore deprived of their profits.

Dentists were asked if they had suspended their activities since the beginning of the COVID pandemic. Over half reported that this had happened to them (59.6%), while the remaining 40.4% had not stopped working. The highest proportion of those who stopped at the beginning, when the state of emergency was declared (86.2%), followed by those who stopped their activities for the duration of their illness or quarantine (6.9%), and another 5.2% stopped during the peak of the epidemic. A further 1.7% reported working according to a reduced schedule almost every month. The survey showed that due to the COVID epidemic, dentists experienced a decrease in patients, with more than half

of dentists (55.6%) reporting this (Table 2). The reduction in patients during the peak of the epidemic was reported by 65.4% of dentists.

The fact that the virus initially attacks and affects and develops in the nasopharynx makes the dentist's work particularly risky. The patient is infectious both during the incubation period - when there are no symptoms - and after he develops a clinical picture of the disease. As highlighted, this makes the working environment of dentists highly risky. Therefore, some dentists - most often older and/or with co-morbidities - severely restrict or stop seeing patients. These actions, driven by concern for their health, lead to financial losses for the dental practices they run.

In everyday dental practice, rotary instruments are continuously used, which, when working in the oral cavity, lead to the swirling of an air-aerosol cloud. If the patient is positive and is a carrier of a COVID infection, viral particles are also swirled in this air-aerosol cloud. Therefore, to reduce the risk of infection and subsequent illness of the dentist and the support team of dental assistants, hygienists, and receptionists in the dental surgery, it is recommended:

1. To use protective clothing, safety masks with the maximum degree of protection, safety glasses with side shields, safety helmets, safety gloves, and shoe covers.
 2. To ventilate the dental surgery
 3. To disinfect the workplace and the surgery
 4. To conduct triage - the dentist takes a history of the patient to report the absence or presence of symptoms for COVID infection (presence or absence of fever, headache, night sweats, scanty running nose, sore throat, conjunctivitis, muscle pain, loss of sense of smell, cough, contact with people sick with COVID)
 5. Availability of a green certificate (vaccine, previous illness, antigen test, PCR)
 6. To conduct a rapid antigen test in dental surgery.
 7. To enrol patients with time off in between.
- Thus, on the one hand, the aim is that the patients do not meet each other in the waiting room as a preventive measure against COVID infection. On the other hand, this ensures the necessary time for cleaning, disinfection, and ventilation of the workplace and work area. These free time intervals between patients are recommended to be in the order of 15-20 min.

Concerning the protective equipment used in the work in the period before the start of the COVID pandemic, dentists were expected to use more and more

varied equipment due to the specific nature of their work. Almost all dentists (97.4%) used a mask; gloves were applied in the practice of almost all dentists (95.9%); protective goggles were used by 75.6% of dentists; protective overalls were used by 14.5% of dentists, bonnets by 22.3% of dentists, and something else by 10.9% of dentists. Helmets, air purifiers, and disposable clothes/towels were the most frequently mentioned in the "other" response. The percentages added up to more than 100 as respondents gave more than one answer. It is possible that some respondents misunderstood the question and answered with the time since the pandemic began in mind.

The dentists surveyed were asked what new precautions they had added since the SARS-CoV-2 pandemic began. A quarter of dentists (26.4%) reported that they had not supplemented their practice with a new means of protection. A mask was added by 25.6% of dentists; gloves were added by 22.3%; protective eyewear was started by 31.1%; overalls by 42.5%; bonnet by 35.8% and something else by 12.4%. In the "other" response, helmets, air purifiers, disposable sheets/clothes, and higher-grade masks (FFP2) were the most common. The percentages sum to more than 100 as respondents gave more than one answer. It is possible that some respondents who were confused by the previous question did not write down the additional protective equipment after the start of the COVID epidemic, as they had already noted them in the previous question.

The majority of dentists responded positively to the question "Do you spend more time per patient appointment to further clean and disinfect the surgery?", 84.5% respectively. The proportion of negative responses was 9.3% and those who could not judge were 6.2%, respectively.

Dentists were asked if they book patients at greater intervals to ensure that patients do not meet in the waiting room for their surgery. The majority of respondents answered in the affirmative: 76.7%, while the remaining 23.3% did not take such a measure.

More than two-thirds of the dentists (70.5%) questioned all their patients about their current health status to identify symptoms of COVID among them. Only at-risk groups are asked by 10.4% of dentists. 17.6% of dentists do not collect such information. Three dentists responded with "other", and their responses indicate that this was an activity they performed at the beginning of the pandemic, but they do not collect such information recently.

Table 2.

Variables		Total		Dentists	
		n	%	n	%
Has the COVID pandemic affected the number of patients visiting your surgery?	Yes, they decreased	114	55,6%	110	57,0%
	No	50	24,4%	48	24,9%
	Yes, they grew	19	9,3%	16	8,3%
	I can not judge	22	10,7%	19	9,8%
Do you notice a noticeable change in the number of patients visiting your surgery related to the peak of the pandemic?	Yes, patients decrease during COVID peaks	134	65,4%	128	66,3%
	No	40	19,5%	40	20,7%
	Yes, patients increase during COVID peaks	9	4,4%	7	3,6%
	I can not judge	22	10,7%	18	9,3%
What personal protective equipment did you use in your practice before the COVID pandemic	I have not used	1	0,5%	0	0,0%
	Mask	199	97,1%	188	97,4%
	Gloves	195	95,1%	185	95,9%
	Safety glasses	153	74,6%	146	75,6%
	Safety overalls	30	14,6%	28	14,5%
	Safety Bonnet	45	22,0%	43	22,3%
	Other	22	10,7%	21	10,9%
	Answer "Other"	Helmet	16		15
	Air Purifier	1		1	
	Disposable clothes/sheets	4		4	
	All that exists as protection!	1		1	
What personal protection equipment have you added to your practice since the start of the COVID pandemic	I have not added a new protection	52	25,4%	51	26,4%
	Mask	54	26,3%	49	25,4%
	Gloves	49	23,9%	43	22,3%
	Safety glasses	63	30,7%	60	31,1%
	Safety overalls	85	41,5%	82	42,5%
	Safety bonnet	71	34,6%	69	35,8%
	Other	25	12,2%	24	12,4%
Answer "Other"	Helmet	15		14	
	Air Purifier	5		5	
	Disposable clothes/sheets	4		4	
	Higher class mask (ffp2)	1		1	
Do you take more time to see one patient to further clean and disinfect the surgery	Yes	173	84,4%	163	84,5%
	No	19	9,3%	18	9,3%
	I can not judge	13	6,3%	12	6,2%
When patients come to your surgery, do you collect information about their current health status to detect symptoms of COVID	Yes, for every patient	142	69,3%	136	70,5%
	Yes, for patients from risk groups	25	12,2%	20	10,4%
	No	35	17,1%	34	17,6%
	Other	3	1,5%	3	1,6%
How is the pandemic affecting the general/dental health of your patients?	Negative	138	67,3%	128	66,3%
	No reflection	65	31,7%	63	32,6%
	Positive	2	1,0%	2	1,0%
During the COVID pandemic, what patients with what need visit your dental surgery	Patients with pain in need of emergency dental care			151	78,2%
	Patients in need of standard manipulations - therapeutic, surgical, periodontal, etc.			171	88,6%
	Aesthetic procedures			53	27,5%
	Other			2	1,0%
Have you suspended your dental practice at any time during the pandemic	Yes			115	59,6%
	No			78	40,4%
Did you stop your dental practice at any time during the pandemic - when	in the beginning, when the state of emergency was declared			100	86,2%
	at epidemic peaks			6	5,2%
	during your illness/quarantine			8	6,9%
	I work at a reduced schedule almost every month			2	1,7%
Do you enroll patients at greater intervals as an anti-epidemic measure so that patients do not meet each other in the waiting room	Yes			148	76,7%
	No			45	23,3%

All these protective equipment, disinfectants as well as the additional time for ventilation, cleaning, disinfection, preventing patients from meeting each other in the waiting room, and conducting a rapid antigen test if there is no green certificate, make the treatment process more expensive and if they are at the expense of the dental practice reduce its financial income, and if they are calculated in the cost of dental treatment lead to the increase in the cost of the dental procedures and are at the expense of patients. If in the first case, we have increased costs that lead to a direct reduction in the dental practice's income, in the second case the increase in the cost of dental procedures leads to a partial outflow of patients, which indirectly has a negative impact on the dental practice's financial income.

Another problem of dental practices related to the COVID pandemic is the supply of dental consumables and materials. In the initial stages of the spread of infection, the supply of protective equipment was extremely difficult to obtain and at speculatively inflated prices. At present, the supply of protective equipment is unproblematic but due to the COVID pandemic on the one hand, the difficulties in the supply of raw materials and electricity on the other hand, and international and national inflationary processes, significant price increases between 50% and 150%, sometimes more, are currently being reported. There are also shortages or severely delayed supplies of some standard dental materials, and here too sustained price increases of 40% or more are being observed. The lack of some materials and/or their increased prices lead to their substitution by others, which on the one hand can worsen the quality of the treatment process and on the other hand when they are replaced by more expensive raw materials, as well as increased prices of personal protective equipment, can make the whole complex of dental manipulations more expensive. Unfortunately, this price increase has a negative impact on some patients, who reduce the number of dental treatments they can pay for or visit dental surgeries offering dental services at lower prices. In the latter situation, the lower price in most cases manifests itself as unsatisfactory quality, which in the long term is again a negative aspect for the patient. The lower financial receipts in the dental surgeries lead to a limitation of cash for the purchase of new materials, updating of the material base of the surgery, and training of the staff, in some cases a reduction of staff is necessary, which again affects the quality of the treatment offered.

Some of the dental practices have used loans and the financial instability caused by the COVID pandemic is leading to the danger of their closure. This is on the one hand a financial problem for the employed staff who are left without a job, a problem for the state social security as the employees register at the unemployment bureau, and a problem for the patients who are faced with the choice of a new dentist and above all a difficult time from a financial and psychological point of view for the owners of dental practices.

Another economic problem indirectly linked to the COVID pandemic is the significant increase in the price of electricity and gas supplies internationally. In Bulgaria, unlike domestic electricity consumers, who use electricity for domestic purposes at a price that is currently limited by a moratorium, dental surgeries, and general practitioners' practices use industrial electricity, which is traded on the free electricity market and is at exchange prices. Many dental practices are subscribers to district heating companies, which is a major cost and high expense.

Dentists in their daily practice use the services of dental technicians. There has been an increase in the prices of dental technician services, which again is indirectly linked to the COVID pandemic and the international chaos it has caused, inflation - international and national, expensive electricity, and difficulty in supplying internationally expensive materials.

Dentistry is a specialty, which is actively developing and is closely related to technical progress. Seminars, training, and professional exhibitions are mandatory parts of the professional development and growth of dentists. In the course of the COVID pandemic and to comply with the anti-epidemic measures, dentists' training has been severely affected.

Impact of the COVID pandemic on patients' dental health

One of the most interesting questions in the survey was "How is the pandemic affecting the dental health of your patients?". Dentists reporting a negative effect resulting from the pandemic were 66.3%. Only two dentists (1%) believe the pandemic is having a positive impact. According to another 32.6% of dentists, the COVID pandemic has had no impact on their patients' overall health.

Dentists were asked what patients who visited their surgeries during the pandemic were suffering from. The highest proportion reported that patients needed standard manipulations (88.6%), but a relatively high proportion also reported that patients came in with pain needing emergency dental care (78.2%). Something else was indicated by another 1%, adding that it was "anything" and long-delayed treatment that was urgent". The percentages added up to more than 100 as participants gave more than one answer.

Among the patients surveyed, the most commonly reported reason for going to the dentist was tooth decay (38.3%), followed by having a crown, bridge, or denture made or replaced (23.3%), a broken tooth (13.6%), cosmetic dentistry (11.2%), tooth extraction (9.2%), tooth pain (0.5%), or something else (14.6%). Among the "other" responses, preventive check-ups predominated, followed by tartar cleaning. The sum of the percentages exceeded 100 as respondents gave more than one answer.

We examined whether there was a difference between dentists' and patients' responses regarding reasons for visiting dental surgery.

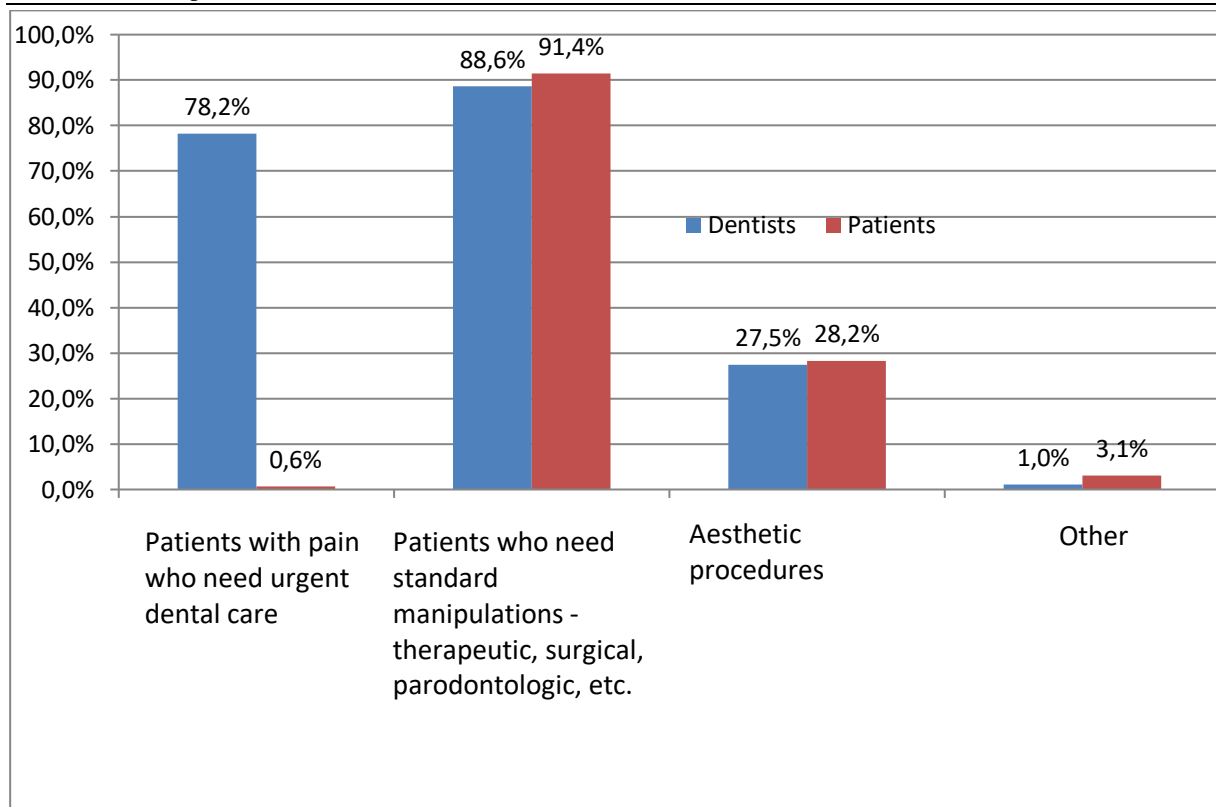


Fig. 1.

Differences in patients' and dentists' responses regarding the reasons that led them to visit dental surgeries.

There was a significant difference in the proportion of physicians and patients reporting a pain visit, $p < 0.001$. There was no significant difference in the responses of dentists and patients who reported a visit for standard, aesthetic, and other manipulations ($p > 0.05$).

In the survey, patients were asked about the frequency of dental surgery visits before the COVID epidemic. More than one-third responded at least once a year (37.9%) and at least twice a year (36.9%), while the remaining 25.2% went to the dentist only for emergencies/pain.

For the majority of patients (60.5%), the COVID epidemic did not affect the number of visits to dental

surgery but one in three (33.2%) reported that the number had decreased, in 0.5% (one patient) it had increased, and another 5.9% could not judge.

Patients who visited a dental surgery for various reasons since the beginning of the COVID epidemic were 79.1%, while 20.9% did not.

Differences were sought in dentists' and patients' responses to the questions "Has the COVID pandemic affected the number of patients visiting your surgery?" (for dentists) and "Has the COVID pandemic affected your standard number of dental surgery visits on an annual basis?" (for patients). The two groups were shown to respond differently, with differences persisting even when eliminating the "can't judge" response, $p < 0.01$.

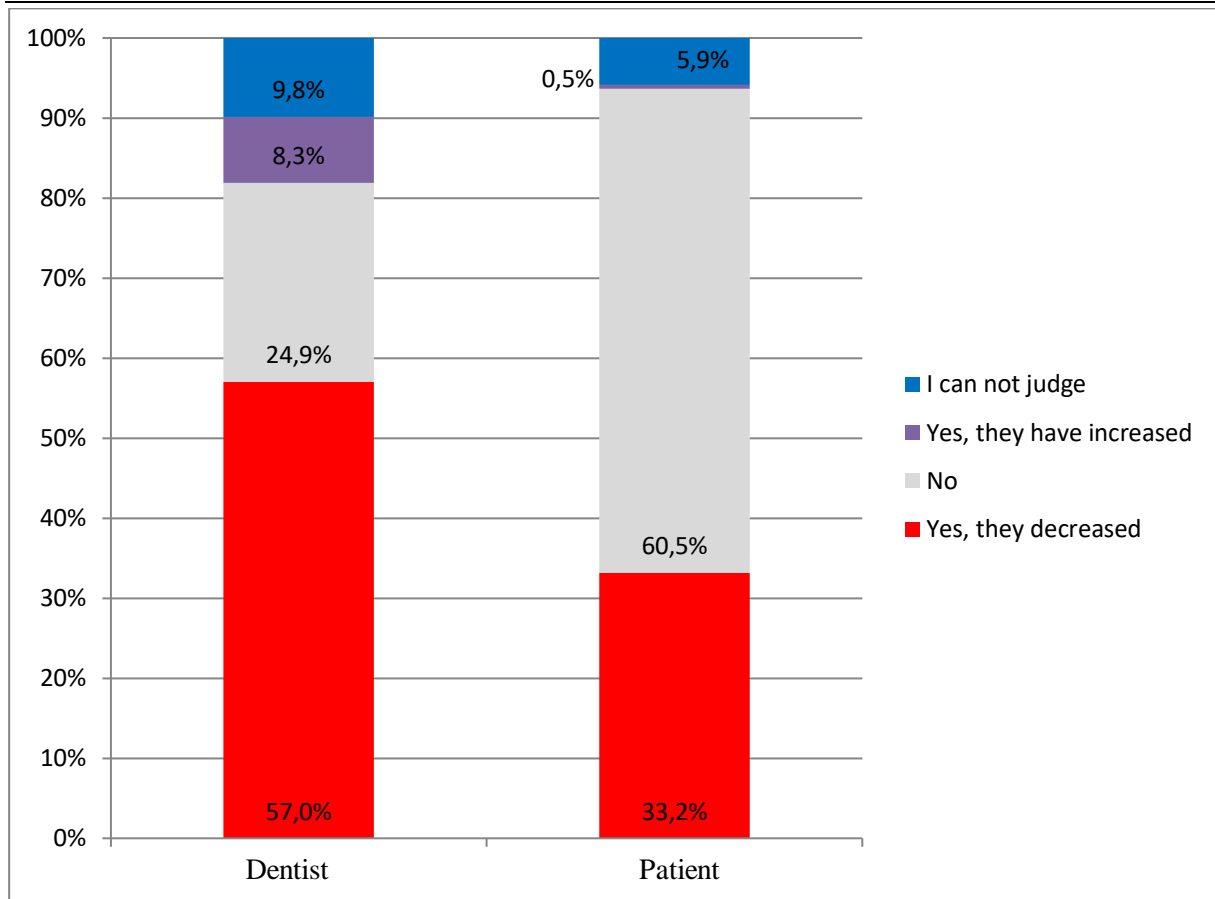


FIG. 2. Impact of the COVID pandemic on dental surgery visits according to patients and dentists

A possible explanation for this imbalance in responses between patients and dentists is that the survey was taken by patients who on the one hand were proactive in general life and on the other hand were responsible for their general and in particular their dental health. For them, the number of visits to dental surgery on an annual basis has remained virtually unchanged despite the pandemic. A large proportion of these patients visit the same dental practice for many years. They are satisfied with the services offered and have

faith in the work of the dentist as well as the sterilization and disinfection carried out in the practice. These are patients with well-maintained oral health and usually need standard dental manipulations that are not emergencies. On the other hand, dental practices are also visited by patients who are irresponsible with their dental health and it can be assumed that the COVID pandemic has reinforced this irresponsibility, which according to dentists has manifested itself in a decrease in the total number of patients visiting dental practices and an increase in pain emergencies.

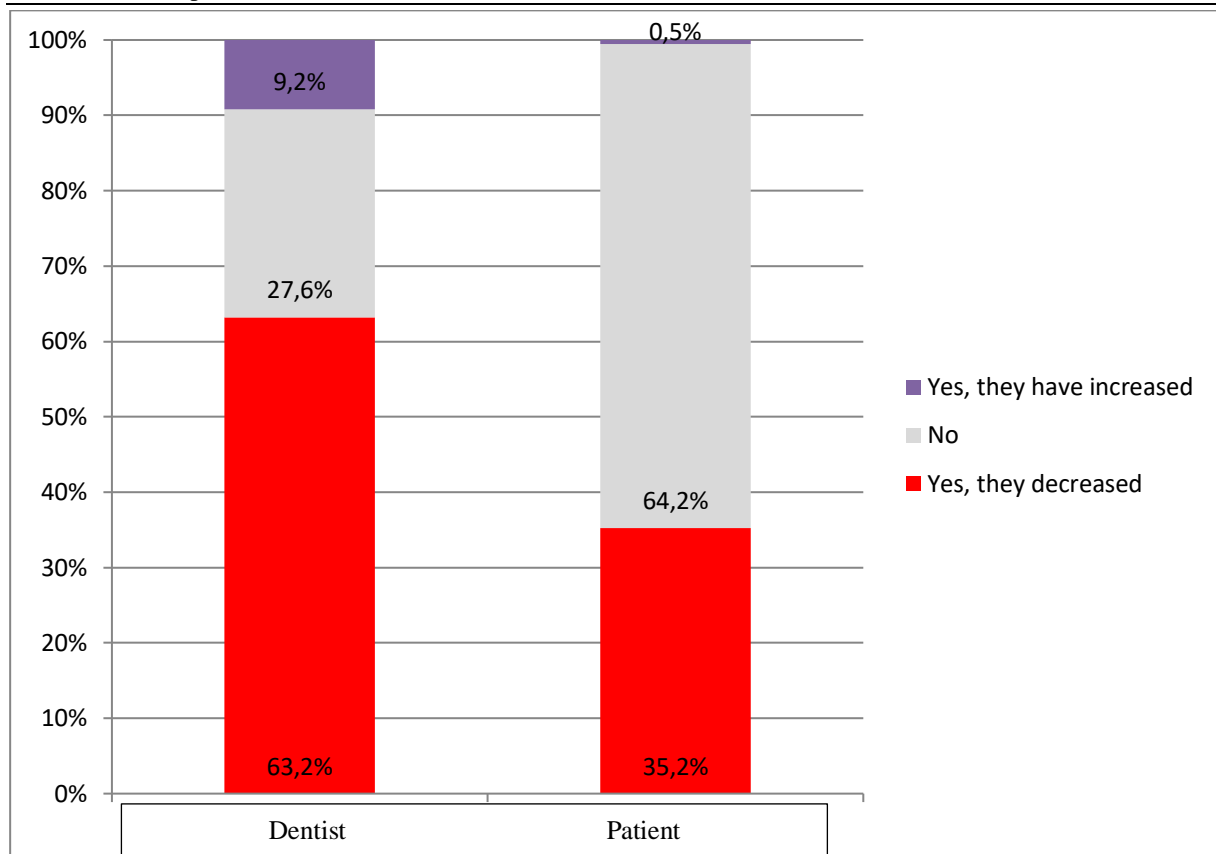


Fig. 3. Differences in responses of patients and dentists regarding the intensity of dental treatment during the COVID pandemic.

Because the mean values of patients according to their answers to the question "Has the COVID pandemic affected your standard number of dental surgery visits per year?" varied, patients were divided into 4 groups according to their age, in 15-year intervals.

Table 4.

Age markers of dental surgery visits during the COVID pandemic.

Your age

Has the COVID pandemic affected your standard number of dental surgery visits per year?	Arithmetic mean	n	Standard deviation
Yes, they decreased	49,1	68	10,8
No	44,7	124	10,6
Yes, they increased	37,0	1	.
I can not judge	49,3	12	14,0
Total	46,4	205	11,0

Due to the small number of patients in the individual responses ("yes, increased" and "can't judge"), they were excluded from the analysis because they violated the conditions for its application (number of expected frequencies in cells above 5). Different age groups were shown to respond significantly differently to this question, $p=0.013$: as age increased, more patients reported that the number of visits to dental surgery decreased.

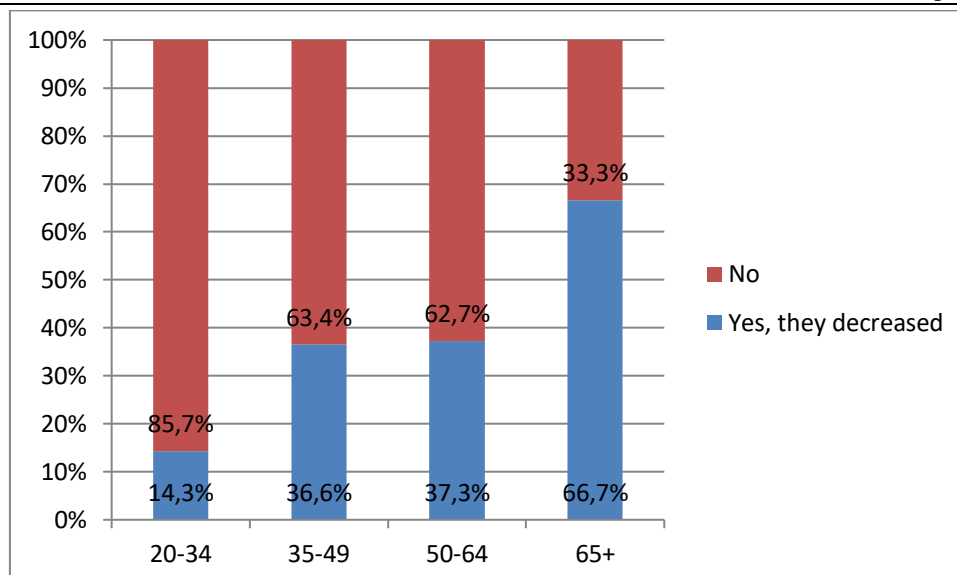


Fig. 4. Patients' responses regarding their perceived risk of COVID when visiting the dentist and physician and age comparability of the problem.

Patients were asked if they considered it risky to visit their dentist. 35.0% and 48.5%, respectively, rated going to the dentist as risky; for 48.5%, going to the dentist was not risky. 16.5% could not judge their dentist appointment (Table 3).

Tab. 3.

Patient responses		n	%
Variables			
In your opinion, is it risky to visit the dentist because of the COVID pandemic?	Yes	72	35,0%
	No	100	48,5%
	I can not judge	34	16,5%
How often did you visit the dentist before the COVID pandemic (March 2020)	Only if necessary (emergency/pain)	52	25,2%
	At least once a year	78	37,9%
	At least twice a year	76	36,9%
Has the COVID pandemic affected your standard number of dental surgery visits per year?	Yes, they decreased	68	33,2%
	No	124	60,5%
	Yes, they increased	1	,5%
Have you visited a dentist since the beginning of the COVID pandemic (March 2020)	I can not judge	12	5,9%
	Yes	163	79,1%
	No	43	20,9%
On what occasion did you visit the dental surgery during a pandemic	Pain in a tooth	1	0,5%
	Caries	79	38,3%
	Broken tooth	28	13,6%
	Tooth extraction	19	9,2%
	Making or replacement of crowns, bridges, dentures	48	23,3%
	Aesthetic dentistry	23	11,2%
	Other	30	14,6%
Answer "Other"	Prophylactic examination	17	
	Cleaning tartar	7	
	Other	6	

Some patients, mostly the elderly, are embarrassed to visit dental surgery because of their fear of COVID infection. Patients are found to miss their regular annual check-ups. This leads to undiagnosed problems in the meantime, aggravating them medically and making them more expensive financially. It is reported that there are patients who started treatment before the COVID pandemic but did not complete it or interrupted it. Subsequently, the interruption of the treatment led to a worsening of the clinical findings in the oral cavity and a corresponding change in the treatment plan. An

increased percentage of periodontal disease was found. The explanation on the one hand is the patient's fear of COVID infection and consequently not coming to the dental surgery for a prophylactic examination and professional oral hygiene. On the other hand, it was found that when working online, at home, patients significantly underestimated their oral hygiene, and when a prophylactic examination was performed on patients who had impeccable hygiene and healthy periodontal health, the absence of plaque, gingival inflammation,

and presence of dental plaque was found. This is indicative of neglected personal oral hygiene at home and leads to the development of caries and its complications at a later stage besides periodontal disease. During the peaks of the different waves of the COVID pandemic, there was a decrease in patients visiting dental surgeries. At these times, the patients who visit dental surgeries most often present with an acute dental problem accompanied by pain.

In some patients, there is a temporary postponement of restorative dental manipulations that are not characterized by urgency. This postponement is on the one hand due to the fear of COVID infection, on the other hand to financial problems caused indirectly by the COVID pandemic, and thirdly to the lack of vaccination certificates at the moment.

Because they have not sought dental care because of concerns about COVID infection, some patients complain of gastrointestinal problems caused by poor mechanical processing in the oral cavity. Patients with uncontrolled diabetes due to lack of examination by an

endocrinologist are found to have periodontal problems.

Before the availability of vaccines, some patients had expressed concern about infecting their elderly relatives and therefore refrained from visiting the dentist. With the advent of vaccines in the fight against the COVID pandemic, the worries of infecting both dentists and patients have diminished.

It is interesting to see the difference between doctors' and patients' responses regarding dental health. It turns out that the two groups (doctors and patients) have different opinions about the impact of the pandemic on people's dental health: the proportion of those who think the impact is negative is similar, 67.3% of doctors and 61.2% of patients, respectively. The percentage of individuals believing that the pandemic had no impact was significantly higher among physicians (31.2%) than among patients (19.7). In contrast, only 1% of physicians and as many as 19.1% of patients expressed the opinion that the COVID pandemic had positively affected their health. The differences were significant, with $p < 0.001$

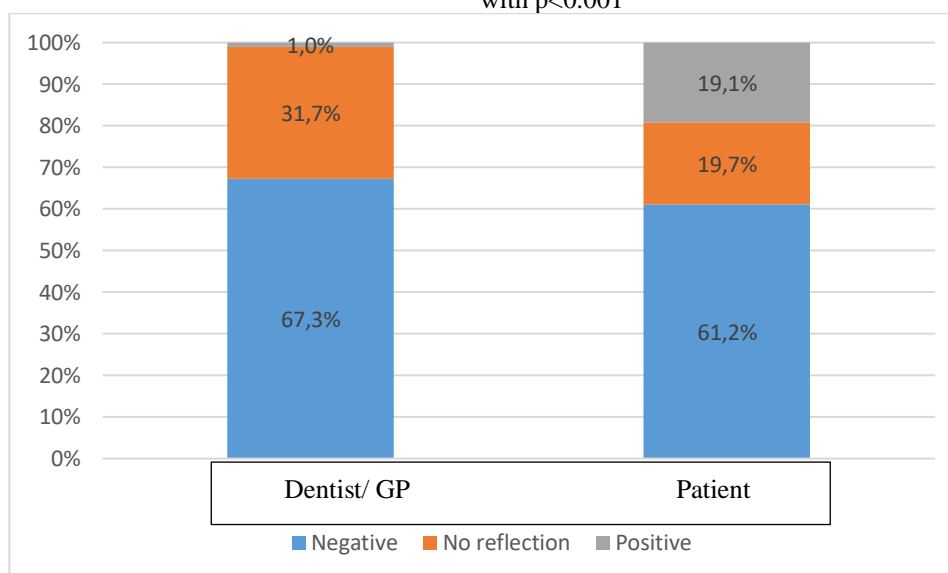


Fig. 4. Distribution of responses to the question "How has the COVID pandemic affected dental health" by respondent type (relative proportion of responses for the respective respondent type)

Conclusion:

In dental offices, the patient flow, the standard course of dental treatment as well as the financial revenues are seriously affected by the COVID pandemic in several ways.

1. Dentists perform treatment activities in a high-risk environment where the likelihood of a COVID infection is significant. As a precautionary measure for dental professionals and their teams, in addition to personal protective equipment, strict disinfection, ventilation, the use of UV lamps, and buffer periods of free time between patients, vaccination is recommended as the method of protection of the highest importance.

2. As a result of the COVID pandemic, the financial profits of dental practices have fallen due to a reduction in patient flow (patients who have fallen ill, patients worried about the risk of infection, patients without a green certificate, patients declaring an inability to currently pay the increased prices of dental services).

3. Difficulties in the standard treatment process due to lack or delayed supply of certain dental consumables and materials and their replacement with analogues, which affects the quality and pricing of treatment procedures.

4. Increasing costs of dental clinics based on expensive electricity, increased prices of dental consumables and materials, more time spent on cleaning, ventilation, disinfection - chemical and physical with (UV lamps), additional finances for the purchase of personal protective equipment, increased prices of dental services, etc.

As a result of the COVID pandemic, patients have seen their dental health deteriorate due to a lack of regular preventive check-ups. Also, a worsening of existing pathologies is reported again due to a lack of timely dental care. For some patients, the problem lies in their fear of infection, while for others, the increased cost of dental services appears to be an insurmountable obstacle at present.

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PHYSICAL THERAPY IN THE TREATMENT OF FACIAL NERVE NEUROPATHY

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ABSTRACT

This article is devoted to studying the effectiveness of physical therapy in the treatment of facial nerve neuropathy.

Keywords: facial nerve neuropathy, physical therapy, massage, ultrasound, electrical stimulation, facial muscle paralysis, quality of life, treatment.

Problem statement.

The facial nerve (Latin: nervus facialis) provides innervation to all the facial muscles, the stapedius muscle of the middle ear, most exocrine glands of the head (except for the parotid glands), including the tear glands, nasal and oral mucosa glands. This structure also functions as a taste receptor for the anterior two-thirds of the tongue and provides sensitivity to a small area of the ear [3]. Bell's palsy is the result of damage to the facial nerve, which can be caused by frequent exposure to cold, infections, intoxications, or trauma. This condition was first described in 1836 by Scottish physiologist Charles Bell, and it was named after him. Bell's palsy is accompanied by serious physical and psychological problems such as facial asymmetry, drooling, and other symptoms that can affect the patient's social activity [12]. Facial nerve neuritis is an inflammatory lesion of the nerve that innervates the facial muscles on one side of the face [4]. As a result, weakness develops in the muscles, leading to a decrease (paresis) or complete absence (paralysis) of facial movements and causing facial asymmetry.

Facial nerve neuritis is the most common among cranial nerve disorders in children [5], while in adults, it ranks second among cranial nerve disorders. The prevalence of this condition among children is explained by the anatomical features of the facial nerve [5]: 1) in children, the fallopian canal is not yet fully formed, so the facial nerve exits practically under the

skin from the temporal bone, increasing the risk of injury compared to adults; 2) the nipple-like projection of the temporal bone is also not fully formed in children, making this nerve less protected from injury.

Currently, viruses are believed to play an important role in the development of facial nerve neuritis. Studies in recent years have shown that patients with this disease have increased titers of antibodies to viruses such as herpes simplex, Epstein-Barr, influenza, and adenoviruses in their blood. Neuritis often occurs as a result of hypothermia [4]. For a long time, the pathogenesis of facial neuropathy was explained by various theories, including vascular, inflammatory, and others [6]. Nowadays, facial neuropathy is considered as one of the variants of a tunnel syndrome. Recent studies confirm the sequence of changes that occur with this disease, namely: "ischemia, edema, compression" or "primary ischemia, edema, compression, secondary ischemia". The development of inflammation and edema leads to compression and ischemia of the facial nerve. Prolonged and pronounced compression of the nerve can result in demyelination and secondary degeneration of nerve fibers [5; 4; 11].

Clinical manifestations of facial nerve neuropathy depend on the level of nerve damage. The main clinical symptom is paresis or paralysis of the facial muscles on the corresponding side of the face, leading to facial asymmetry. In addition, ophthalmological symptoms such as inability to close the eye due to paralysis of the

eye's circular muscle, tearing, and drooling due to paralysis of the mouth's circular muscle on the affected side may occur [5; 8].

Research by Ukrainian scientist O.V. Bismak suggests that facial nerve damage can lead to irreversible tissue processes in the nerve. This type of nerve damage usually cannot be restored, which can lead to trophic disturbances in facial muscles [3]. In 10-25% of cases, after treatment for facial nerve neuropathy, the function of facial muscles is not completely restored, and in 18% of cases, a cosmetic defect is observed. Post-neuritic contracture is formed in 16% to 32% of cases [1].

The question of the treatment and rehabilitation of patients with facial nerve palsy still does not have a definitive answer. Physical rehabilitation can play an important role in restoring facial nerve function after its damage.

Objective: To determine the effectiveness of comprehensive physical rehabilitation in the treatment of facial nerve palsy.

Method

This study was conducted at the Ternopil Municipal Hospital No.2. The study included 20 patients with facial nerve palsy, 12 (55%) males and 8 (45%) females. The age of the examined patients ranged from 49 to 63 years. All patients underwent a comprehensive examination, which included questioning and examination. The House-Brackmann scale [7; 9] was used to assess the severity of facial nerve damage. The medical facility followed the relevant regulatory documents in determining the diagnosis and treatment of patients.

Results and Discussion

The general condition of patients with facial nerve palsy who were examined was characterized by the following impairments: inability to fully close the eye on the affected side, weak facial muscle movements, unevenness of the face at rest, and absence of forehead movements. Upon admission to the hospital, all patients had a similar level of severity of facial nerve palsy, including severe dysfunction corresponding to 5 points on the House-Brackmann scale.

In addition to standard treatment for all patients with facial nerve palsy, physical rehabilitation measures were applied to restore normal tone of facial muscles, function of eyelids, and overall body tone. A physical rehabilitation program was developed, which included morning exercises, sound therapy, facial muscle exercises, therapeutic massage, self-massage, and physiotherapy measures.

The goal of physical therapy was to restore independent movements of the facial muscles and symmetry between the sides of the face in patients. To

achieve this goal, special exercises were used, starting with sound gymnastics and lip movements that are responsible for articulation, and then progressing to performing simple movements of facial muscles. Patients were recommended to practice sounds "b", "v", "p", "f", "z", which were combined with sounds "s" and "u" in front of a mirror. The criterion for successful treatment was the restoration of the ability of patients to whistle on exhaling and to purse their lips.

To restore independent movements of the facial muscles on the affected side and achieve maximum symmetry between the healthy and affected sides, patients performed special exercises for the facial muscles. These exercises included raising and lowering the eyebrow arch, inflating the cheek with pressure, closing and opening the eye, puckering the lips for whistling, protruding the tongue, baring the teeth, raising and frowning the brow, as well as pulling the cheek with the mouth closed. Initially, these exercises were performed with the help of hands and then independently in front of a mirror up to 5 times a day. A physical therapist ensured the correct execution of the exercises to avoid the formation of pathological conditioned reflex connections. The pace of exercise was moderate. At the beginning of the course, 10-15 repetitions of each exercise were done, and then the number of repetitions increased by 3-5 every day until reaching 30-40 repetitions. The amount of hand assistance decreased gradually as the amplitude of independent movements and the strength of the paralyzed muscles' contraction increased to avoid fatigue in the affected muscles. Exercises for the facial muscles alternated with strengthening and respiratory exercises.

To maintain muscle tone on the affected side, therapeutic massage of the cervical-collar zone, face, and scalp was used. The massage began with therapeutic massage of the cervical-collar zone. Therapeutic massage of the chest-clavicular-nipple-shaped muscles included stroking, rubbing, and kneading.

To achieve an anti-inflammatory effect, improve blood and lymph circulation in the facial muscles, and improve the conductivity of the facial nerve, an ultra-high frequency (UHF) electric field was applied to the area of branching of the facial nerve. The UHF therapy was performed using the UHF-80-3 apparatus.

Table 1 contains a list of components of the physical rehabilitation program, the number of procedures, and their duration. The sequence of performing the procedures in the physical rehabilitation program corresponded to the order indicated in Table 1.

Table 1

medical rehabilitation services	The number of classes	The duration of the lesson	The total duration of the lesson	The room where the procedure takes place
Morning hygienic gymnastics	1	15-20 min.	20 min.	chamber
Audio gymnastics	1	5-10 min.	10 min.	physical therapy office
Gymnastics for facial muscles	1	15-20 min.	20 min.	physical therapy office
Therapeutic facial massage	1	15-20 min.	20 min.	massage room
Therapeutic scalp massage	1	15 min.	15 min.	massage room
UHF	1	10 min.	10 min.	office of physiotherapeutic procedures

After undergoing physical rehabilitation, certain changes were observed in the patients. According to the House-Brackmann scale, after 7 days of following the program, 4 (20%) patients did not show any noticeable improvement in their clinical condition. The severity of facial nerve impairment changed from 5 to 4 on the scale (indicating moderate dysfunction) in 12 (60%) patients, while in 4 (20%) patients, it changed from 5 to 3 (indicating mild dysfunction). After a 14-day course

of treatment and physical rehabilitation, significant improvements in health were observed in all patients. Following the physical rehabilitation program, 12 (60%) patients had moderate dysfunction of the facial nerve (rated 4 on the House-Brackmann scale), while 8 (40%) had mild dysfunction of the nerve (rated 3 on the House-Brackmann scale).

Table 2 contains the results of the impact of physical rehabilitation.

Table 2

Severity of urafacial nerve points	Volume of patients					
	Before rehabilitation		On the 7th day of rehabilitation		On the 14th day of rehabilitation	
	Abs.	%	Abs.	%	Abs.	%
5 (severe dysfunction)	20	100	4	20	0	0
4 (severe dysfunction)	0	0	12	60	20	60
3 (severe dysfunction)	0	0	4	20	8	40

The results of physical rehabilitation were analyzed separately by symptoms, and it was found that after 14 days of applying the physical rehabilitation program, all patients showed positive changes in individual indicators.

Conclusion

After using a complex of physical rehabilitation, which included morning hygiene exercises, sound gymnastics, facial muscle exercises, therapeutic massage of the neck-collar zone, facial massage, therapeutic massage of the hairy part of the head, electric field therapy for the branching area of the facial nerve, and self-massage of the face, restoration of moderate dysfunction of the facial nerve was achieved in 60% of cases and mild dysfunction in 40% of cases in all patients with severe nerve damage. In addition, all patients regained symmetry of the nasolabial folds and normal tear and salivary secretion. These results were achieved within 14 days of rehabilitation measures.

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АНОМАЛИИ РАЗВИТИЯ И ПАТОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ ЭКСТРАЭМБРИОНАЛЬНЫХ ОБРАЗОВАНИЙ: СОВРЕМЕННЫЙ ОБЗОР С УЧЕТОМ МЕЖДУНАРОДНОЙ ПРАКТИКИ И СТАТИСТИКИ

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ANOMALIES OF DEVELOPMENT AND PATHOLOGICAL CHANGES OF EXTRAEMBRYONIC FORMATIONS: A MODERN REVIEW TAKING INTO ACCOUNT INTERNATIONAL PRACTICE AND STATISTICS

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АННОТАЦИЯ

В статье представлены аномалии развития и патологические изменения экстраэмбриональных образований могут привести к серьезным осложнениям для здоровья развивающегося плода. В данной статье проведен обзор аномалий и патологических изменений амниона, хориона, плаценты, желточного мешка и пуповины, а также представлена актуальная статистика и международная практика в этой области.

ABSTRACT

The article presents developmental anomalies and pathological changes in extraembryonic formations that can lead to serious complications for the health of the developing fetus. This article provides an overview of anomalies and pathological changes in the amnion, chorion, placenta, yolk sac and umbilical cord, as well as current statistics and international practice in this area.

Ключевые слова: амнион, хорион, плацента, желточный мешок, пуповина, аномалии развития, патологические изменения, статистика, международная практика.

Keywords: amnion, chorion, placenta, yolk sac, umbilical cord, developmental abnormalities, pathological changes, statistics, international practice.

Введение

Экстраэмбриональные образования играют важную роль в раннем развитии плода и включают такие структуры, как амнион, хорион, плацента, желточный мешок и пуповина. Аномалии и патологические изменения этих образований могут вызывать серьезные последствия для здоровья плода, такие как задержка роста, гипоксия, инфекции и даже смерть. В данной статье мы рассмотрим основные аномалии и патологические изменения экстраэмбриональных образований, представим актуальные статистические данные и международную практику в области диагностики и лечения.

Обзор аномалий и патологических изменений экстраэмбриональных образований

2.1. Амнион и хорион

2.1.1. Амниотические ленты (амниотический синдром)

Амниотические ленты представляют собой волонистые ленты, образующиеся в амниотической полости. Они могут вызвать сдавление и искажение развивающихся структур плода [Кардос et al., 2019].

Инцидентность амниотического синдрома составляет около 1 на 1200-15000 родов [Насонова и Морозова, 2016].

Возможные последствия включают ампутации, врожденные деформации и смерть плода [Бенн и Мардер, 2020].

2.1.2. Хориоамнионит

Хориоамнионит - это бактериальное воспаление амниона и хориона, часто вызываемое инфекциями, такими как *Escherichia coli* или *Streptococcus*

agalactiae [Тагер и Катар, 2017]. Инцидентность хориоамнионита составляет около 2-4% всех родов [Смирнова et al., 2021]. Осложнения могут включать преждевременный разрыв плодных оболочек, преждевременные роды, сепсис и даже смерть новорожденного [Смирнова et al., 2021].

2.2. Плацента

2.2.1. Приращение плаценты

Приращение плаценты - это аномальное сращение плаценты с миометрием, которое может привести к кровотечению после родов и потребности в гистерэктомии [Райт и Митчелл, 2018]. Инцидентность приращения плаценты составляет 1 на 2500 родов [Шарма и Райт, 2018]. Факторы риска включают повторные кесаревы сечения, многоплодные беременности и плацентарные аномалии [Брек и Брент, 2019].

2.2.2. Предлежание плаценты

Предлежание плаценты - это аномальное расположение плаценты, когда она частично или полностью перекрывает шейку матки, что может привести к кровотечению и проблемам при родах. Инцидентность предлежания плаценты составляет около 1 на 200 родов [Буш и Ли, 2020]. Лечение включает планирование кесарева сечения, чтобы избежать кровотечения и других осложнений [Буш и Ли, 2020].

2.2.3 Аномалии плаценты

Встречаются аномалии размера (гипо- и гиперплазия) и строения плаценты, опухоли, а также аномалии ее локализации и прикрепления (*placenta accreta*).

Гипоплазия плаценты - нарушение, при котором ее вес составляет менее 1/10 веса плода (в норме он равен 1/6-1/7), а толщина - менее 2 см. Гипоплазия плаценты наблюдается у женщин с многоводием, гестозом, гипертонической болезнью, при плацентарной недостаточности, ювенильной форме сахарного диабета с васкулопатией. Гипоплазия плаценты в большинстве случаев сочетается с задержкой развития плода. Гиперплазия плаценты - нарушение, при котором ее вес составляет 1/3-1/2 веса плода. Гиперплазия плаценты встречается при тех же состояниях, что и многоводие.

Аномалии формы могут быть различными.

Кольцевидная плацента - *placenta annularis*: из-за отсутствия *decidua spongiosa* и *decidua compacta* центральная часть плаценты склерозирована.

Двудольчатая плацента - *placenta bilobata* - чаще встречается в варианте добавочной доли плаценты; добавочные доли формируются из ткани трофобласта, не подвергшейся атрофии, и могут располагаться на некотором расстоянии от плаценты, при этом они соединяются с плацентой оболочками, по которым проходят сосуды; задержка добавочной доли в матке после рождения последа может вызвать кровотечение.

Окончатая плацента - *placenta fenestrata* - клинического значения не имеет. Плацента, окруженная валиком, - *placenta circumvallata* - формируется в результате отслойки и скручивания краев плаценты в ранние сроки беременности; при этом гладкий хорион расположен в виде валика вокруг хориальной пластинки; если отслойка и скручивание произошли по самому краю плаценты, формируется плацента, окруженная ободком, - *placenta marginata*; в большинстве случаев проявления отсутствуют, и аномалию обнаруживают случайно при осмотре последа; возможны кровотечение и подтекание околоплодных вод в течение беременности, преждевременные роды, пороки развития и гибель плода [Радзинский В.Е., 2020].

2.3. Желточный мешок

2.3.1. Персистирующий желточный мешок

Продолжительное существование желточного мешка после обычного срока его исчезновения может свидетельствовать о наличии хромосомных аномалий или других врожденных дефектов [Деркач и Каминский, 2019]. Инцидентность персистирующего желточного мешка составляет около 1 на 3000 родов [Морган и Пристер, 2016]. Риск развития такого состояния может быть связан с материнскими факторами, такими как возраст, курение или применение определенных лекарств [Деркач и Каминский, 2019].

2.4. Пуповина

2.4.1. Одноартериальная пуповина

Одноартериальная пуповина - это аномалия, при которой в пуповине присутствует только одна артерия вместо двух, что может привести к нарушению кровообращения и развитию плода [Бренд и Карлсон, 2020]. Инцидентность одноартериальной пуповины составляет около 1% всех родов [Бренд и Карлсон, 2020].

В некоторых случаях одноартериальная пуповина может быть связана с хромосомными аномалиями, врожденными пороками сердца и другими врожденными дефектами [Бренд и Карлсон, 2020].

2.4.2. Узлы на пуповине и запутанность пуповины

Узлы на пуповине и запутанность пуповины могут вызвать нарушение кровообращения плода и гипоксию [Карпенко и Ковалева, 2017]. Инцидентность узлов на пуповине составляет около 1% всех родов, а запутанность пуповины - 2-5% [Карпенко и Ковалева, 2017]. Врачи должны тщательно следить за состоянием плода во время беременности и родов, чтобы своевременно выявить и устранить возможные осложнения.

3. Пузырный занос: обзор, этиология, клиническая картина и лечение

Пузырный занос - это редкое гистологическое состояние, которое характеризуется многочисленными гроздевидными образованиями в виде пузырьков различной формы и размера на ворсинах хориона. Каждый пузырек представляет собой измененную ворсину хориона, и процесс может сопровождаться водянистым перерождением клеток. Хотя этиология пузырного заноса до сих пор остается неизвестной, существуют две основные теории: перерождение яйца или перерождение децидуальной оболочки материнского организма.

Клиническая картина пузырного заноса может проявляться следующим образом:

Периодические кровяные выделения из матки, которые усиливаются с ростом матки.

Быстрый рост матки, превышающий срок беременности.

Неравномерная консистенция матки и увеличенные яичники при пальпации.

Диагностика пузырного заноса основывается на клинических симптомах, результате ультразвукового исследования и определении уровня хорионического гонадотропина (ХГЧ) в моче пациента. Важно проводить дифференциальную диагностику с другими состояниями, такими как многоплодная беременность, острое многоводие, самопроизвольный аборт, миома матки и неправильно определенный гестационный срок.

Лечение пузырного заноса является только оперативным. В зависимости от срока беременности и состояния плода.

Лечение пузырного заноса является операционно-хирургическим. Метод вмешательства выбирается в зависимости от срока беременности и состояния шейки матки. В некоторых случаях применение сокращающих средств может способствовать самопроизвольному рождению заноса.

Если шейка матки уже раскрыта, врачи могут производить осторожное удаление пузырного заноса с помощью кюретажа, предварительно введя препараты для сокращения матки и предупреждения ее перфорации.

При закрытом внешнем зеве и размере матки, соответствующем беременности не более 3 месяцев, проводится расширение цервикального канала,

после чего матку опорожняют с помощью вакуум-аспиратора.

Важно провести гистологическое исследование полученного соскоба, чтобы исключить злокачественное перерождение. При отсутствии злокачественного перерождения пациентка должна быть выписана из больницы и продолжать наблюдение у врача женской консультации. Для своевременного обнаружения хорионэпителиомы рекомендуется регулярно исследовать мочу на наличие ХГЧ.

Прогноз для пациентов с пузырным заносом в основном зависит от своевременности диагностики и адекватности проведенного лечения. В большинстве случаев, если пузырный занос обнаруживается и лечится на ранних стадиях, прогноз является благоприятным.

Однако существует небольшой риск развития злокачественного перерождения в хориокарциному. В таких случаях, прогноз может быть менее благоприятным, и пациентам потребуется химиотерапия и интенсивное наблюдение врачом.

Также после лечения пузырного заноса у пациентки может возникнуть проблема с последующими беременностями. Риск возникновения повторного пузырного заноса увеличивается, поэтому рекомендуется тщательное планирование и контроль за будущими беременностями. Пациентка должна обязательно проходить регулярные осмотры у врача-гинеколога и, при необходимости, проводить дополнительные исследования.

В целом, прогноз после лечения пузырного заноса является благоприятным, если пациентка следует всем рекомендациям врача и проводит наблюдение за своим состоянием.

Международная практика и статистика

Современные методы диагностики, такие как ультразвуковое исследование, магнитно-резонансная томография и пренатальная диагностика, позволяют своевременно выявлять аномалии развития и патологические изменения экстраэмбриональных образований [Смирнова et al., 2021]. Во многих странах рекомендуется проведение рутинных ультразвуковых исследований во время беременности для своевременного выявления возможных аномалий [Антонова и Иванов, 2019].

Согласно статистике, инцидентность аномалий развития и патологических изменений экстраэмбриональных образований может варьироваться в зависимости от географического региона и этнической принадлежности [Павлова и Белоусова, 2018]. Кроме того, в разных странах могут применяться различные подходы к лечению и реабилитации пациентов с аномалиями и патологическими изменениями экстраэмбриональных образований [Тагер и Катар, 2017].

Заключение

Аномалии развития и патологические изменения экстраэмбриональных образований являются

серьезной проблемой в области перинатологии и могут привести к значительным осложнениям для развивающегося плода. Современные методы диагностики и лечения позволяют своевременно выявлять и корректировать эти состояния, что в целом способствует снижению инцидентности осложнений и улучшению прогноза для плода и матери. Благодаря международному сотрудничеству и обмену опытом в этой области, врачи и ученые продолжают изучать новые методы диагностики и лечения аномалий развития и патологических изменений экстраэмбриональных образований, что без сомнения, будет способствовать улучшению качества жизни и здоровья беременных женщин и их детей.

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Конфликт интересов

Автор заявляет об отсутствии конфликта интересов.

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PEDAGOGICAL SCIENCES

COMPLIANCE OF QUALITY MANAGEMENT OF GENERAL EDUCATION WITH THE GENERAL LAWS OF MANAGEMENT AND TEACHING-LEARNING PROCESS

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Abstract

The article emphasizes that improving the quality of general education and finding management ways that determine the expected level has become the object of a perceived goal of social importance, gives a scientific interpretation of the concept of "quality of education" and shows the main reasons why the quality of education is perceived as an urgent problem of society in modern times.

Here, the authors propose an effective way of managing the quality of general education based on the idea of L. Bertalanfi's "system analysis" established in the 30s of the last century, the "system-structure" theory, which has become a development branch of dialectical philosophy, with the paradigm of "compliance with the general laws of management and teaching-learning process" put forward the idea of identification, argue the said idea by means of their personal experiences and generalizations on scientific research materials.

Keywords: efficient management system, systematic action, cognitive component, reflexive component, regulatory component, communicative component.

Relevance of the research topic

Education is such a system, process, value and result that most of its problems are eternal. This situation exists naturally (logically). Because education has an anthropological nature, its existence depends on the level of spiritual development of the objective reality determined by movement, time and space, during the sharing of spiritual development, the functions of the educator are bound to change in a form corresponding to the demands of industrial revolutions. Logically, the "Educational space" is subject to faster renewal in accordance with the emerging challenges of the technodemocratic-informational society. Despite what has been said, the problem of establishing an "optimal model" of quality education adequate to the challenges of modern times regarding the development of education, including general education, or its management should be kept in focus. Among the cognitive issues aimed at solving this problem, there is a special place for the issue formulated as "Compliance of the management of the quality of general education with the general laws of management and teaching-learning process". Therefore, we claim the relevance of the topic of the article.

Interpretation of the summation of research materials

One of the problems related to the development of education, perhaps the first one, is the establishment of quality education adequate to the challenges of modern times and its management.

The problems of the development of education at the desired level and direction (adequate to the challenges of modern times) affect everyone - from the people who make management decisions on a national scale, to heads of educational institutions, scientific

workers, authors of textbooks, methodologists, teachers, in short, those who organize the educational process at various levels. and finally, it worries parents, the whole community, makes them think, and forces them to look for solutions. Professor R.H. Mammadzade rightly noted that quality management in education today is attracting attention due to its urgency. [6, p.3]

In the field of education, quality is understood as the level of learners corresponding to pre-determined norms according to the results of education, and in general, the state of the education system. Quality is a philosophical category that expresses the certainty of any object, including education, and is an objective and general characteristic manifested in the set of its properties. Quality is a determinant of any process, thanks to which the process does not act like another process, but exactly that process and differs from other processes.

Historically, in order to evaluate the result and quality of education in educational institutions, the following qualitative (descriptive) methods were used: obtaining a forecast determined by teachers; assessment of students' morals in extreme situations that always occur in a student's life; assessment of students' morals in diagnostic situations thought and organized by teachers; evaluation of results according to the scale of criteria developed by the school itself; assessment of psychological indicators, all kinds of actions and activities used in the student's life: knows how to do (intellectual indicator); able to carry out (voluntary indicator); wants to relate (emotional indicator). [5, p.12-13]

After gaining independence, the attitude towards improving the quality of our education and working out the scientific basis of its efficient management models

has changed and the work in the mentioned direction has become more constructive. The modern concept of education considers the development of thinking as the main goal of the mental development of students. [1, p.54]

In modern times, the main reasons why the quality of education is perceived as an actual problem of society can be explained by two objective cases: 1) All subjects of educational activity - learners, parents, educators, managers and other workers at various levels who are engaged in effective management of the educational system are interested in building a quality education system. Recently, there has been increasing attention to building a quality education system for students. Both society and the state are very interested in providing quality education to citizens; 2) General education schools currently differ from each other due to the profiling of the training process, the application of innovative approaches, the effective use of new pedagogical and training technologies, the selection of new textbooks and teaching aids, educational programs, teaching-methodical complexes. The stabilizing role of the quality of education opens wide opportunities for effective management of the process in the conditions where such diversity has become more widespread in the education system in recent years. Therefore, the tendency of parents and learners to freely choose educational institutions is expanding, and the responsibility of educational institutions in preparing a competitive learner and fulfilling the requirements is increasing.

Managing an educational institution (including a general educational institution) is a complex process. In that process, the evaluation of the quality of education is one of the leading directions of the mentioned complex process. In this management, it is possible to talk about effective management and its scientific bases if the process itself and its purposeful characteristics, the compatibility of the process parameters with the final result is ensured. Of course, the result depends on the process itself, its quality organization. In order to assess the quality of education at each stage of the educational process from the point of view of management, grouping of its quality indicators, evaluation of educational results at periodic, near and distant time intervals during the course of the process should be provided, and the school's activities should be directed to these results. According to our subjective understanding, "educational quality management" should have a research character.

Scientific-pedagogical sources show that it is possible to group the pedagogical principles that ensure the effectiveness of quality management in education as follows: 1) The accuracy of information about the concept of "quality of education" as the main indicator of the efficiency of the managed system (if the managed object (system) is not clearly defined, then the meaning of management is lost, if the managed object is incompletely defined, then the management is ineffective, the educational system or education no positive progress is achieved in the activities of their enterprises); 2) Compliance of the effective management system of the quality of education with the general laws of management; 3) Compliance of the effective management system of

the quality of education with the laws and regulations of the teaching-learning process. [12, p.46-47] Based on our generalizations to the research materials obtained from scientific sources, we come to the conclusion that the paradigm of the effective management system of the quality of education should be considered "the expectation of compliance of management and teaching-learning process with laws and regularities".

The quality level of education implementation depends significantly on the form of its realization. The correct understanding of the concepts of "training" and "teaching" activities, which are important elements of the categorical apparatus related to education, fundamentally affects the correct realization of their functions.

It should be remembered that educational activity is multifaceted. Although training is a characteristic of educational activity, it does not cover all aspects of it. Training, in the broadest sense of the word, involves the acquisition of new knowledge, skills and habits. However, learning and learning activities are essentially different events. Learning is an integral part not only of the learning process, but of every field of activity, for example, play or work. Educational activity is a type of activity, a unique form of social activity of the personality. In the structure of educational activity, its following components can be distinguished: 1) educational situation (or tasks); 2) educational operations; 3) control; 4) price. [1, p.150]

Professor A.O.Mehrabov writes that the analysis of the approaches used to manage the quality of education leads to the following conclusions:

- in order to ensure quality management, the meaning of that concept must be defined in advance for each managed object;

- it should be taken into account that the quality of education includes common elements common to the entire educational system, as well as special elements that characterize each managed object and have a corresponding property;

- since the quality of education has a complex structure, and there is no unanimous opinion about its management methods, it is impossible to give its general definition and broad interpretation for any educational system and educational institution. [7, p.214-215]

According to our subjective understanding, the "system-structure dialectical approach" should be focused here. When referring to such a methodological basis, it is taken into account that a part is a component that is part of the system and has relative independence. A system is complete, containing both elements and relationships between elements. The dialectical relationship of the whole and the part is actually the relationship that constitutes the structure of the whole, and in this sense, the structure acts as one of the important modes of existence of the whole. The dialectical unity of elements and structure is considered the main sign of the system concept. The full concept is understood in terms of the system, it is the organization of the system. A system can be viewed as a whole consisting of the unity of its structure and functions. In principle, any system enters as an element and subsystem of another

system that has a higher, more complex completeness than itself, and must obey its emergent sign. [3, p. 104-107]

The correct identification of the factors characterizing the concept of the quality of education allows the management of the quality of the facility. According to Professor A.O.Mehrabov, it is possible to group such factors based on a certain logical basis. [7, p.215]

The requirements of the specific consumer using the educational system determine the main content of the quality of education, which is directly related to the functioning of the educational system. All parameters of the activity are subject to these requirements. In many cases, the education system has to work with several consumers at the same time. In such cases, it is very important to fulfill the requirements of the consumer, which requirements to take as the basis for determining the quality of education. The conducted analyzes show that in such cases it is logical to fulfill the requirements of learners. Such an approach meets the requirements of building student-oriented education. A large number of requirements that have already received public and state status in the applicable norms and standards should be summarized here. Learners should be grouped according to the same or similar requirements. These requirements include a certain part of the quality of education and allow determining its content.

Many methods of quality assessment are used in education. These can include: 1) licensing of educational institutions; 2) attestation of teaching staff and educational institutions; 3) intermediate and final attestation of students; 4) audit of teaching and other activities of educational institutions; 5) professional, competitions related to professionalism. [7, p. 216]

Among the presented issues, quality control in education and regular review of its status occupy a special place. In this case, the procedures for evaluating the quality of any process and determining new evaluation criteria for homogeneous objects are taken as the basis.

In the formation of the effective management system of the quality of education, it is of particular importance to give priority to the approaches related to management according to "process" or "result". Some approaches suggest that it is possible to divide the processes taking place in educational institutions into three groups - basic, controlled and auxiliary. Mainly scientific-methodical and scientific-research works; strategic planning for management, evaluation of the level of use of the results of educational activities of consumers; and the auxiliary can include material provision, financial and infrastructure management.

The results of the educational activity must fully correspond to the requirements of the consumer. The main issue here is to determine which results are considered as the main indicator of educational activity. It is known that since the object of interactions in education is the learner, it is logically necessary to give the results of education in the characteristics related to the learner.

Some researchers have determined the results of education with such approaches and based on the following: 1) students' knowledge, skills and habits; 2) indicators of the learner's personal development process;

3) developed effective approaches to eliminate negative effects affecting the teaching-learning process; 4) students' level of competence. Some researchers highlight the following as the results of education: 1) high self-awareness of personality; 6) physical and spiritual health; 2) his high education, his need for education and his habits; 3) high education; 4) the position of patriotism and high citizenship. Another group of researchers, as the result of education, considers the level of education of students who have completed their education as the main indicator, which includes the following parameters: 1) knowledge, skills and habits; 2) level of culture; 3) spiritual development, value indicators; 4) the possibilities of intellectual and physical development of the organism.

Researches show that the quality characteristics related to the subjects of educational activity play an important role in the modernization of education as a whole.

Circumstances related to the events occurring in the educational process create ample conditions to act as the main provider of the quality indicator of the teaching-learning process, while having appropriate effects on the participants of the process. Determination of training quality sanitary-hygienic, moral-psychological, educational process resource provision conditions, etc. depends on many factors. Therefore, in the educational process, such factors should be determined with special approaches and the limits of their influence should be defined.

The characteristics that ensure the efficiency of quality management in education, more precisely, the compliance of the quality management system with the general laws of management, have been partially investigated. [11]

The conducted analyzes show that without taking into account the laws of general management, the establishment of the education quality management system and the efficiency of quality management cannot be ensured. Such a conclusion is fully consistent with the "system-structure" approach [3, p. 104-107] and L. Betalanfi's idea of system analysis [9, p. 8], which was formed as an important branch of dialectics.

In creating the methodological basis of the effective management system of the quality of education, an approach that ensures "systematic activity" should be used. In general, the structure of the education quality management system should consist of a dialectical sum of the managing and managed subsystems. Informational information comes from the management subsystem to the controlled subsystem. The response to this information indicates changes in the managed subsystem. [4]

From the analysis, it can be concluded that in this case, the following cases may occur in the managed system that receives informational information:

- the quality of the managed subsystem's activity increases;
- there is no change in the operation of the managed subsystem;
- the quality of the managed subsystem's activity decreases.

The main condition for the effective management of the quality of education is the correct establishment of feedback between the managing and managed subsystems. In this case, the following requirements must be met: completeness, appropriateness, adequacy, objectivity, convenience, continuity, structuring. [13, p.34]

The structure of the administrative subsystem depends on the combination of factors that determine the meaning of the quality of education, and includes the following:

- methods of evaluating the quality of education;
- the processes taking place in the educational system;
- subjects of educational activity;
- the results of educational activities;
- the conditions under which the educational activity is carried out. [7, p.218-219]

With regard to the managed object (system), subjects of management consistently perform certain management functions: targeted analysis; to plan; control; revision and reanalysis. Among the functions of training quality management, the importance of planning should be emphasized. The achievement of each goal (conclusion as a result) depends on the selection of the methods of its implementation, the determination of the steps of the deliberate implementation of the methods of ensuring the consistency of the process. In fact, planning, in a certain sense of the word, consists of forecasting, programming and preparation of a work plan. [8, p.40] Plan indicators enable control. If the planning is done correctly, management activities are properly directed, good results are achieved and time is saved. In the education system, stable conditions are needed to achieve the normal learning process of schools and the development of the school, to achieve quality in education. However, in real life, the internal and external environment of the school is constantly changing, something is happening in the lives of teachers, and children's attitudes towards life are changing. It is often impossible to foresee these changes. They either hinder the implementation of the plans or expand the opportunities to improve the quality of education. In well-organized management, these changes are detected in time and changes are made to plans and work done accordingly. The control system obtains information about these changes through well-organized control or periodic monitoring. Management requires feedback. Management is impossible without it. If it is taken into account that the object of control is the quality of education, its importance increases even more. By the way, let's emphasize that there are many factors in the educational process and the quality of education can be improved due to them.

Achieving the quality of education, the structure of results-oriented management is formed from relevant operations. Here, the implementation of tasks and goals, the achievement of necessary results depends on the choice of management strategy. There are three main development strategies for the school to work in innovation mode, adopt and apply innovations: local, modular, systemic. [8, p. 56-57]

The local strategy involves the use of various unrelated factors that will affect the quality of education. Such changes are carried out on the basis of independent plans and certain results are achieved. They affect the development and progress of the school.

A modular strategy is used to solve certain problems complexly in a class or at a certain stage of education. In this case, the object of implementation of each idea is determined, the program of the experiment is prepared, its parameters are coordinated, applied, and the results are compared. If interesting results are obtained, it is studied and used. In this process, a team of like-minded and innovative teachers and managers to lead them are formed, which is of great importance in achieving quality.

The third strategy is the strategy of systemic changes. At this time, it is about the coordinated and planned implementation of all factors, innovations, and changes that can affect the final results in the management of the quality of education. The innovations applied here should be coordinated, and a development program of the educational institution should be prepared. The program for the reconstruction of systemic changes can be prepared when the school leaders are familiar with the application, organization, and experience of all pedagogical collective innovation processes, and master the methodology of conducting experiments. It should not be forgotten that the choice of strategy also depends on the nature, complexity, and volume of the innovations to be implemented. [8]

The quality of education can be understood as the relationship between goals and results. In order to achieve high quality in education, although it is complex and difficult, the goal that can be optimally implemented must be defined. Then, in order to achieve that goal, the shortcomings encountered in the analysis process are investigated. The following factors can be attributed to these defects: outdated, suboptimal, educational and development technologies that do not benefit the content of education, or have lost their importance, or weak involvement of students in the learning process, etc. After that, it is clarified under what conditions the defects that manifest themselves in the educational process have arisen. Mainly, the following can be attributed to them: shortcomings of scientific-methodical conditions; lack of high-level teaching staff; material and technical base does not meet the requirements; shortfalls in funding.

Ensuring quality in education and its effective management requires the introduction of new approaches to the content and methods of training in order to form new professional competencies in learners. In this case, it is necessary to include the following components in the structure of professional competences: cognitive; regulator (director); communicative; individual (personal); reflexive (involuntary). [8]

The conducted analyzes show that the components of professional competencies are formed as a result of the influence of reflexive processes. Therefore, it is necessary to be able to distinguish the following forms of the involuntary component:

- retrospective (critical understanding of past experience);

- situational (real assessment of the current situation, situation);
- perspective (foreseeing the consequences of the action, choosing the perceived option of the optimal strategy of morality, behavioral norms, etc.).

Since these components open wide opportunities for the learner to effectively implement reflexive processes and high reflexive self-organization, they should be taken into account in the educational process and the formation of such qualities should be ensured. [7, p.222]

Experience shows that it is important to ensure the quality of education and to prioritize the application of new approaches to its effective management, to prevent the mechanical transmission of ready-made knowledge, and to create appropriate conditions for the implementation of creative searches in the field of professionalism.

The quality of education is a category that changes from time to time, and it changes and updates according to the needs of social customers based on the challenges of our time. This reality requires that the monitoring of the results of education be carried out systematically, and searches for quality improvement be made. [12]

Continuous, realistic, relevant testing and evaluation programs provide teachers and parents with evidence of each student's learning outcomes and successes. Such objective information allows students, teachers, and family members to accurately determine the educational goals of students and plan the next level of education. The scores collected by the students are not enough to evaluate their activities and to determine the extent to which the students have achieved their goals. Students should have the opportunity to set personal goals, monitor their own personal development and reflect on the knowledge, skills and attitudes they have achieved. The means of evaluating the learning success of students should also have a teaching function and help them understand their learning outcomes. Inspection and evaluation criteria should evaluate the learning activities of students as both the result of the work and the process itself, and should serve to reveal the different and individual characteristics of students. Assessment should not serve to determine how one student reads in relation to another student, but should reveal the student's own level of individual development, and should not refer to external motives. [8] It should not be forgotten that the evaluation of student achievements is considered as a process of collecting information about the student's ability to acquire knowledge, use it, and draw conclusions, and serves the following purposes: 1) monitoring the student's progress (retardation); 2) making decisions in the training process; 3) evaluation of student's training results; 4) curriculum evaluation.

Assessment and learning processes are seen as two interacting aspects of education. Evaluation, which is a systematic process, is structured as an effective feedback tool between learning outcomes and stakeholders, including the following components: 1) Evaluation standards; 2) Data collection; 3) Assessment results. [2, p. 294-295]

By the way, it should be emphasized that the following principles are observed in conducting all types of assessments: expediency; mutual evaluation of achievements and educational opportunities; ensuring qualitative relevance and reliability of collected data, transparency, fairness, mutual agreement and cooperation in assessment; ensuring the developmental role of assessment results in training activities.

Monitoring and evaluation should be considered as the main tool for studying the quality of the pedagogical process and its individual areas. As in all management systems, in order to achieve the set goals in the training process, the process should be managed, evaluated at each stage, deviations should be noted, and clarifications should be made. In this case, the following requirements must be met: 1) the purpose of management must be clearly stated; 2) the starting state of the managed process should be noted; 3) the mechanism of influence on the process in the intended main transition states of the managed process should be determined; 4) systematic feedback and the processing of the data received as a result of it should be ensured, a mechanism should be created to regulate deviations during data processing. [5, p.11-12]

In order to establish a quality teaching-learning process in our education system and its effective management, it is necessary to ensure the development of the scientific, pedagogical-psychological, methodical bases of new pedagogical technologies, interactive learning methods, and bringing their results to the pedagogical process.

Scientific-theoretical novelty of the research

1) Improvement of the quality of general education, finding management ways that determine the expected level is shown to be a socially significant objective; 2) The scientific interpretation of the concept of "quality of education" was given and the main reasons why the quality of education is perceived as an actual problem of society in modern times were indicated; 3) The idea of determining the effective way of managing the quality of general education with the paradigm of "compliance with the general laws of management and the teaching-learning process" was put forward.

The result

An effective way of managing the quality of general education should be determined by the paradigm of "compliance with the general laws of management and teaching-learning process".

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МЕТА І ЗАВДАННЯ НАВЧАЛЬНОЇ ДИСЦИПЛІНИ «РЕКРЕАЦІЙНІ КОМПЛЕКСИ СВІТУ» В СИСТЕМІ РЕАЛІЗАЦІЇ ОСВІТНЬО-ПРОФЕСІЙНИХ ПРОГРАМ ДЛЯ ІНДУСТРІЇ ГОСТИННОСТІ

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META AND OBJECTIVES OF THE EDUCATIONAL DISCIPLINE «WORLD RECREATIONAL COMPLEXES» IN THE SYSTEM OF IMPLEMENTATION OF EDUCATIONAL-PROFESSIONAL PROGRAMS FOR THE HOSPITALITY INDUSTRY

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АНОТАЦІЯ

У статті проведено аналіз основних сучасних вимог до якості підготовки фахівців для індустрії гостинності та індустрії туризму. Акцентовано увагу на фаховій підготовці кадрів для ринку праці готельно-ресторанного та туристичного бізнесу, який відчуває дефіцит спеціалістів нової генерації в усьому світі. Відзначено, що одним із шляхів розв'язання цієї проблеми є інноваційна академічна і практична підготовка за участі стейкхолдерів. Обґрунтовано роль і місце професійно орієнтованих дисциплін, зокрема, дисципліни циклу професійної підготовки «Рекреаційні комплекси світу» у фаховій підготовці бакалаврів з готельно-ресторанної справи та бакалаврів з туризму. Доведено, ефективність зміни традиційних форм проведення семінарів з предмету «Рекреаційні комплекси світу» на інтерактивні: співнавчання, взаємонавчання (колективне, групове, навчання у співпраці). Встановлено, що уніфікація змісту і структури навчальних програм та професійно-орієнтованих дисциплін, доцільна послідовність вивчення, наступність використання компонентів знань щодо загальних об'єктів вивчення є необхідною умовою підвищення якості підготовки фахівців для індустрії гостинності та індустрії туризму.

ABSTRACT

The article analyzes the main modern requirements for the quality of training of specialists in the hospitality and tourism industry. The focus is on the professional training of personnel for the hotel, restaurant, and tourism business, which is experiencing a shortage of new-generation specialists worldwide. It is noted that one of the ways to solve this problem is through innovative academic and practical training of bachelor's degree students in hotel and restaurant management and tourism with the participation of stakeholders. The role and place of professionally oriented disciplines, in particular, the discipline of the professional training cycle «World Recreational Complexes» in the professional training of bachelor's degree students in hotel and restaurant management and tourism, are justified. The educational component of «World Recreational Complexes» is part of the compulsory cycle of educational and professional programs for the preparation of a bachelor in hotel and restaurant management and tourism. The main goal of the discipline «World Recreational Complexes» in the system of training specialists is to study the conditions for the formation, development, and placement of territorial recreational complexes (TRC), familiarization with systems for organizing population activities to restore physical and spiritual strength: rest, recuperation, resort treatment, and tourism. It has been proven that the effectiveness of changing traditional forms of seminars for the subject «World Recreational Complexes» to interactive ones: co-learning,

and collaborative learning (collective, group, cooperative learning). It is noted that the organization of interactive learning contributed to the use of role-playing games, discussion topics, modeling life situations, and joint problem solving based on the analysis of the achieved level.

The unification of the content and structure of the curriculum and professionally-oriented disciplines, the appropriate sequence of study, the continued usage of knowledge components in relation to common study objects is a prerequisite for improve.

Ключові слова: професійна підготовка, бакалавр з туризму, бакалавр з готельно-ресторанної справи, рекреація, рекреаційна сфера, рекреаційні комплекси світу.

Keywords: professional training, bachelor's degree in tourism, bachelor's degree in hotel and restaurant business, recreation, recreation sphere, world recreational complexes.

Постановка проблеми у загальному вигляді та її зв'язок із важливими науковими чи практичними завданнями. Економічні та соціальні перетворення, які відбуваються в Україні, зумовили глибокі структурні зміни в індустрії гостинності та індустрії туризму, що призвели до проблем, пов'язаних з недоліками в управлінні готельно-ресторанним та туристичним господарством, стихійним розвитком індустрій, недосконалістю законодавчої та нормативної бази у сфері рекреації, недосконалістю системи кадрової підготовки.

Актуальність і доцільність дослідження проблеми фахової підготовки майбутніх фахівців для готельно-ресторанного та туристичного бізнесу зумовлені необхідністю подолання суперечностей, які існують між потребою суспільства, яку формує ринок праці, а саме у високоякісних спеціалістах для індустрії гостинності й туризму і недостатнім рівнем їх підготовки, що зумовлено відсутністю уніфікації змісту та структури професійно-орієнтованих дисциплін, які й забезпечують фахову підготовку спеціалістів.

Аналіз останніх досліджень і публікацій. У Стратегії розвитку сфери інноваційної діяльності на період до 2030 року зазначається, що державна інноваційна політика має фокусуватися на напрямках, які відповідають інноваційному процесу в Україні, враховуючи інтереси всіх зацікавлених сторін. Саме тому, особливо важливою є співпраця між усіма учасниками інноваційного процесу, які сприяють інноваціям на всіх етапах створення і виведення інноваційного продукту на ринок. Напрями і способи розв'язання проблем вбачають у підвищенні рівня спроможності, що реалізується як шляхом культурно-просвітницької діяльності, підвищення інноваційної культури, так і через освітню діяльність, спрямовану на забезпечення успішної кар'єри молоді після завершення навчання у закладах вищої освіти за одним з обраних напрямів: започаткування власної справи, робота на підприємстві, що відповідає сучасному технологічному рівню, або наукова (викладацька) робота [1].

Особливу увагу слід зосередити на процесах покращення якості освіти шляхом наближення її до потреб глобального ринку та потреб у фахівцях, здатних створювати, адаптувати та використовувати технологічні інновації, підтримка запровадження навчальних дисциплін з підприємництва, фінансової грамотності та охорони інтелектуальної власності, охорони, збереження та відновлення здоров'я. Усі перелічені вимоги безпосередньо впливають й на процес професійної підготовки кадрів для

індустрії гостинності та туризму. Створення нової освітньої системи, адаптованої до динамічних змін, що відбуваються в сфері рекреації на умовах інноваційної економічної формації, стало пріоритетним завданням й у більшості країн Європи. Як відомо, готельно-ресторанний бізнес та туризм є унікальним видом діяльності, який відрізняється глобальністю, сталим розвитком та позитивними економічними результатами. Глобалізація, зростання туристичних потоків висувають нові вимоги до освіти у галузі знань про індустрію гостинності. Серед них, у першу чергу, наявність єдиних професійних кваліфікаційних умінь та навичок в туристичній та готельно-ресторанній діяльності, вміння оцінити потенціал потужностей та особливостей ресурсних туристично-рекреаційних комплексів, знання мов, культури, економіки, правової та соціальної систем країн-партнерів, дотримання єдиних технологічних і гуманітарних норм [2].

Значну роль у розв'язанні проблеми підготовки кадрів відіграє Всесвітня туристична організація (UNWTO), яка підтримує реалізацію освітньо-професійних програм. За ініціативи UNWTO розроблені вичерпні Стандарти міжнародної класифікації туристичної індустрії [3]. Національна туристична організація України у співпраці із навчальними закладами також, реалізовує політику якісної підготовки кадрів за освітніми програмами Готельно-ресторанна справа та Туризм першого і другого рівнів вищої освіти [4].

Динамічна і багатогранна індустрія гостинності охоплює кілька важливих сфер обслуговування, включаючи готельну та ресторанный справу, туристичний і транспортний бізнес, рекреацію та інші. В останні роки з'явилася ідентифікація в системі підготовки кадрів для індустрії гостинності та індустрії туризму із значною кількістю кваліфікацій, що віддзеркалюють різноманітність ринкових продуктів готельно-ресторанного та туристичного бізнесу і враховують перспективи стрімкого розвитку сфери обслуговування. Саме це може виступати перевагою і результатом інноваційності та гнучкості освіти в індустрії гостинності та туризму. Адже, туристичний сектор економіки відчуває дефіцит спеціалістів нової генерації вусюму світі. Одним із шляхів розв'язання цієї проблеми є академічна підготовка кадрів за освітньо-професійними програмами Готельно-ресторанна справа та Туризм.

Передумови створення нової галузевої системи підготовки кадрів для індустрії гостинності та туризму ми досліджували і висвітлювали резуль-

тати у наших попередніх публікаціях [18]. Уніфікація при підготовці спеціалістів, актуалізує питання розробки теоретичних, методичних та дидактичних засад професійної освіти. Розробка парадигми професійної підготовки фахівця з готельно-ресторанної справи та організації туризму як одне з актуальних завдань сучасного професійного освітнього процесу, повинна передбачати формування світоглядної концепції фахівця, в межах якої закладаються основи фахового, економічного та логіко-інформаційного мислення, накопичуються необхідні знання, виробляються навички та вміння – компетенції. Кожен із напрямів підготовки передбачає отримання певної системи знань і вмінь, що досягається через засвоєння предметів відповідного циклу, поєднання теоретичної підготовки з практикою та самостійною і науково-дослідною роботою здобувача вищої освіти [5].

Під час дослідження ми звернулись до праць вітчизняні науковців: Каролоп О. О. [6], Любарець В. В., Родінова Н. Л., Левадна К. Ю. [7], Дишкантюк О. В. [8], Симонович Н. [9], Дербак О. [10], Баєв В. В. [11], Збиранник О. [18], які вивчали проблеми підготовки кадрів для індустрії гостинності та індустрії туризму в сучасних умовах, дослідники зробили висновки і запропонували ряд рекомендацій враховуючи перспективні запити роботодавців та суспільства.

Формулювання цілей статті (постановка завдання). Обґрунтувати роль і місце, мету та завдання професійно-орієнтованого компоненту, зокрема, дисципліни «Рекреаційні комплекси світу», що входить до циклу професійної підготовки бакалаврів з готельно-ресторанної справи та бакалаврів з туризму за освітньо-професійною програмою Готельно-ресторанна справа та освітньо-професійною програмою Туризм.

Виклад основного матеріалу дослідження. Вища освіта, дослідження та інновації відіграють вирішальну роль у підтримці соціального згуртування, економічного зростання та глобальної конкурентоспроможності. Враховуючи бажання європейських суспільств все більше ставати суспільствами знань, вища освіта стає істотною складовою соціально-економічного і культурного розвитку. Водночас, зростання вимог до навичок та компетентностей вимагає від вищої освіти реагувати по-новому. Розширення доступу до вищої освіти надає закладам вищої освіти можливість використовувати все більш різномірний індивідуальний досвід. Відповідь на різноманітність і зростаючі очікування вимагає від вищої освіти фундаментальних змін у її наданні; це потребує більш студентоцентрованого підходу до навчання і викладання, включаючи гнучкі навчальні траєкторії та визнання компетентностей, набутих поза формальними освітніми програмами. Самі заклади вищої освіти стають більш різноманітними за своїми місіями, способами надання освіти та співпраці, включаючи зростання інтернаціоналізації, цифрове навчання та нові форми надання освітніх послуг. Роль забезпечення якості стає вирішальною у підтримці систем і закладів вищої освіти у їх реагуванні на ці зміни,

водночас гарантуючи, що кваліфікації, набуті студентами, та їх досвід здобуття вищої освіти залишаться на першому плані інституційних місій [12].

Вища освіта та система вищої освіти України, як структурна одиниця ступеневої системи освіти, мають свої специфічні цілі. Вони узагальнюються у змісті вищої освіти – обумовленій вимогами та потребами суспільства системі знань, умінь і навичок, світоглядних і громадських якостей людини, що мають бути сформовані в процесі навчання.

Ключова мета «Стандартів і рекомендацій щодо забезпечення якості у Європейському просторі вищої освіти» (ESG) – сприяти спільному розумінню забезпечення якості навчання і викладання, не зважаючи на кордони та між усіма стейкхолдерами. Стандарти відігравали і відіграватимуть важливу роль у розвитку національних та інституційних систем забезпечення якості в Європейському просторі вищої освіти (EHEA) та у транскордонній співпраці [12].

Зміст навчання, відображений у існуючих національних стандартах [13, 14] і конкретизується у навчальних планах закладів вищої освіти і навчальних програмах дисциплін. Саме у освітніх компонентах (предметах, навчальних курсах) отримує свою конкретизацію зміст освіти, представлений у навчальних планах на рівні теоретичного осмислення. У навчальних програмах компонентів загальний зміст підготовки фахівця перетворюється на логічну структуру окремих тем і дисципліни в цілому, задаються діагностичні цілі засвоєння, засоби навчання та контролю, нормативний час навчальної роботи. Навчальний предмет є змістовно-організаційним компонентом професійної підготовки здобувачів закладів вищої освіти, що визначається освітньо-адаптованою системою навчальних знань. Ці знання структуруються відповідно до професійного змісту, що є дидактичним аналогом відповідної галузі наукових, науково-технічних, виробничих (технологічних) і суспільних знань та досвіду професійної діяльності людини. Зміст кожного навчального предмету структурований у систему, відповідній науковій дисципліні або галузі знань, що містить опис основних положень тієї чи іншої галузі наукових знань або досвіду виробничої (професійної) діяльності

Освітні програми знаходяться у центрі місії закладів вищої освіти, пов'язаної з викладанням. Вони забезпечують студентів академічними знаннями й навичками, включаючи ті, що є загальними, які можуть вплинути на особистий розвиток та можуть бути застосовані студентами у майбутній кар'єрі [12].

Освітні умови навчально-методичного забезпечення підготовки кадрів для індустрії гостинності та індустрії туризму визначаються, в першу чергу, самою професійною сферою, яка має неоднозначний та багатоаспектний характер. Відповідно, різномірність і багато-структурність природи готельно-ресторанного бізнесу туристичної діяльності визначають мультидисциплінарність навчальних планів, пов'язаних із розвитком професійного мислення.

Підготовка бакалавра з готельно-ресторанної справи та бакалавра з туризму передбачає отримання певної системи знань і вмінь шляхом засвоєння дисциплін відповідного циклу, а саме: професійної підготовки, природничо-наукової та загально-економічної, професійно орієнтованої в межах як нормативної частини, так і вибіркової.

У Навчально-науковому інституті економіки та бізнес-освіти Уманського державного педагогічного університету (УДПУ) імені Павла Тичини сформовано компоненти освітньо-професійних програм спеціальностей 241 Готельно-ресторанна справа і 242 Туризм. Професійно орієнтовані дисципліни відіграють проміжну роль між загальноосвітньою та професійною підготовкою та виступають у ролі наскрізного компоненту змісту освіти.

Блок дисциплін з організації туристської діяльності та готельно-ресторанної справи створює систему більш високого порядку внаслідок того, що забезпечує здобувачів вищої освіти знаннями про основи і механізм функціонування індустрії гостинності, законодавчу та нормативну базу, інструменти державного регулювання індустрії, у ролі яких виступають ліцензування, стандартизація та сертифікація готельно-ресторанних та туристських послуг, організаційно-правові форми підприємств, організацію договірних відносин в готельно-ресторанному та туристичному підприємстві, організацію роботи з постачальниками послуг тощо.

У процесі проходження навчальної практики з організації готельно-ресторанного господарства, навчальної практики з краєзнавства та виробничих практик здобувачі реалізують отримані знання та набувають умінь і навичок щодо організації та надання послуг в рекреаційній сфері відповідно законодавчих нормативів, ринкових тенденцій і міжнародних галузевих рекомендацій.

Освітній компонент «Рекреаційні комплекси світу» є обов'язковим компонентом освітньо-професійних програм підготовки бакалаврів з готельно-ресторанної справи та бакалаврів з туризму. Завдання предмету – визначення теоретичних основ формування і факторів розвитку територіально-рекреаційних комплексів (ТРК), їх спеціалізації та видів в сучасних конкретних умовах; дослідження зарубіжного та вітчизняного досвіду створення та функціонування ТРК; аналіз функціональної, галузевої і територіальної структури рекреаційно-туристичного комплексу України та світу; розробка принципів удосконалення системи збалансованого забезпечення рекреаційних потреб населення України та раціонального використання світових та національних рекреаційно-туристичних ресурсів [15].

Досліджуваний компонент в зазначених освітніх програмах для здобувачів є важливою складовою у фаховій освіті. Крім того, він має на меті допомогти здобувачам осмислити й визначити особливості майбутньої роботи в транскордонному просторі, а також власні пріоритети, основи фахової придатності та підготуватись до сприйняття фахових знань. Таким чином, освітній компонент виконує роль «вектора», закладає той самий необхідний теоретичний фундамент, який дозволяє

органічно перейти до вивчення інших професійних дисциплін. Основна мета компоненту «Рекреаційні комплекси світу» у системі підготовки фахівців індустрії гостинності та індустрії туризму – вивчення умов формування, розвитку та розміщення територіально-рекреаційних комплексів (ТРК), ознайомлення з системами організації діяльності населення для відновлення фізичних і духовних сил: відпочинком, оздоровленням та курортним лікуванням, туристичними мандрівками.

Для бакалаврів з готельно-ресторанної справи у контексті набуття інтегральної компетентності формується здатність розв'язувати складні спеціалізовані задачі та практичні проблеми діяльності суб'єктів готельного і ресторанного бізнесу, що передбачає застосування теорій та методів системи наук, які формують концепції гостинності і характеризується комплексністю та невизначеністю умов.

Дисципліна забезпечує формування загальних компетентностей: здатність зберігати та примножувати моральні, культурні, наукові цінності і досягнення суспільства на основі розуміння історії та закономірностей розвитку предметної області, її місця у загальній системі знань про природу і суспільство та у розвитку суспільства, техніки і технологій, вести здоровий спосіб життя; здатність вчитися і оволодівати сучасними знаннями; здатність застосовувати знання у практичних ситуаціях.

Також, дисципліна забезпечує формування фахових компетентностей: розуміння предметної області і специфіки професійної діяльності; здатність проектувати технологічний процес виробництва продукції і послуг та сервісний процес реалізації основних і додаткових послуг у підприємствах (зкладах) готельно-ресторанного та рекреаційного господарства.

Освітній компонент забезпечує формування програмних результатів навчання для бакалаврів з готельно-ресторанної справи: вміння аналізувати сучасні тенденції розвитку індустрії гостинності та рекреаційного господарства; аналізувати, інтерпретувати і моделювати на основі існуючих наукових концепцій сервісні, виробничі та організаційні процеси готельного та ресторанного бізнесу; зберігати та примножувати досягнення і цінності суспільства на основі розуміння місця предметної області у загальній системі знань, використовувати різні види та форми рухової активності для ведення здорового способу життя [16].

Для бакалаврів з туризму у контексті набуття інтегральної компетентності формується здатність комплексно розв'язувати складні професійні задачі та практичні проблеми у сфері туризму й рекреації як в процесі навчання, так і в процесі роботи, що передбачає застосування теорій та методів системи наук, які формують туризмознавство і характеризуються комплексністю та невизначеністю умов. Дисципліна забезпечує формування загальних компетентностей: здатність зберігати та примножувати моральні, культурні, наукові цінності і досягнення суспільства на основі розуміння історії та закономі-

рностей розвитку предметної області, її місця у загальній системі знань про природу і суспільство та у розвитку суспільства, техніки і технологій, використовувати різні види та форми рухової активності для активного відпочинку та ведення здорового способу життя; прагнення до збереження навколишнього середовища; здатність працювати в міжнародному контексті.

Дисципліна забезпечує формування фахових компетентностей для бакалаврів з туризму: здатність аналізувати рекреаційно-туристичний потенціал територій; розуміння сучасних тенденцій і регіональних пріоритетів розвитку туризму в цілому та окремих його форм і видів; розуміння процесів організації туристичних подорожей і комплексного туристичного обслуговування (готельного, ресторанного, транспортного, екскурсійного, рекреаційного).

Освітній компонент забезпечує формування програмних результатів навчання для бакалаврів з туризму: знати, розуміти і вміти використовувати на практиці основні положення туристичного законодавства, національних і міжнародних стандартів з обслуговування туристів; пояснювати особливості організації рекреаційно-туристичного простору; аналізувати рекреаційно-туристичний потенціал території; проявляти повагу до індивідуального і культурного різноманіття [16].

Навчально-тематичний план програми освітнього компоненту «Рекреаційні комплекси світу» включає лекційні заняття, на яких здобувачів знайомлять із системою знань, що формують комплекс інтегральних, загальних та фахових компетентностей. Програма містить також семінарські заняття для опрацювання та конкретного осмислення теоретичних питань, модульну контрольну роботу для здобувачів заочної форми навчання, поточний модульний контроль та індивідуальне науково-дослідне завдання, план самостійної роботи. Контрольна робота виконується письмово по варіантах, кожний з яких містить питання з основних тем курсу. Поточний модульний контроль здійснюється викладачем для перевірки рівня якості набутих знань та компетенцій здобувачами з програмного матеріалу змістового модуля (рейтингова оцінка зі змістового модуля), які він отримав під час усіх видів занять і самостійної роботи. Індивідуальне науково-дослідне завдання виконується за обраною темою і самостійна робота проводиться відповідно методичних рекомендацій. Індивідуальне науково-дослідне завдання є видом позааудиторної індивідуальної роботи здобувачів вищої освіти навчального, навчально-дослідного характеру, який використовується у процесі вивчення програмного матеріалу навчального курсу і завершується обов'язковим звітом про його виконання. Формою підсумкового контролю знань є екзамен або залік, який забезпечує оцінювання результатів навчання [15].

У сучасній підготовці кадрів активно відбувається перегляд цілей і змісту освіти, підвищуються вимоги до підготовки фахівців, які були б достатньо конкурентоспроможними на сучасному ринку

праці. Мова йде насамперед про формування творчого потенціалу особистості майбутнього фахівця в індустрії гостинності та індустрії туризму, потреби самореалізації, самовираження не тільки в період навчання у вищому закладі освіти, але й упродовж усього життя [17].

Підвищення індексу конкурентоспроможності туристичної України серед країн світу, забезпечення високого рівня надання туристичних послуг потребує постійного вдосконалення підготовки кадрів, розвиток їх компетентностей та зміни парадигми і форм освітнього процесу. Адаптація освітньо-професійних програм з підготовки кадрів у вітчизняних закладах вищої освіти для індустрії туризму та індустрії гостинності під відповідності очікуванням бізнесу є важливим фактором для задоволення потреб як випускників так і працедавців [18].

В Навчально-науковому інституті економіки та бізнес-освіти УДПУ імені Павла Тичини традиційні форми проведення семінарів з предмету «Рекреаційні комплекси світу» були замінені інтерактивними формами їх проведення. Під інтерактивним навчанням мають на увазі співнавчання, взаємонавчання (колективне, групове, навчання у співпраці). Організація інтерактивного навчання передбачало використання рольових ігор, опрацювання дискусійних питань, моделювання життєвих ситуацій, спільне вирішення проблем на основі аналізу обставин та відповідних ситуацій. Семінарські заняття проводились на базі Національного дендрологічного парку «Софіївка» Науково-дослідного інституту Національної академії наук України [19], що являє собою шедевр світового садово-паркового мистецтва кінця XVII – початку XIX століть, який розміщений в туристично-рекреаційній зоні міста Умань на території площею 182 гектари та Державного історико-культурного заповідника «Стара Умань» [20], який розташований в туристично-рекреаційній зоні міста Умань на площі 82 гектари. Вище зазначені установи є стейкхолдерами освітньо-професійної програми Готельно-ресторанна справа та освітньо-професійної програми Туризм освітніх ступенів молодший бакалавр, бакалавр та магістр.

В загальній освітній професійній практиці відомо, що впровадження групової навчальної діяльності є важливим засобом формування професійної компетентності та сприяє підготовці фахівців для подальшої роботи в команді. Імітаційно-ігровий підхід реалізується через використання імітаційно-ігрових форм та методів, які дають змогу не тільки з'ясувати, поглибити та закріпити теоретичний матеріал, а й навчити здобувачів самостійно мислити, діяти, вести науковий диспут, здійснювати пошук оптимального виходу із запропонованих професійних ситуацій та особисто відповідати за прийняті рішення.

Для проведення семінарів з освітнього компоненту «Рекреаційні комплекси світу» була обрана форма групової навчальної діяльності з елементами «ділової гри». Контрольні заміри рівня навченості, проведені за результатами впровадження іннова-

ційних форм організації семінарських занять, показали значне підвищення та стабільну динаміку рівня навченості. Після апробації нових форм організації викладання предмету «Рекреаційні комплекси світу» були розроблені методичні рекомендації з проведення семінарських занять, які увійшли до робочої програми освітнього компоненту.

Для отримання позитивних результатів удосконалення цієї форми навчальної діяльності необхідно дотримуватися низки основоположних принципів, серед яких:

- студентоцентроване навчання і викладання, що проявляється у стимулюванні мотивації студентів, їх самоаналізі та залученні до освітнього процесу;
- орієнтація на практичну підготовку з урахуванням кращих світових стандартів туристичного сервісу та гостинності;
- урахування запитів роботодавців та кваліфікаційних вимог;
- застосування компетентнісного підходу;
- надання можливості вибору теми індивідуального науково-дослідного завдання, забезпечуючи безперервність удосконалення і реалізації результатів навчання;
- застосування сучасних інформаційних та цифрових технологій у навчанні;
- забезпечення умов і підтримки, необхідних для досягнення здобувачами прогресу у своїй академічній кар'єрі.

Висновки з даного дослідження і перспективи подальших розвідок у даному напрямі. Таким чином, професійно орієнтована дисципліна «Рекреаційні комплекси світу» є важливою складовою в системі фахової підготовки майбутніх бакалаврів з готельно-ресторанної справи та бакалаврів з туризму, яка забезпечує їх професійне становлення. Уніфікація змісту і структури освітньо-професійних програм, навчальних програм та професійно-орієнтованих дисциплін, доцільна послідовність вивчення, наступність використання компонентів знань щодо загальних об'єктів вивчення є необхідною умовою підвищення якості теоретичної та практичної підготовки.

Також, в організації освітнього процесу та формуванні освітніх продуктів потрібно враховувати, що успішність випускника і його фаховий потенціал формують не тільки державні вимоги (стандарт), але й збалансовані вимоги інших зацікавлених стейкхолдерів, особливо активних учасників ринку праці на які він орієнтується здобуваючи вищу освіту за обраним фахом.

Отже, з метою відповідності між реальними знаннями, уміннями та навичками випускника складу вищої освіти за бакалаврською освітньою професійною програмою Готельно-ресторанна справа і освітньо-професійною програмою Туризм, яких він набуває під час вивчення освітнього компоненту «Рекреаційні комплекси світу» та очікуваннями ринку праці, під час освітнього процесу важливо збалансовувати формування та розвиток компетенцій необхідних для професійної діяльності в індустрії гостинності та індустрії туризму, що

у свою чергу врівноважує інтелектуальний та практичний зміст підготовки фахівців, адже високопрофесійні фахівці зміцнюють обороноздатність та конкурентоспроможність країни.

Перспективи подальшого наукового дослідження можливі в напрямку обґрунтування міждисциплінарних зв'язків предметів професійно-орієнтованого циклу з метою підвищення якості підготовки фахівців для індустрії гостинності та індустрії туризму відповідно до вимог інформаційного суспільства та реалізації мети мультикультурного діалогу як освітнього продукту, який отримує здобувач з метою проведення професійної діяльності та особистісного розвитку, що у свою чергу відображає рівновагу інтелектуального та практичного змісту освітнього процесу.

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PHYSICS AND MATHEMATICS

GEOPHYSICAL RESEARCHES OF PORTALS WILL ALLOW TO PROVE THE EXISTENCE OF HIDDEN MULTIVERSE AND TO RESEARCH IT¹

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ABSTRACT

The article proves that the version of the special theory of relativity (STR) presented in physics textbooks is incorrect. This is because in the early 20th century science lacked experimental knowledge required for the STR to be created, and the postulate (called the principle of light speed non-exceedance) that replaced the knowledge turned out to be incorrect and has been experimentally refuted in the 21st century. It is explained that tsunami and piano music would not exist, church bells would not ring and even swings would not swing on playgrounds, if the generally accepted version of the STR were true. Moreover, this version of the STR also implies that Ohm's law as interpreted by Steinmetz used daily by millions of radio and electrical engineers in their practice does not exist, and therefore radio engineering and electrical engineering should not exist either.

That is why, an alternative version of the STR has been created instead of the incorrect one. It follows from this that there is an invisible Multiverse whose universes are interconnected by numerous portals, including those located on Earth. And at least some of anomalous zones are entrances to portals. Geophysical exploration of portals are very necessary, as they will allow us to obtain new valuable knowledge about our Multiverse and confirm the correctness of the alternative version of STR.

Keywords: portals, parallel universes, Multiverse, special theory of relativity, physical reality of imaginary numbers, dark matter, dark energy.

1. Introduction

Portals, sometimes also called 'star gates' [1], understood as transitions from some universes to others, are the subject of research in the article. Therefore, it is clear that one can speak of portals only if there are at least two universes, i.e. Multiverses. The term 'Multiverse' meaning two and more universes was proposed by the American philosopher-psychologist William James in 1895 and introduced to practice by the English science fiction writer Michael John Moorcock. To date, a large number of Multiverse hypotheses have been proposed. The most informative of them are [2]-[13].

But the special theory of relativity (STR) [14]-[16] recognized in physics as the greatest scientific achievement of the 20th century, denies existence of Multiverses at all and claims that there is only our visible universe.

Yet, there are a very large number of the so-called anomalous zones [17]-[20] planet. They are fraught with phenomena incapable of being explained by modern science. At least some of them are supposedly entrances to portals. Geophysical exploration of portals will allow visiting them safely and solving some important problems of modern astrophysics successfully.

2. The version of the special theory of relativity presented for study in physics textbooks is incorrect

The alternative version of the STR states the generally recognized version of the STR studied in physics textbooks to be incorrect [21]-[32], because:

- the relativistic formulas obtained therein are incorrect;
- the relativistic formulas have been incorrectly explained using the incorrect principle of light speed non-exceedance;
- the relativistic formulas have entailed wrong conclusions consisting in physical unreality of imaginary numbers and existence of only our visible universe.

Hence the alternative version of the STR thereby asserts exactly what we need – the existence of other universes, besides our universe, which together form the Multiverse. This follows from its relativistic formulas that are different from those in the generally accepted version of the STR. In order to understand the relativistic formulas of the alternative version of the STR better, let us first consider the simpler relativistic formulas of the generally accepted version of the STR. They are as follow

$$m = \frac{m_0}{\sqrt{1 - (v/c)^2}} \quad (1)$$

$$\Delta t = \Delta t_0 \sqrt{1 - (v/c)^2} \quad (2)$$

$$l = l_0 \sqrt{1 - (v/c)^2} \quad (3)$$

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where m is the relativistic mass of a moving body;
 m_0 is the rest mass of a moving body;
 Δt is the relativistic time of a moving body;
 Δt_0 is the rest time of a moving body;

l is the relativistic length of a moving body;
 l_0 is the rest length of a moving body;
 v is the velocity of a moving body;
 c is the speed of light.

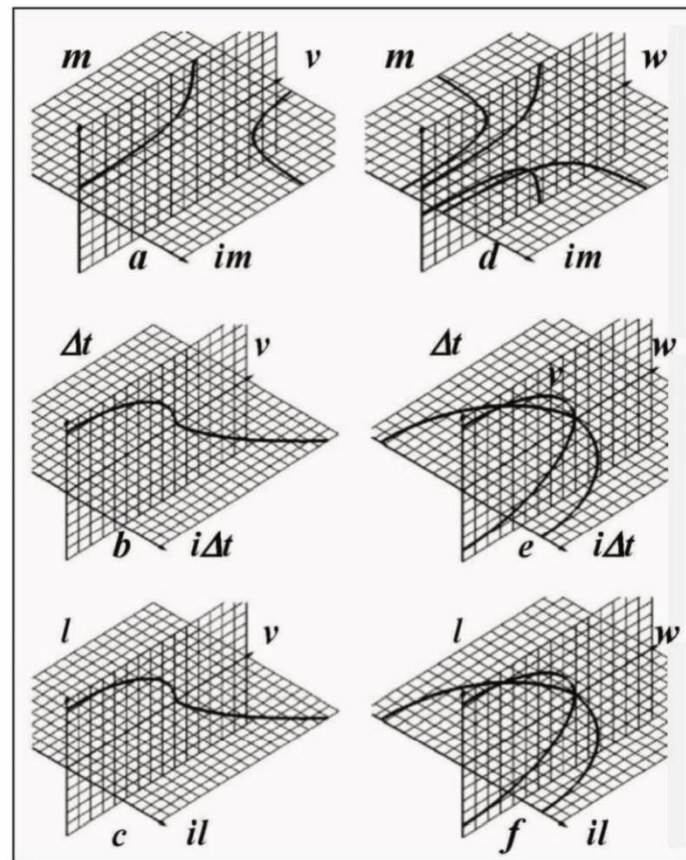


Fig. 1. Graphs of functions $m(v)$, $\Delta t(v)$ and $l(v)$ corresponding to the existing and alternative versions of the STR in the subluminal $v < c$ and superluminal $v > c$ ranges

Fig. 1a,b,c presents the graphs of the formulas. As can be seen, all formulas for $v < c$ lead to results measured by real numbers, and for $v > c$ to results measured by imaginary numbers. This circumstance greatly discouraged authors of the generally accepted version of the STR, since until very recently no one could explain physical sense of the results measured by imaginary numbers discovered 500 years ago. And no one would need a theory whose results could not be explained even by its creators. The fate of the generally accepted (but it's only now, not then) version of the STR hung in the balance in the early 20th century. It was saved by introducing a postulate, i.e. an unproven assumption, called the principle of light speed non-exceedance, the sense of which is clear from its name. The postulate looked quite acceptable, since in the early 20th century physics knew no phenomenon, in which any physical entity would move with superluminal velocity. This is how the STR has begun to be studied and still been studied even in the most prestigious universities

But in 1934, Cherenkov radiation was discovered [33]. The radiation is emitted when electrically charged particles are moving at speeds faster than that of light.

In 1958, Pavel Alekseevich Cherenkov, Igor Evgenievich Tamm and Ilya Mikhailovich Frank received the Nobel Prize for the discovery and explanation of this radiation. The fate of the STR hung in the balance again. And the STR was saved once again. This time it was saved by making a clarification that the principle of light speed non-exceedance had implied the speed of light exclusively in a vacuum.

In the 21st century, one more attempt to refute the STR was undertaken. This time it was the OPERA experiment at the Large Hadron Collider. It was supposed to register superluminal neutrinos and thereby prove physical reality of imaginary numbers. A sensational report about successful completion of the very complex and expensive experiment was published on September 22, 2011. However, six months later, the OPERA experiment was refuted by the ICARUS experiment. Therefore, the STR again failed to be refuted.

Nevertheless, in 2008-2010, i.e. before publication of the OPERA experiment results, the results of alternative studies of special processes in linear electric circuits [34]-[38], were published. They proved that resonance, discovered by Galileo in 1602, occurs at complex frequencies, rather than at real ones, which has still been stated in textbooks on the theory of linear

electric circuits. Thus, physical reality of imaginary numbers has been finally proved and the unsuccessful OPERA experiment has become useless. And since mathematics is the language of all exact sciences, the principle of physical reality of imaginary numbers proven experimentally in the theory of linear electric circuits has become generally scientific. Therefore, this time the principle of light speed non-exceedance has been refuted.

At the same time, it has been also proved that if the outdated version of the STR presented in physics textbooks were true, then tsunami, bell ringing and music of piano or other musical instruments would be impossible; swings would not swing in a playground; Ohm's law as interpreted by Steinmetz used daily by millions of radio engineers all over the world would not work; and there would be no radio and electrical engineering at all. However, authors of the incorrect version of the STR did not know this when they created their theory at the beginning of the 20th century, but later physicists-relativists did not want to know this. Moreover, they did everything so that no one knew about it. For example, they staged a misleading and very expensive advertising action in the form of OPERA and ICARUS experiments at the Large Hadron Collider.

Nevertheless, physical reality of imaginary numbers has already been proven and the truth of this statement is beyond doubt. And therefore, in accordance with the relativistic formulas (1)-(3), something must exist in nature at $v > c$. However, analysis of the formulas has shown that the universes corresponding to such a situation should be physically unstable and therefore self-liquidating, i.e. could not exist. Thus, the relativistic formulas (1)-(3) are incorrect as well as the generally accepted version of the STR.

The generally accepted version of the STR turned out to be incorrect because, due to the lack of necessary scientific knowledge in the early 20th century, relativistic formulas were derived incorrectly. Postulates were used instead of missing scientific knowledge. However, the principle of light speed non-exceedance turned out to be wrong. Derivation errors were not timely detected and corrected. In subsequent years, following the inertia of competitive struggle (after all, within the framework of a market economy, science is a kind of business), the STR turned out to be so canonized that it became poorly receptive to new knowledge. As a result, the relativistic formulas have not yet been corrected.

3. Alternative version of the special theory of relativity

$$m(q) = \frac{m_0 e^{iq\pi/2}}{\sqrt{1 - (v/c - q)^2}} = \frac{m_0 [\cos(q\pi/2) + i \sin(q\pi/2)]}{\sqrt{1 - (w/c)^2}} \quad (7)$$

$$\Delta t(q) = \Delta t_0 e^{iq\pi/2} \sqrt{1 - (v/c - q)^2} = \Delta t_0 [\cos(q\pi/2) + i \sin(q\pi/2)] \sqrt{1 - (w/c)^2} \quad (8)$$

$$l(q) = l_0 e^{iq\pi/2} \sqrt{1 - (v/c - q)^2} = l_0 [\cos(q\pi/2) + i \sin(q\pi/2)] \sqrt{1 - (w/c)^2} \quad (9)$$

3.1. There is a hidden Multiverse in nature, not a Monoverse

Actually, relativistic formulas obtained in the generally accepted version of the STR not only were not, but could not be explained, because functions (1)-(3) vary in significantly different ways (see Fig. 1a,b,c) in the subluminal (for $v < c$) and superluminal (for $v > c$) velocity ranges. As has been shown above, universes corresponding to the formulas (1)-(3) are physically unstable in the superluminal velocity range (for $v > c$) and, therefore, cannot even exist. That is why the formulas (1)-(3) are incorrect. In order for the same regularities to take place in the subluminal (for $v < c$) and superluminal (for $v > c$) velocity ranges and, therefore, formulas describing the corresponding processes could be explained, the graphs $m(v)$, $\Delta t(v)$, $l(v)$ should take the form shown in Fig.

1d,e,f. This requires introduction of the function i^q into the corrected relativistic formulas of the STR corresponding to them

$$m(q) = \frac{m_0 i^q}{\sqrt{1 - (v/c - q)^2}} = \frac{m_0 i^q}{\sqrt{1 - (w/c)^2}} \quad (4)$$

$$\Delta t(q) = \Delta t_0 i^q \sqrt{1 - (v/c - q)^2} = \Delta t_0 i^q \sqrt{1 - (w/c)^2} \quad (5)$$

$$l(q) = l_0 i^q \sqrt{1 - (v/c - q)^2} = l_0 i^q \sqrt{1 - (w/c)^2} \quad (6)$$

where $q(v) = \lfloor v/c \rfloor$ – is the 'floor' function of discrete mathematics (Figure 2a);

$w = v - qc$ is its own local velocity for each universe (Fig. 2b).

And the function i^q is the simple and clear function convenient for this situation, since, for integers of the argument q , it takes on only the proper values $+1$, $+i$, -1 , $-i$ and in the proper sequence. These values correspond to four different universes alternating in space. However, its values are unknown for non-integers of the argument. This is not actually a problem, since we can replace the function i^q in the formulas (4)-(6) by the Euler's formula $e^{iq\pi/2} = \cos(q\pi/2) + i \sin(q\pi/2)$ that takes on the same values $+1$, $+i$, -1 , $-i$ for integers of the argument q and, therefore, can completely replace it

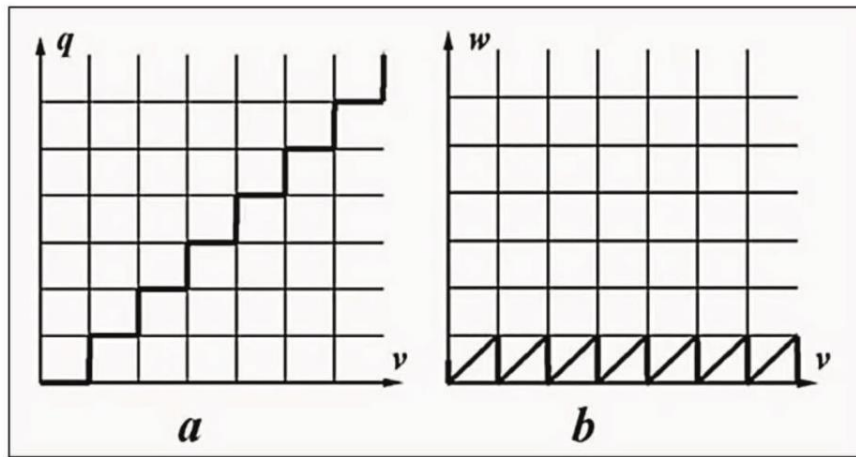


Fig. 2. Graphs of functions $q(v)$ and $w(v)$ illustrating the meaning of the 'floor' function of discrete mathematics

Thus the corrected relativistic formulas (4)-(6) and (7)-(9) imply that the quantity q takes on integers² (see Fig. 2a), determined by the discrete 'floor' function $q(v) = \lfloor v/c \rfloor$. The integers correspond to different universes. Thus, the quantity $q = 0$ corresponds to our

visible universe (for which $i^0 = 1$) and the quantity $q = 1$ corresponds to another universe (for which $i^1 = i$) that is invisible for us by virtue of the condition $v > c$, because it is located beyond the event horizon.
Stephen William

² It takes non-integer values in the portals considered below, in which, from their entrance to exit, under the influence of

physical factors that have not yet been studied, the value changes by one

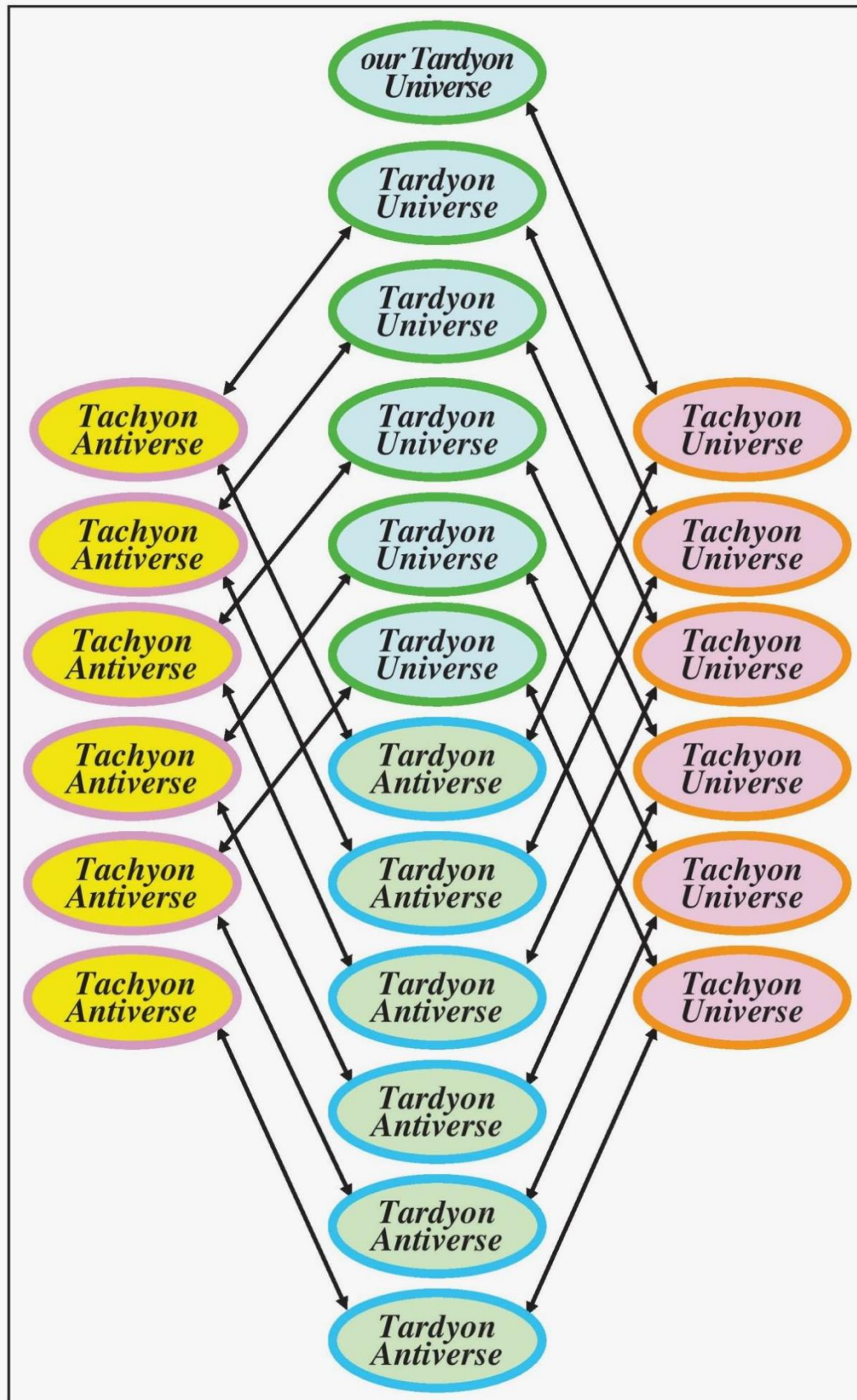


Fig. 3. Estimated helical structure of the hidden Multiverse

Hawking wrote about imaginary time in such a Multiverse: “Imaginary time is a new dimension, at right angles to ordinary, real time”. Thus, his research confirmed the validity of the hypothesis of the hidden Multiverse considered below.

Let us, for definiteness, call the universe corresponding to $q = 1$ a tachyon universe, since it contains tachyons [39]-[40] that are understood to be subatomic particles moving at a speed faster than that of light. Therefore, many physicists believe that they

should not exist in nature (by which they mean a Monoverse corresponding to the generally accepted interpretation of the STR), since they violate the principle of causality. However, since tachyons are actually in a tachyon universe (or antiverse), rather than in our universe, they do not violate the principle of causality.

For similar reasons, let us call our universe a tardyon universe. Then it would be logical to assert that the quantity $q = 2$ corresponds to a tardyon antiverse (for which $i^2 = -1$), the quantity $q = 3$ corresponds to a tachyon antiverse (for which $i^3 = -i$), the quantity $q = 4$ corresponds to another tardyon universe (for which $i^4 = 1$), the quantity $q = 5$ corresponds to another tachyon universe (for which $i^5 = i$), etc.

Consequently, such a Multiverse has a helical structure (Fig. 3). Moreover, since $v = w + qc$ follows from the formula $w = v - qc$, then $v > c$ is for all universes, except for ours, and therefore they are beyond the event horizon, i.e. are invisible. The entire Multiverse is also invisible, which is why it is called hidden [41]-[47]. Universes of the hidden Multiverse do not intersect, which is why they can be called parallel. However, drifting in the fourth spatial dimension q they sometimes touch each other and even slightly penetrate into each other, forming some transitional zones called portals [48],[49] (they are shown by double-headed arrows in Fig. 3).

3.2. Dark matter and dark energy phenomena are generated by the existence of the Multiverse

But shown in Fig. 3 structure of the hidden Multiverse has the significant drawback that it does not take into account the existence of the phenomena of dark matter and dark energy, which are not explained. So what are dark matter and dark energy? And why is it so important to explain them? This is because, according to the data obtained by the WMAP spacecraft, the entire universe (actually, the entire hidden Multiverse) consists of 22.4% of dark matter, 73.0% of dark energy and only 4.6% of baryonic matter [50]. And according to more recent data obtained by the Planck spacecraft, the entire universe (again, actually, the entire hidden Multiverse) consists of 26.8% of dark matter, 68.3% of dark energy and only 4.9% of baryonic substances [51]. That is, according to these data, almost the whole of nature is not at all what we have understood it to be in our visible universe. It is rather different. Thus, without understanding physical sense of dark matter and dark energy, understanding of our visible universe does not seem to be quite reliable. However, despite all the efforts of scientists to solve this important problem, dark matter and dark energy have been defied explanation for almost a hundred years. Michio Kaku wrote in this regard: *“Of course, a whole bunch of Nobel Prizes is waiting for the scientists who can reveal the secrets of the ‘dark energy’ and ‘dark matter’”*.

All these efforts have actually so far been undertaken within the framework of the generally accepted version of the STR. Therefore, considering the remark of Albert Einstein *“Insanity: doing the same thing over and over again and expecting different results”*, let us now try to seek for such an explanation within the framework of the alternative version of the STR. We should assume what could not be assumed within the framework of the generally accepted version of the STR – to seek for the explanation in the macrocosm, rather than in the microcosm. That is, we should assume that the phenomena of dark matter and dark energy are evoked in our visible universe by the rest of invisible universes of the hidden Multiverse. We should as well assume that the phenomena of dark matter and dark energy [52]-[60] are a kind of optical shadow of these invisible universes on our universe (however, it is gravitational or some other shadow, rather than an electromagnetic one). This will make it possible to understand why, until now, no material carriers of these phenomena have been found by research at the Large Hadron Collider. After all, no optical image (including a shadow) has ever contained any physical components of such an image.

Then, having made such an assumption, it might be argued that:

- the phenomenon of dark matter is evoked by invisible universes of the hidden Multiverse adjacent to our visible universe, and
- the phenomenon of dark energy is evoked by the rest of invisible universes of the hidden Multiverse, more distant from our visible universe.

Herewith, since these universes do not intersect anywhere, they are parallel. However, floating in space, they inevitably touch and even slightly penetrate into each other in many spots, generating portals. Adjacent universes exchange their material content through these portals. Therefore, over billions of years of their existence, parameters of all universes have substantially averaged. And this allows you to determine the number of universes in the hidden Multiverse. Assuming that our visible universe has such averaged parameters, we can find the following:

- the total number of universes in the hidden Multiverse is $100\% / 4.6\% = 21.74$ according to the above data obtained by the WMAP spacecraft, and $100\% / 4.9\% = 20.41$ according to the data obtained by the Planck spacecraft. Consequently, their real number is supposedly equal to 20...22 universes;
- the number of universes in the hidden Multiverse that are adjacent to our universe and evoke the phenomenon of dark matter is $22.4\% / 4.6\% = 4.87$ according to the above data obtained by the WMAP spacecraft, and $26.8\% / 4.9\% = 5.47$ according to the data obtained by the Planck spacecraft. Consequently, their real number is supposedly equal to 5...6 universes.
- the number of universes in the hidden Multiverse that evoke the phenomenon of dark energy is $73.0\% / 4.6\% = 15.87$ according to the above data obtained by the WMAP spacecraft, and $68.3\% / 4.9\% = 13.94$ according to the data obtained by the Planck

spacecraft. Consequently, their real number is supposedly equal to 14...16 universes.

3.3 Dark matter and dark energy phenomena allow to determine the structure of the hidden Multiverse

And immediately striking is the discrepancy between the obtained calculation results and the one shown above in Fig. 3 supposed structures of the hidden Multiverse, which cannot be explained in any way by the inaccuracy of the measurements of the WMAP and Planck spacecraft, since the difference between the results of calculations and experimental data is too large. There has been found to be five or six other parallel universes adjacent to our universe, rather than two. However, this number does not fit within the structure shown in Fig. 3.

Hence, it is logical to assume that there has been some mistake in the previous reasoning. This mistake,

$$i_1^2 = i_2^2 = i_3^2 = -1 \quad (10)$$

$$i_1 i_2 i_3 = i_2 i_3 i_1 = i_3 i_1 i_2 = -1 \quad (11)$$

$$i_1 i_3 i_2 = i_2 i_1 i_3 = i_3 i_2 i_1 = 1 \quad (12)$$

That is why, the relativistic formulas (4)-(6) and (7)-(9) must be corrected again as follows

$$m(q, r, s) = \frac{m_0 i_1^q i_2^r i_3^s}{\sqrt{1 - [v/c - (q + r + s)]^2}} \quad (13)$$

$$\Delta t(q, r, s) = \Delta t_0 i_1^q i_2^r i_3^s \sqrt{1 - [v/c - (q + r + s)]^2} \quad (14)$$

$$l(q, r, s) = l_0 i_1^q i_2^r i_3^s \sqrt{1 - [v/c - (q + r + s)]^2} \quad (15)$$

or

most likely, is that earlier, for simplicity, we have supposed the existence of only one extra dimension q in the hidden Multiverse, and, therefore, its correspondence to physically real complex numbers containing only one imaginary unit. In order for six other parallel universes to be adjacent to our universe (i.e. three tachyon universes and three tachyon antiverses), there should be three extra dimensions q, r, s , determining their position in space. Therefore, the structure of the hidden Multiverse should be described by quaternions $\sigma + i_1 \omega_1 + i_2 \omega_2 + i_3 \omega_3$, i.e. hypercomplex numbers [61], containing three imaginary units i_1, i_2, i_3 connected by the relations

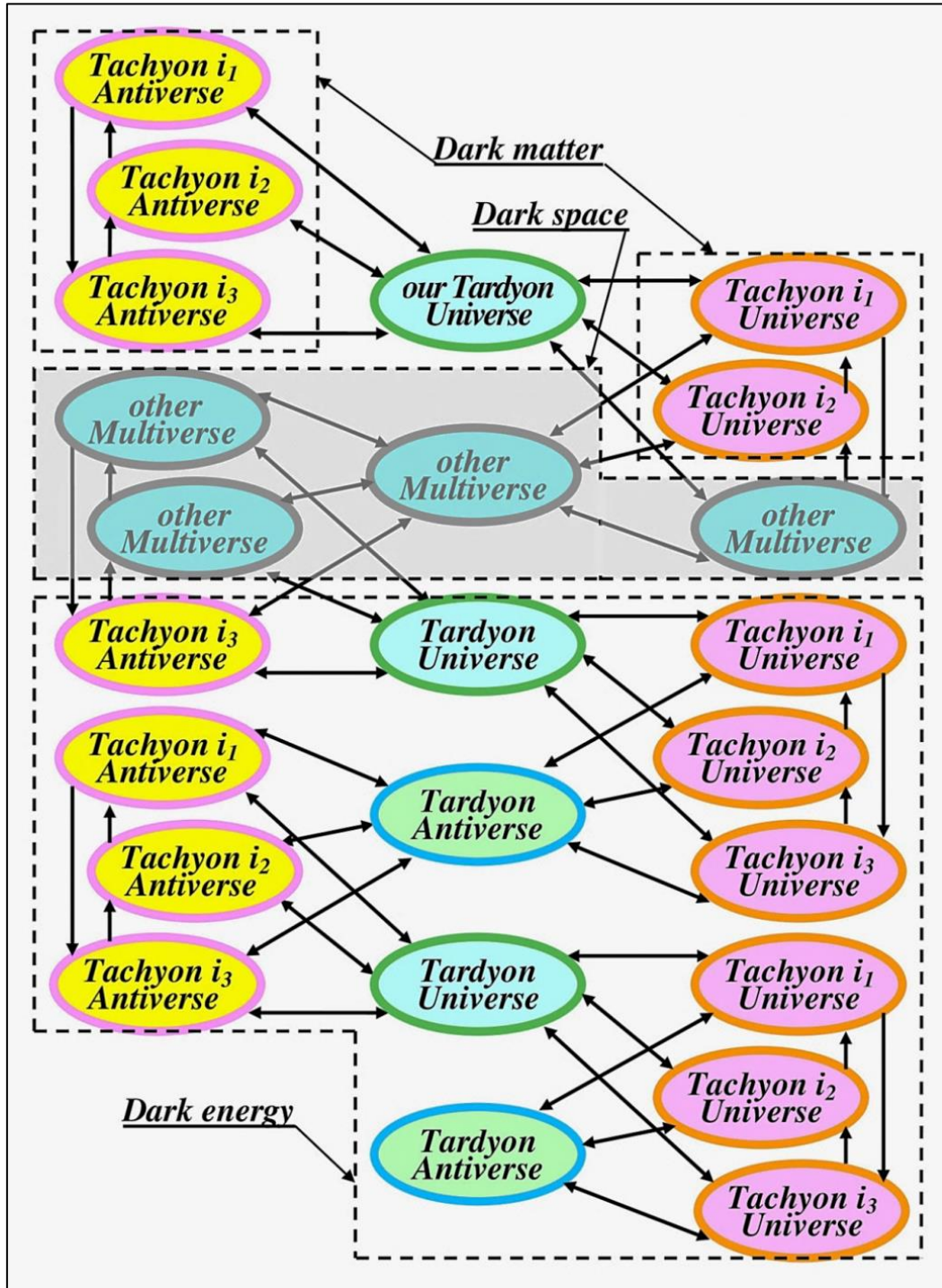


Fig. 4. Probable structure of the hidden Multiverse corresponding to the data obtained by the WMAP and Planck spacecraft

$$m(q, r, s) = \frac{m_0 e^{iq\pi/2} e^{ir\pi/2} e^{is\pi/2}}{\sqrt{1 - [v/c - (q+r+s)]^2}} \tag{16}$$

$$\Delta t(q) = \Delta t_0 e^{iq\pi/2} e^{ir\pi/2} e^{is\pi/2} \sqrt{1 - [v/c - (q+r+s)]^2} \tag{17}$$

$$l(q) = l_0 e^{iq\pi/2} e^{ir\pi/2} e^{is\pi/2} \sqrt{1 - [v/c - (q+r+s)]^2} \tag{18}$$

where m is the relativistic mass of a moving body;

Δt is the relativistic time of a moving body;
 l is the relativistic length of a moving body;

q, r, s are the coordinates of the universe in which a moving body is located.

These formulas implies that our Multiverse has a quaternion structure in six-dimensional space [62]-[64] and its structure is described by the function $f_{q,r,s}(x, y, z) + i_1q + i_2r + i_3s$, where the real summand $f_{q,r,s}(x, y, z)$ describes distribution of physical content in the universe with coordinates q, r, s , and the imaginary summand $i_1q + i_2r + i_3s$ describes the position of this universe in the space of the Multiverse.

According to the formulas (4)-(6), for integers³ of the coordinates of the universes q, r, s in the hidden Multiverse

- we get $i_1^q i_2^r i_3^s = 1$ for $q + r + s = 0$, that corresponds to our visible universe, which we shall call it a tardyon universe, since we have $0 \leq v < c$ in this case;

- we get either $i_1^q i_2^r i_3^s = i_1$ or $i_1^q i_2^r i_3^s = i_2$ or $i_1^q i_2^r i_3^s = i_3$ for $q + r + s = 1$, which corresponds to one of the invisible universes adjacent to our universes; we shall call them tachyon universes, since we have $v > c$ in this case;

- we get either $i_1^q i_2^r i_3^s = -1$ for $q + r + s = 2$, which corresponds to one of the invisible universes; we shall call them tardyon antiverses, since we have $v > c$ in this case;

- we get either $i_1^q i_2^r i_3^s = -i_1$ or $i_1^q i_2^r i_3^s = -i_2$ or $i_1^q i_2^r i_3^s = -i_3$ for $q + r + s = 3$, which corresponds to one of the invisible universes; we shall call them tachyon antiverses, since we have $v > c$ in this case;

- etc.

Examples of the structural diagrams of the hidden Multiverses corresponding to the calculations are shown in fig. 4-6. As can be seen, the universes contained in these Multiverses are interconnected not only by bidirectional portals corresponding to the formula (10), but also by unidirectional portals corresponding to the formulas (11) and (12). Besides, some universes of the hidden Multiverse, including our visible universe, it appears, can be connected through portals with universes of other Multiverses that together form a Hyperuniverse⁴, generating the phenomenon of dark space [65], [66].

³ And non-integer values q, r, s are taken in portals

⁴ By analogy with the term 'Multiverse', hereinafter, instead of 'Hyperuniverse', we will use the term 'Hyperverse'.

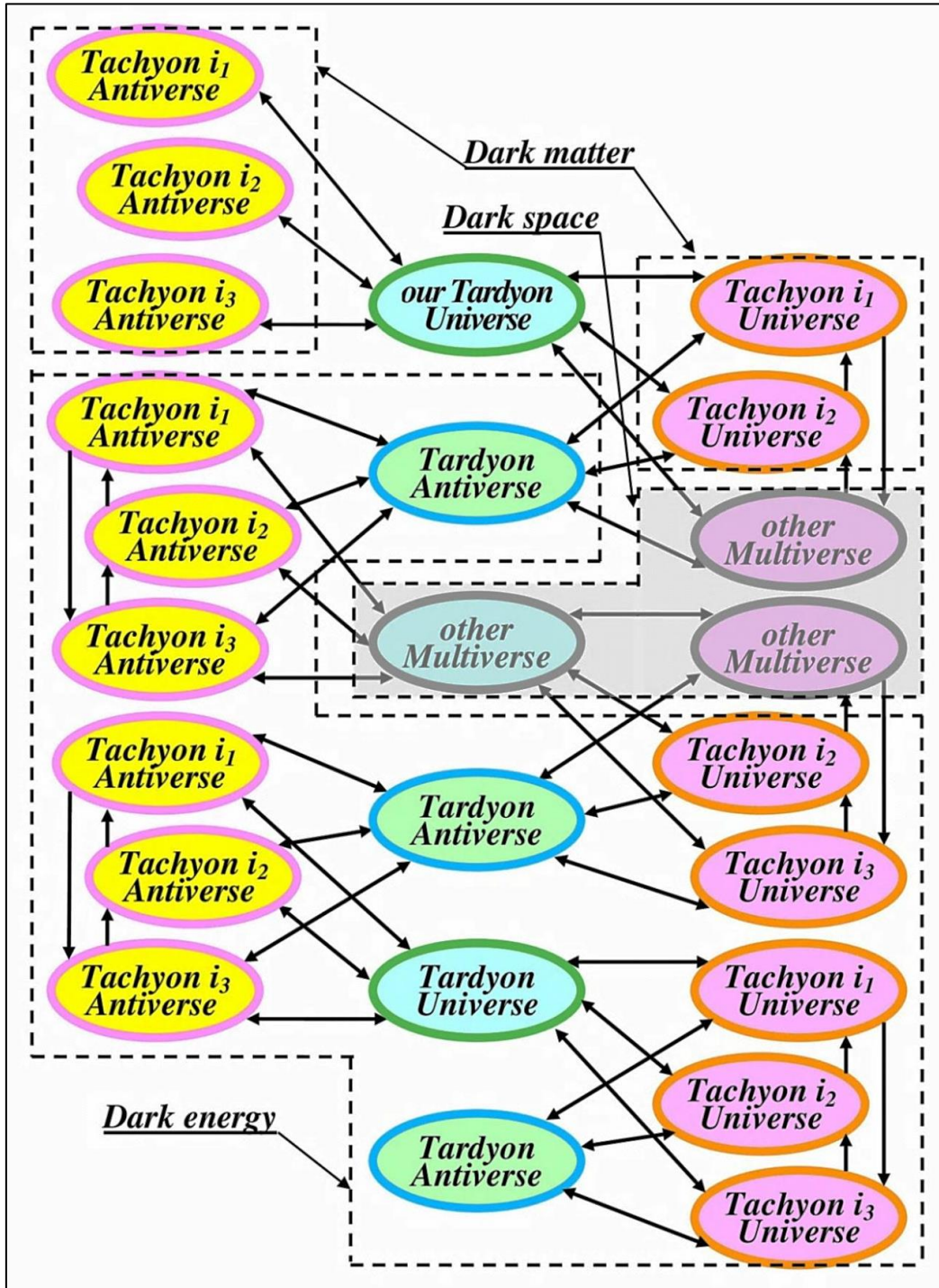


Fig. 5. Another probable structure of the hidden Multiverse corresponding to the data obtained by the WMAP and Planck spacecraft

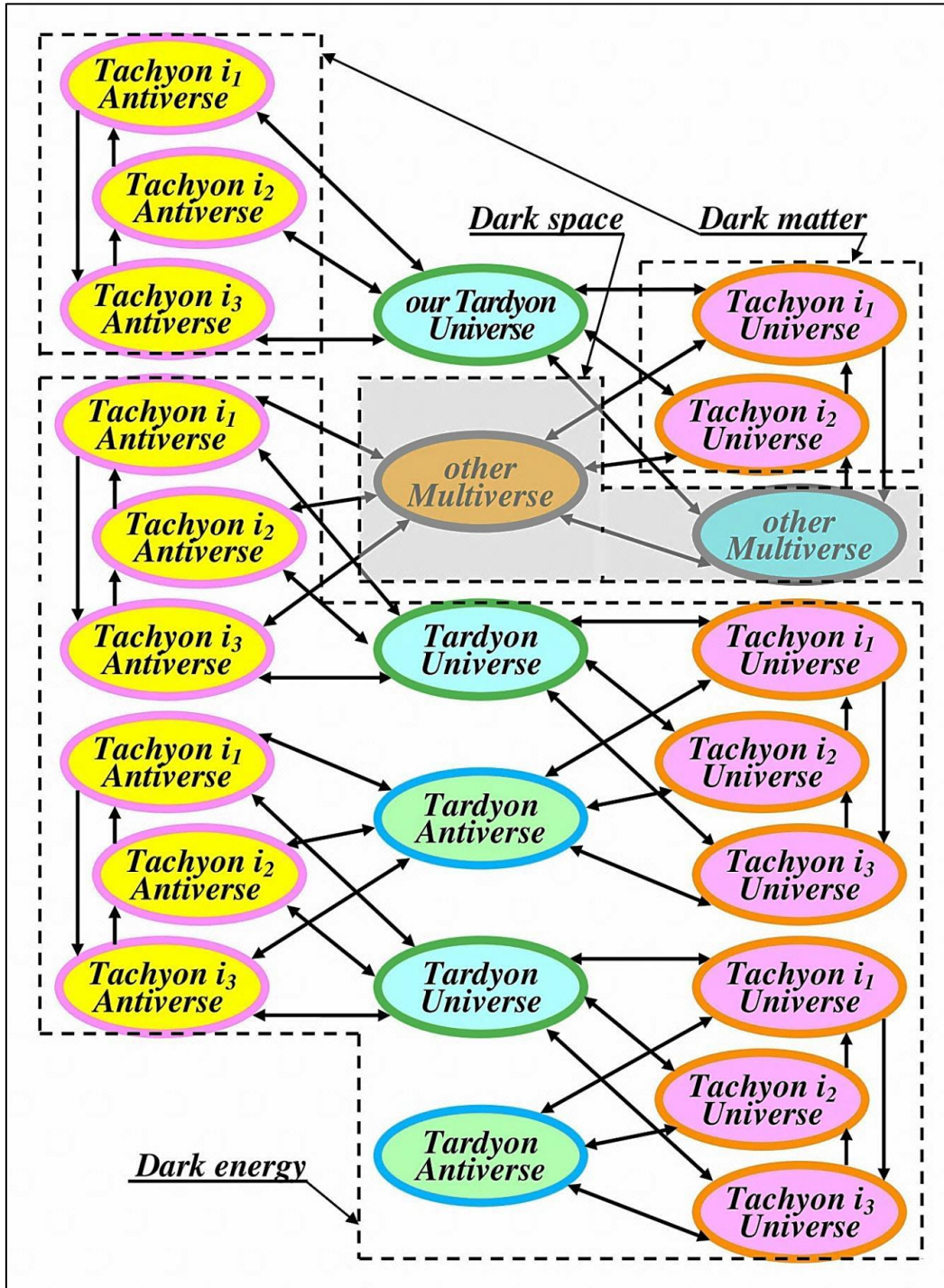


Fig. 6. One more probable structure of the hidden Multiverse corresponding to the data obtained by the WMAP and Planck spacecraft

4. How to see invisible universes

So, the alternative version of the STR successfully solves the problems that turned out to be unsolvable for the generally accepted version. Nevertheless, it will remain but a hypothesis until it finds experimental confirmation. What experimental confirmations of its truth will be authoritatively convincing and how can they be obtained?

Experimental confirmations of real physical existence of the hitherto undetected invisible universes

would obviously be the most authoritative evidence. It turns out that one can see [67]-[71], or, in other words, discover them. This requires placing a telescope in a portal⁵ and comparing its observations of the starry sky with the observations of telescopes located outside the portals (Fig. 7). Constellations in the skies of other universes would actually be completely different. Therefore, once a hypothetical telescope is moved through a portal from our universe (i.e. from the earth's

⁵ Similarly, to see the invisible neighbouring room of our dwelling, you need to look into it from the corridor connecting these rooms

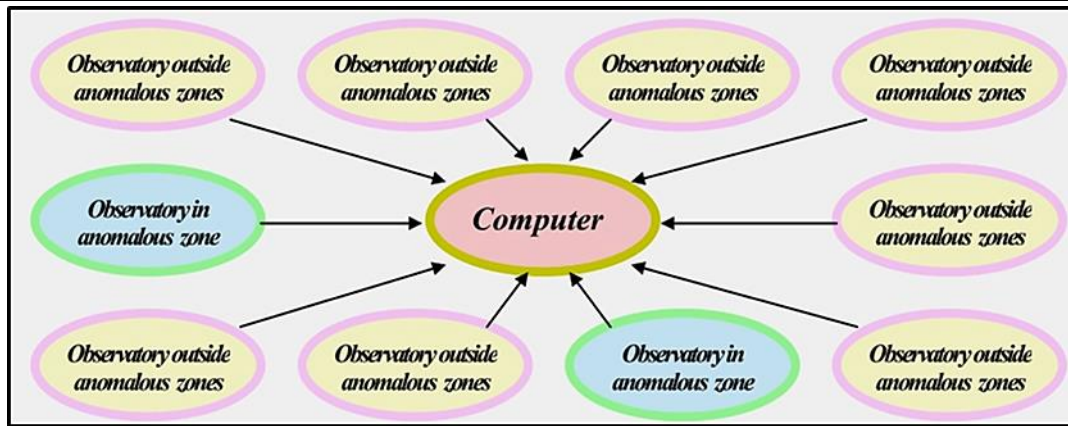


Fig. 7. Diagram of an astronomical experiment on invisible universe detection



Fig. 8. The Main Astronomical Observatory of the National Academy of Sciences of Ukraine located in an anomalous zone

surface) to an adjacent universe invisible on Earth, all the known constellations in the starry sky would gradually be replaced by the constellations of the adjacent universe. This would be the most obvious and indisputable evidence of existence of other universes. And such an experiment will be much less expensive than a similar experiment a hundred years ago by the President of the Royal Astronomical Society, Sir Arthur Stanley Eddington [72], [73].

Moreover, some observatories, such as, for example, the Main Astronomical Observatory of the National Academy of Sciences of Ukraine (Fig. 8) located in the Holosiivskyi forest, just 12 km from the centre of Kyiv, the capital of Ukraine, are already in anomalous zones, presumably being entrances to portals. Other observatories also located in anomalous zones can be identified by similar comparative studies of high-precision astronomical observations of all observatories. It is also desirable to subject all anomalous zones to such an examination so that to determine passport data of all portals available on Earth. Their comparative analysis will reveal how many adjacent invisible universes there are on the Earth and determine whether there are universes among these invisible universes that are not the part of the hidden Multiverse. Exploration of such universes would be the most interesting, as it makes possible to discover the Hyperverses.

In the future, when the portals are explored and people learn how to navigate through them safely, people can visit adjacent universes that are currently invisible. This would be another proof of their existence.

5. The relevance of geophysical researches of portals

At present, portals are absolutely unexplored. This even raises doubts as to their existence. Herewith, although there are a lot of anomalous zones supposedly being the entrances to portals, people avoid visiting them. And they are right. This is unsafe, because portals are a kind of invisible labyrinths, three-dimensional labyrinths. So, naturally, finding a way out of a portal is not easy without knowing this and taking special precautions in advance (for example, the Ariadne's thread mentioned in ancient Greek mythology). Even more difficult is to successfully move from entrance to exit through a portal (the Ariadne's thread would not help here) and get into an adjacent universe. To do this, you need to create special tools for orientation in the portals.

But all the means used for a serious portal research, including portal orientation tools, vehicles (including unmanned vehicles), communications equipment and everything else, are much less expensive than people's flights to the Moon or Mars and much more effective in terms of quantity and

quality of new expected knowledge, both astrophysical and geophysical. From the standpoint of scientific, as well as political and economic consequences for human civilization development this would appear to be much more crucial than, for example, the discovery of America by Columbus.

6. Conclusion

Thus, because the fallacy of the universally recognized version of STR stated in physics

Thus, because the fallacy of the universally recognized version of STR stated in physics textbooks, which asserts the existence in nature of our only visible universe, is experimentally proven in the most indisputable way, and the alternative version of this theory states that there are many parallel universes, it has also been proven that there are portals between these universes.

And these portals need to be explored. This is very important from a practical point of view, since one must know how one can safely visit neighboring universes. This is no less important from a scientific point of view, as it will prove the existence of anti-space and anti-time and the possibility of traveling through the hidden Multiverse not only in space, but also in time. Moreover, time travel can be not only in the past, but also in the future [74]-[78].

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POLITICAL SCIENCES

POLITICAL MECHANISMS OF DEMOCRACY: ESTABLISHMENT OF POLITICAL INSTITUTIONS

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ABSTRACT

The article explores the formation of political mechanisms of democracy and the establishment of political institutions. The importance of the establishment of political institutions to ensure the sustainability of democratic governance, to enhance the effectiveness of governance, and to ensure the legal relationship between the state and society is emphasized. By analyzing various political institutions, the role and importance of their democratic governance are clarified. The raised issues are based on systematic and comparative analysis and come to a specific conclusion.

Keywords: democracy, political mechanism, political institutions, elections, parliamentarism, pluralism, referendum.

Introduction

Democracy reflects political and social institutions. It is through these political and social institutions that the political mechanisms of democracy are formed and operate. These institutions include the following: election and referendum institutions, representative and direct (direct) democracy institutions, parliament, executive and judicial authorities, legal institutions, political parties and other socio-political organizations, mass media, local self-government bodies and others.

When examining the structure of the political mechanism of democracy, it is possible to compare it according to the basic principles of democracy, government institutions, their legitimacy, the concrete realization of human rights and freedoms, as well as the level of political decision-making and political participation in this important process.

The article analyzes the importance of the role of establishing political institutions in the formation of the political mechanism of democracy. It is explained that this is very important for the realization of a democratic society. Because it is possible only in this case to have the influence mechanism of the institutions, efficient and effective working opportunities.

1. Conceptual approach to institutionalism

The society's transition to democracy is strengthened by the institutionalization of the political mechanisms of the new state power. M. Oriu, trying to explain the necessity of the relationship between the state and other social institutions, notes that "the state should be considered as an institution of institutions" [1].

Institutionalization refers to:

- establishment of institutions of parliamentarism or presidential democracy;
- prepare the legal bases that clearly define the powers of the division of power;
- to create appropriate structures of all three branches of government at different levels, etc.

The institutionalization of the new power system is strengthened by the Constitution, which ensures its

legitimacy. The institutional and constitutional establishment of the democratic regime is inseparable from the reform of the state apparatus. Because the ruling elite is changing here. This process has its own rules and contradictions. Legitimacy - implies the support and justification of the use of power and the implementation of a certain form of management either by the state as a whole or by its individual structures and institutions [2, p. 100-135].

The transition to democracy requires the formation of appropriate institutions of the civil society, the participation of citizens of different strata of the population in political processes, the creation of socio-political organizations and various associations that can realize their interests and achieve the realization of the political course of the government. Freedom flourishes when a society manages to create institutions that ensure its stability and long-term existence. According to Ralph Darendorf, "facilities, for example, are the framework we choose for our economic prosperity. Institutions provide us with the guarantee of our rights and therefore social justice"[3].

In the process of strengthening the civil society, as its diversity increases, the country adapts to the new regime. The loyalty of the former elite - the majority of various layers of the bureaucracy, military circles, political opposition - to the new regime is obtained. On the basis of new circles, new ideology, political and social forces are being strengthened. With the development of civil society, conditions are created for the comparison of ideas, views, and positions. Only in this way, it is possible to achieve a truly democratic strengthening of society and its development within the framework of new common basic values, not by forcing the views of the minority to be accepted by the majority. Of course, if the new regime prepares and implements a political course that meets the interests of the majority, not only political rights and freedoms, and if it achieves a noticeable improvement of the entire complex of living conditions, then it gets the support of that majority. The constant attainment of such support is the

basis of a democratic structure. At the same time, the protection of the government by the people does not exclude the right to express dissatisfaction with individual views and actions, and the possibility of constructive opposition.

A true democracy is a system of socio-political relations in which the government is elected by the people, and if necessary, removed from power by the will of the people and without the use of force. According to the representatives of the concept of democracy based on competition, the ideal of democracy is the celebration of the principle of balance of the free will of citizens and individuals. These or other theories, which accept democracy formally as the rule of the people elected by the people and for the people, make interrelated propositions without which democracy in any sense is impossible. In other words, democracy is a field of collective decisions. Democracy represents an ideal system in which decisions concerning society or any social group are made by all members. At the same time, those members have the right to participate equally in making these or other decisions [4, p.127]. It can be concluded from this that democracy requires public control over collective decisions and realization of the principle of equality of rights in the implementation of this control. Based on these principles, the political mechanisms of citizens' participation in the democratic management system are formed.

In itself, the recognition of general principles as elements of democracy does not mean that they have been fully realized in political reality. Only agreement between democratic views and actions creates real democracy.

2. The institution of parliamentarism

The formation of the institution of parliamentarism as one of the main political mechanisms of democracy is of particular importance. Political democracy is reflected in the institution of parliamentarism. Parliamentarianism is an integral part of a democratic regime, but parliamentarianism is not the only system of governance. In addition to parliamentarism, Western countries have presidential democracy (typical American model) and a collegial system like Switzerland.

Parliamentarianism is a complex institution of state building and administration and is based on representative democracy. The concept of "parliamentarism" reflects the system of legal, political and moral norms, traditions, "rules of the game" at various levels developed in the process of historical-political experience and realized in state administration. The main principles of democracy - people's sovereignty, majority rule, representation, pluralism form the basis of parliamentarism.

Parliament is elected by the people and governs on behalf of the people. In turn, the people exercise control over their representatives through elections as sovereigns. The powers of the elected deputies are determined and limited by the Constitution, which reflects the national consensus.

The Parliament reflects the majority of all socially important strata of the population; in addition, the decision-making mechanism is adopted by the "majority" principle (while respecting the opinion of the minority);

opposition is a necessary institution of parliamentarism.

The functioning of parliamentarism is the real implementation of the principle of pluralism in political practice. The election of parliamentarians on the party list, the activity of party factions, including the opposition factions, are concrete forms of meeting the program visions and concepts, political views of various political groups, expressing the spectrum of interests and ideas of voters.

The power function of the parliament is a derivative of the people's sovereignty and has a constitutional guarantee. Its most important activity is legislative activity. The composition of the power function also includes political control and bringing to responsibility the administrative subjects who violate the constitutional principles and norms.

Parliament is the most important institution for legitimizing state power, as it represents the majority of society and implements its will. Political legitimacy is realized by making political decisions that are in the interest of the society. Decisions made by representatives of the people are necessary for all state and public institutions, and the law is fundamental for those who govern and those who are governed.

Parliamentary democracy also institutionalizes social conflicts. Those elected by the people discuss and resolve the conflicts that have arisen in the society based on the generally accepted norms and "rules of the game" in an apparently legitimate manner.

The real power role of the parliament, the actual influence of the institution of parliamentarism on the political life of the democratic regimes as a whole depends on the order of the constitutional division of power in each country. The principle of separation of powers is the basis of parliamentarism. Otherwise, if you do not limit the powers of the parliament, it can become a destructive force, because making a decision based on the opinion of the majority does not guarantee the constructiveness and democracy of the decision [5].

Parliament, as a political institution, reveals the necessity of competition of its political forces. The competition, the competition within the framework of generally accepted "rules of the game", serves as a method of stimulating the political activity of political forces and selecting decision options. Parliamentary competition is the best way to reveal political leaders and educate them. In democratic countries, opposition is viewed as a normal and natural state of democracy.

Ensuring the rule of law is unequivocally the most important principle for the normal operation of the above-mentioned institutions. The powers of those in power are determined only by laws. The law prevents the government from having unlimited power over the governed (that is, it determines that they must do what the law requires, not how they want). On the other hand, the law facilitates the work of the administrators. Every citizen understands his responsibility before the laws and behaves accordingly. Everyone knows well that regardless of social status and position, punishment for breaking the law is absolute. Therefore, the behavior and activity of everyone in accordance with the requirements of the law allows for a better organization of

management. Every citizen believes and trusts in the supremacy of the laws developed in accordance with his interests, the policy of the government and considers it his duty to follow it. As a result, this forms a sense of mutual trust and confidence in nation-state relations.

3. People's sovereignty and electoral institution

The main essence of the principle of people's sovereignty, which is the main idea of people's power as a moral concept of democracy, is that the people are the source of the supreme political power in society. This principle is also reflected in the Constitution of the Republic of Azerbaijan.

The principle of popular sovereignty refers to the following:

- constitutional power in the state belongs to the people; the people elect their representatives and may periodically change them; the people can directly participate in the development and adoption of laws through popular initiative and referendums; recognition of the government by the people is the basis of the legitimacy of the existing government.

The principle of people's power was directly related to the issue of democracy. Direct democracy is a form of organization and management of public life in which the people or their representatives directly participate in the implementation of the functions of state power. In the words of J. J. Russo, the unified will of the people completely coincides with the will of the state.

The principle of people's sovereignty is closely related to the principles of "majority" and "representation". The principle of "majority" is accepted by everyone, including liberals, conservatives, communists, and socialists. U. Rostow, one of the modern American sociologists, believes that democracy means statehood implemented on the basis of agreement between the governed and the governing majority [6, p. 324-335].

The principles and institutions of democracy are realized in various procedures (technologies of democracy) developed in political practice. These procedures are elections, voting, plebiscite, referendums, negotiations and compromises. In other words, the main factor in the formation of the political mechanism of democracy is the holding of free and democratic elections. The existence of a free and democratic electoral system and institution is the basis of the political mechanism of democracy. The completeness of democracy depends more on the technique of the electoral institution itself, the way in which the supreme legislative and executive authorities are elected, the rules for the election of authorities and administrative bodies below it, the extent to which the voters have the right to choose, the extent to which the right to vote is common to all, the voting is open or it depends on its secrecy, whether the elections are held periodically or not, and the degree of expression of citizens' free will.

It should also be emphasized that elections, which are an important principle for democracy, are also the biggest weapon in the hands of the people, through which they directly ensure their participation in the formation of power. Elections also determine the government's responsibility to the people and make it more attentive to its activities. The government is guided by

the interests of the people in its activities and decision-making (the highest goal of every state is to ensure human and civil rights and freedoms and a decent standard of living). He understands his responsibility before the people and does not forget that he has to report to it. Because the people always have the chance to use their sovereign rights [7].

Political representation has two main implications. First, a parliamentary representative acts as an agent of his constituents "accepted by them", "speaking on their behalf" and "defending their rights". In some cases, he acts on behalf of all voters.

The second concept of political representation is microcosmic and refers not to individual representatives of a representative body, but to the body itself as a whole. The legislature is considered representative to the extent that it reflects the character of the electorate as a whole in terms of some important aspects: social composition, territorial distribution, and the protection of individual parties.

The first aspect of political representation embodies the two basic principles of democracy mentioned above. According to the principle of the sovereignty of the people, all political power originates from the people, and the parliament and the government are controlled by them, this principle is reflected in the fact that the member of the representative body is in itself a kind of agent of the electorate. He is represented by the electorate, he acts in the interests of the electorate, he reports to it and can be replaced by it. The second aspect of the activity of members of representative bodies reflects the principle of political equality: all voters are equal, regardless of where they live and which party they vote for [8, p.51-53].

The principle of representation realized through the electoral system has the essence of democracy when it accepts the equality of citizens' participation in the political process. Democracy is a system that ensures the participation of all citizens in making political decisions. Its content is a set of rights that give everyone the opportunity to be elected to the power and management structure, to control the activities of ruling circles together with others, and if necessary, to change them by voting. Of course, this equality is formal, because it does not guarantee everyone to be a real participant. Political equality becomes real when it is sufficiently based on the social base of all sections of the population.

A. Tocqueville first discussed the problems of the dichotomy of the concepts of freedom and equality in his work "Democracy in America" [9]. The American political scientist and sociologist R. Dahl, as a result of many years, gave an analysis of the ideal of political democracy and the practice of realizing the principles of democratic governance in a concrete society in his works entitled "Introduction to Economic Democracy", "Introduction to Democracy", "Polyarchy", "Democracy and its Criticism" comprehensively criticized the concepts of equality. Expressing his opinion on A. Tocqueville's attitude to the concepts of freedom and equality, R. Dahl writes: "... A well-organized society ultimately requires three things: political equality, political freedom and economic freedom; Conditions in

the United States gave Americans the opportunity to advance in the direction of these three goals" [10, p. 13].

However, time has not yet eliminated the conflict between political equality and freedom, regardless of the individual's economic and social independence. If we look at the process in a broad framework, we can see that R. Dahl himself is worried about the possibility of such a conflict intensifying in the United States. If in the political sphere, despite all the contradictions, the basic political rights are expanding and strengthening, then in the economic sphere, the sphere of influence of democratic principles narrows to the extent of the creation and expansion of large economic structures. In addition, the unrestricted nature of free enterprise creates economic inequality, which in turn threatens political democracy.

Touching on the principles of equality and freedom in the book "Lessons of Democracy", Roland Watson shows that "there can be no question of freedom without equality. Although equality seems to be superior to freedom here, only the latter remains the goal [11, pp. 6-7].

In the formation of the political mechanism of democracy, the participation of all the people in solving the fateful issues of the society and the nation - the referendum - is of great importance. The referendum considers the most important issues important to the society to be resolved through a national vote, the obtained result has the highest legal status and is mandatory for the implementation of all state bodies. Referendum is used as a legislative mechanism in most democratic countries of the world. As a whole, it functions as a legislative mechanism, especially at the local level, despite its subordination to the legislative activity of the parliament.

There are differences in the right to initiate a referendum in different countries. In some countries (Great Britain, Sweden, Norway, etc.), the initiator of the referendum is only the parliament and the government, in others (for example, France) the president is the initiator of the referendum, and in others (Switzerland, Austria, Italy) it is the people directly [12, p.267].

For the formation of the political mechanism of democracy, the establishment of the legal state and the civil society, their interaction is the main factor. The creation and strengthening of civil society, the strengthening of the democratization process, the establishment of a legal state is not just a slogan or an intention, but the main condition for the comprehensive development of the state [13, p. 147-148].

American political scientist Dankwart Rastow states that "Democracy is not a copy of the constitutional laws or parliamentary practice of some existing democracy, but the ability to honestly look at specific conflicts and invent or use effective mechanisms for their resolution." [14]

In order for political institutions to function effectively and efficiently in the process of democratization, V. Pantin notes that "it is important for political institutions to take into account the opinion and opinion of the

majority of the people, pay attention to legitimacy (legality), correctly assess problems and find a way out" [15]

The conclusion

The analysis of the effective formation of democratic regimes shows that democratic political institutions become effective only as a result of long-term development and the process of adaptation to the conditions and traditions of a certain society. Therefore, the high degree of democracy in Western countries should be discussed only in the 20th century. As a result, the current difficulties in the establishment of democratic political institutions in a number of countries are explained by the fact that democracy and its institutions can be effective only by gradually adapting to political realities, not by their compliance with national traditions and norms.

Also, in parallel with the positive influence of people's political consciousness and political culture on the establishment of democratic governance, their understanding of democratic principles and values creates conditions for more correct and flexible functioning of the governance structure.

The approval and development of new political institutions goes through three main stages. The first stage is the creation and formation of this institution, the second stage is its legalization, rooting in society and public consciousness, adaptation to customs and norms, and the third stage is the increase of its effectiveness. The second phase, as a rule, covers the longest period and may be accompanied by moves against authoritarianism, followed by new opportunities to build democratic institutions in a renewed form.

Institutionalization of political mechanisms allows the state to have a more stable and stable political system and a flexible management apparatus. At this time, rather than the role of individuals, the activity of state institutions as a functioning mechanism plays a key role. With this, the existence of these principles, which are important for a democratic society, provides comprehensive assistance in ensuring the sovereignty, military-political security, economic stability of the state, establishing an efficient model of mutual relations between the government-people, government-opposition in the country, and the normal development of the social-political process.

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TECHNICAL SCIENCES

ТЕОРЕТИЧЕСКИЕ ПРЕДПОСЫЛКИ ФОРМИРОВАНИЯ ПАРАДИГМЫ СИНЕРГИИ ЧЕЛОВЕЧЕСКОГО И ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В РЕШЕНИИ ЗАДАЧ ЦИРКУЛЯРНОЙ ТРАНСФОРМАЦИИ МЕТАЛЛУРГИЧЕСКИХ ПРЕДПРИЯТИЙ

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THEORETICAL PREREQUISITES FOR THE FORMATION OF A PARADIGM OF SYNERGY BETWEEN HUMAN AND ARTIFICIAL INTELLIGENCE IN SOLVING THE PROBLEMS OF CIRCULAR TRANSFORMATION OF METALLURGICAL ENTERPRISES

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АНОТАЦИЯ

В статье обосновано целесообразность синергии естественного человеческого и искусственного интеллекта (ЧИ/ИИ) с целью способствования глубокому обучению последнего и повышения адекватности ее функционирования при решении задач циркулярной трансформации промышленных предприятий, востребованной концепцией «Индустрия - 4.0». В качестве примера проанализированы проблемы и перспективы цифрово-циркулярной трансформации такой ресурсоемкой и экологически вредной отрасли, как черная металлургия. Сформулирована новая парадигма синергии ЧИ и ИИ, главной задачей которого поставлена необходимость временного акцепторного контроля ИИ, под которым, в свою очередь, подразумевается осуществление постоянного мониторинга адекватности принятых ИИ-м решений со стороны ЧИ. Отмечено, что такая обязательная, уровнево- дифференцированная, но полностью взаимосвязанная и взаимозависимая синергия ЧИ и ИИ должно функционировать до достижения приемлемого для технологических процессов рециклинга уровня общей технико-экономико-экологической эффективности.

ABSTRACT

The article substantiates the feasibility of synergy between natural human and artificial intelligence (HI/AI) in order to promote deep learning of the latter and increase the adequacy of its functioning in solving the problems of circular transformation of industrial enterprises, demanded by the concept of "Industry - 4.0". As an example, the problems and prospects of digital-circular transformation of such a resource-intensive and environmentally harmful industry as ferrous metallurgy are analyzed. A new paradigm of HI and AI synergy is formulated, the main task of which is the need for temporary acceptor control of AI, which, in turn, implies the implementation of continuous control of the adequacy of decisions made by AI by HI. It is noted that such obligatory, level differentiated, but fully interrelated and interdependent synergy of HI and AI should function until the level of overall technical, economic and environmental efficiency acceptable for technological processes of recycling is achieved.

Ключевые слова: Искусственный ограниченный интеллект; Общий искусственный интеллект; Человеческий интеллект; Парадигма синергии; Гиперавтоматизация; Цифровизация.

Keywords: Artificial Narrow Intelligence; Artificial General Intelligence; Human Intelligence; Synergy paradigm; Hyperautomation; Digitalization.

Введение

Жизненный мир человека, стиль его мышления претерпевают значительные изменения под

давлением информационной сложности современной техносферы и это давление постоянно возрастает

тает в связи его глобализацией и тотальной цифровизации. К сожалению, разные неопределенности перспектив развития, обусловленные разными рисками, экологическими катастрофами и военными конфликтами, вносят существенные возмущения в процессах цифровой трансформации техносферы и все больше и больше толкают человечество к необходимости ускоренного развития искусственного интеллекта (ИИ) и синергии с ним.

Для промышленных предприятий под понятием синергии подразумевается синтез современной технологии автоматизации производственных процессов Robotic Process Automation (RPA) с ИИ [1, 2]. Известно, что технология RPA основана на использовании программных роботов при создании списка действий (по-другому - языка сценариев) для автоматизации рутинных задач с использованием программных интерфейсов API [3]. Установлено, что уровень автоматизации различных бизнес-процессов пока еще можно повышать с помощью RPA технологии, но возможности его алгоритмизации ограничены, так как он полностью зависит от уровня развития и возможностей Человеческого интеллекта — разработчика (ЧИ). По мнению авторов, данной исследовании, это проблема может быть устранена в случае синергии технологии RPA и ЧИ с ИИ.

Последние 5 лет разными ведущими компаниями (UiPath, Automation, Anywhere, Blue Prism и др.) интенсивно осваивается специальная платформа AI Fabric, которая способствует к достижению синергии RPA с ИИ. AI Fabric играет роль связующего звена между искусственным интеллектом и автоматизированными процессами. Благодаря интеллектуальным и масштабируемым возможностям, предоставляемым AI Fabric, пользователи могут управлять своей собственной автоматизацией, экономить значительное время, затрачиваемое на повседневных задачах и сосредоточиться на инновационном развитии своей организации. Путем такой синергии, на данный этап развития, успешно решаются сложные задачи организационно-логистического и учетного-аналитического характера (электронно-цифровое или онлайн сканирование документации, классификация по отраслям и проблемам, сортировка по задачам или решениям, логический анализ, архивирование-хранение, созданные учетных, бухгалтерских или финансовых форм, создание алгоритмов поиска рациональных логистических цепей и др.) [4-7]. Но до сих пор не решаема главная с точки зрения четверной промышленной революции (Индустрия 4.0) задача о полномасштабной цифровой трансформации и умной автоматизации производственных процессов. В связи с этим можно сказать, что уровень развития ИИ пока что не дает возможность достижения такой высокоэффективной синергии с RPA, причиной которого является мультифакторность и постоянно меняющейся условия/состояние производственных систем. Поэтому, на данном этапе развития ИИ, перед человеческим интеллектом, в первую очередь, становится необходимость решения задачи массив-

ной гиперавтоматизации и максимально достижимой цифровизации производственных процессов с возможностью накапливания и нейросетевого анализа получаемых массивных информационных данных.

Известно, что гиперавтоматизация позволяет бизнес-командам переосмысливать свои процессы, не упираясь в ограничения какой-то одной технологии. Благодаря тщательному перепроектированию процессов они открывают для себя новые возможности, достигают более высокой степени удовлетворенности и вносят дополнительный вклад в решение когнитивных задач и вопросов, связанных с клиентами. Поскольку ключевое значение для гиперавтоматизации имеют платформы low-code [8], организации получают дополнительную гибкость, быстро адаптируясь к происходящим изменениям, обуславливая этим устойчивую имплементацию цифровой и циркулярной трансформации. Последнее особенно важно с точки зрения смягчения антропогенной нагрузки на биосферу. В свою очередь, в последствии нейросетевого анализа [9,10] появляется возможность высокоточного распознавания закономерностей наблюдаемого производственного процесса, что способствует повышению точности при составлении прогнозов. Эти прогнозы затем можно протестировать и использовать результаты проверки для улучшения процесса принятия решений и показателей функционирования этой же производственной системы.

Чрезвычайную важность вопроса интеграции систем RPA и AI Fabric также подчеркивает резолюция Евро парламента о новом плане действий по циркулярной экономике, принятая в начале 2021 года [11]. Эта резолюция предусматривает необходимость проведения дополнительных мер по достижению углероднейтральной, экологически устойчивой, не токсичной и полностью замкнутой экономики к 2050 году. Особенно активно поощряется тенденция совмещения зеленой экономики с циркулярной, с полной цифровизацией последнего.

Современное состояние проблемы

Горно-металлургическая отрасль, как один из самых крупно доходных сегментов современной мировой экономики, по показателю цифрово-циркулярной трансформации сравнительно уступает другим, финансово даже таким менее доходным отраслям, как целлюлозно-бумажно-деревообрабатывающая, химическая, текстильная промышленность, и это в тех обстоятельствах, когда энергоемкость и наносимый природе вред от горно-металлургической активностей значительно выше, чем от других вышеперечисленных отраслей [12].

На основе анализа всемирных статистических данных по рециклингу можно отметить, что на данный период, лидерские позиции по темпу цифрово-циркулярной трансформации занимает индустрия рециклинга промышленного, бытового и пищевого пластика. Важно отметить, что системным интегратором и лидером в продвижении и практической реализации концепции циркулярной экономики в этой отрасли стал Евросоюз, где в свою очередь, лидерскую позицию устойчиво занимает Германия.

Исследователи из этой страны так же интенсивно работают над решением проблем цифрово-циркуляционной трансформации сталеплавильной и машиностроительной отраслей [13].

В мире востребованность массивного перехода на экономике замкнутого цикла в горно-металлургической индустрии существенно повысился с появлением современной глобальной революционной тенденции известной, как «Индустрия - 4.0», основанной на цифровой трансформации промышленных процессов, способных во многих случаях уже сейчас рентабельно и экологически безопасно реализовывать идеи циркулярности, но устойчивое промышленное внедрение отмеченного подхода связано с некоторыми проблемами нехватки и инерционности подачи начальных (входных) информационных данных (потоков), необходимых для правильной оценки ресурсного потенциала накопленных техногенных образований и выбора наиболее эффективных путей их переработки. Практика показывает, что из-за многофакторности решаемой задачи и сложности выявления значимых для управления эффективностью переработки зависимостей между входными и выходными параметрами процесса, невозможно обойтись без помощи искусственного интеллекта, специально обученного и адаптированного к стоящим перед отрасли задачам. Необходимо отметить, что на практике уже имеется некоторые успешные примеры применения ИИ в технике, используемой при горных работах. Например, - Умный экскаватор, способный определить траекторию и глубину необходимых работ, для получения руды с заданной крупностью кусков, система «карьерный беспилотный умный самосвал» с функцией самовзвешивания, самоуравновешивания, автодиспетчеризации, обеспечения безопасности посредством сканирования дорог с помощью ультразвуковых, оптических, лазерных датчиков, системы GPS и др [14]. Аналогичные успехи имеется в управлении системами подготовки шихты и режимами работы плавильных печей [15]. Несмотря на такой существенный прорыв, этот тип ИИ все же относится т.н. искусственному ограниченному интеллекту (ИОИ) (Artificial Narrow Intelligence), характеризующейся узкой специализацией и, с способностью к выполнению одной задачи и достижения успеха в ней.

Для достижения цели интенсификации общей цифрово-циркуляционной трансформации горно-металлургических предприятий, необходимо развить т.н. общий искусственный интеллект ОИИ (Artificial General Intelligence), максимально приближенный к интеллекту человеческого типа, обладающий способностью к анализу и сопоставлению больших потоков данных, самообучению и общению с ограниченным искусственным интеллектом смежных технологических систем. Возможность интеграции разработанных специалистами отрасли черной металлургии алгоритмов циркулярной трансформации (предусматривающих интенсификацию процессов рециклинга на основе новых бизнес-технологических подходов) с ИОИ с прилагаемыми искусственными нейронными сетями даст

возможность унификации этих методов для масштабного решения внутри - и межотраслевых проблем экологически безопасного рециркулирования потоков вторичных материальных ресурсов. Это приведет к существенному расширению функциональности этих методик, с одной стороны, а с другой, - приспособит (научит) искусственного интеллекта распознавать и оцифровать сложные, мультифакторные, незаметные для человеческого интеллекта закономерности взаимосвязей, существующих между входными и выходными параметрами сложного производственного процесса. В таком случае, основной задачей стоящей перед человеческим интеллектом останется правильное определение и постановка решаемой задачи перед искусственным интеллектом, обеспечивая его оперативным доступом или автономной системой подачи необходимой входной информации от ОИИ (напр. Фактический (не усредненный) химический и гранулометрический состав перерабатываемого материала, его влажность, пористость, текучесть, прочность при нагреве, газопроницаемость, температура размягчения, зависимость коэффициента восстановления и извлечения целевых элементов от количества применяемого кокса и содержания в нем твердого углерода и золы, изменение электропроводности реагентов в зависимости от размеров и плотности, изменение электрических режимов работы плавильной печи в зависимости от погружения электродов в шихте, от характеристик силового трансформатора и др.). В будущем, это сделает ОИИ способным самостоятельно принимать решений, обеспечивающие наибольшую эффективность рециклинга техногенных ресурсов без постоянного субъективного вмешательства человеческого интеллекта. Такой подход к циркуляционным трансформациям предприятий черной и цветной металлургии, независимо от их профиля и объемов работы, существенно продлит жизненный цикл эксплуатируемых полезных ископаемых и сделает их практически не убиваемыми. Например, отходы пирометаллургии могут применяться в качестве исходных материалов в гидрометаллургии, отходы гидрометаллургии могут быть применены в цементном производстве, градостроительстве, отходы строительной индустрии могут быть включены в индустрии дорожного строительства, в строительстве морских портов, подземных сооружений, минеральных теплоизоляционных, гидрофобных, вода-ветроустойчивых изделий и др. [16-18].

Необходимость синергии человеческого и искусственного интеллекта кроме начальной стадии определения общей стратегии или технологии переработки, и поэтапного обучения ОИИ, обуславливается неизбежностью ее периодического контроля и оценки на адекватность. Это необходимость будет обусловлено из-за невозможности предугадать все возможные варианты развития событий и предварительной полноценной обучении ИИ. Из-за непредвиденных и не регламентированных алгоритмами системы RPA-ИИ случаев, последний может принимать неадекватные решения и ввести

технологический процесс переработки в экономический или технологический ступор.

Предпосылки и возможности решения поставленной задачи

Исходя из вышеприведенного обобщенного анализа бесспорно, что адаптированная к металлургической индустрии ОИИ должна отличаться от других ограниченных автономных искусственных интеллектуальных систем, своей глубиной и гибкостью анализа, в частности она должна обладать:

- способностью достигать поставленных целей, быстро меняющихся во времени входящей информации;

- способностью сопоставлять, использовать и преобразовывать заранее данные эму знания, алгоритмы и методики ведения технологических процессов;

- способностью экспресс ориентирования в многообразии специальных вспомогательных подсистем, варьируя между ними в нужный момент (напр., - балансировать между экономичностью и экологичностью производства);

- способностью самостоятельно осуществлять подбор и планировать расход имеющейся ресурсов с определением наиболее эффективного метода их переработки.

Кроме того, ОИИ металлургического производства должна иметь возможность:

- в наборе входящей информации распознать их по значимости и сортировать по существенности;

- улавливать сходство, взаимосвязь или закономерность между входящими фактами;

- из имеющихся знаний и фактов сделать выводы с использованием дедукции, с помощью аналогии, индукции и т.п.

ОИИ работающий с такими массивами информационных потоков, как это характерна для металлургической индустрии, также должна быть способна к самооценке и самокоррекции, т.е. обладать рефлексией (средствами оценки результатов собственной работы). Техническая функциональность такого ОИИ в металлургических предприятиях будет практический всеобъемлющим, обеспечивая максимально возможное энерго-ресурсосбереже-

ние и экологичность производства, без повседневного вмешательства человека, однако от его создания очень далеко, так как пока еще даже не существует общая теория искусственной интеллектуальности и не найдено общих методов решения проблем подобного типа. В будущем, создание такого семейства или метасистемы ОИИ, способного полностью автономно управлять металлургическим, и необходимым для его снабжения энергетическим и горнодобывающим комплексами, значительно облегчит стоящей перед человечеством задачу глобальной циркулярной трансформации имеющейся промышленных мощностей, но пока такая возможность отсутствует, на первый план стоит задача устойчивой синергии ограниченного ИОИ с специально подготовленным для этой цели ЧИ.

Среди вышеперечисленных факторов, отсутствие самооценки и самокоррекции является самым главным недостатком существующих систем ИОИ, обуславливая необходимость его синергии с ЧИ.

Формирование новой парадигмы синергии и перспективы его развития

Исходя из вышеприведенного анализа ясно, что интеграционная метасистема, способствующая к синергии человеческого и искусственного интеллекта, должна акцептировать все возможные определенные и неопределенные исходные данные, классифицируя их по весомости, и применяя выборочно, по заданным заранее человеческим интеллектом типичным примерам. Такая метасистема, не в период его запуска, не после, не должна функционировать без акцепторного контроля человеческого интеллекта и должен иметь функцию клонированного подражания его действий, с возможностью самоперепрограммирования на основе полученных от ЧИ примеров дедуктивного анализа, применяемого человеком при оценке и управлении эффективностью целевого производственного процесса.

Неизбежность интеграции человеческого и искусственного интеллекта, ведет к необходимости формирования и обоснования новой парадигмы синергии, которого, по нашему мнению, графический, можно изобразить представленным на рис. 1 образом.

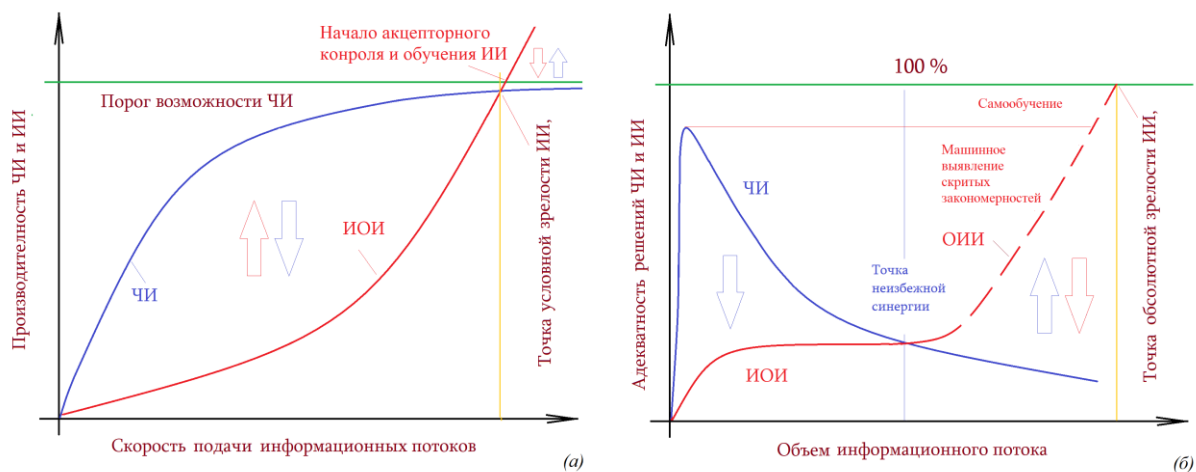


Рис. 1. Сравнение эффективностей функционирования человеческого и искусственного интеллекта (а), и скрытый потенциал их синергии (б).

Из рис. 1 (а) видно, что с повышением скорости накопления базы производственно-информационных данных, сначала, продуктивность ЧИ растет степенью квадратного корня, но достигая определенный уровень (это субъективный фактор возможностей), рост начинает замедляться и после определенного порога (условная зеленая линия), вообще прекращает рост. За то, продуктивность ИИ, по сравнению с возможностями ЧИ, не имеет такого ограничения и может расти экспоненциально. Условную точку пересечения продуктивности ИИ и ЧИ можем назвать точкой зрелости ИИ, но выше это точки процесс саморазвития, или же машинного обучения ИИ, должно быть контролируемо обученным естественным образом человеческим интеллектом. Эту зону можем назвать началом акцепторного контроля ЧИ над ИИ, а саму точку соприкосновения, - точкой неизбежной синергии. С другой стороны, скорость и адекватность принятый управленческих решений ЧИ и ИИ так же могут быть зависимы от объема получаемого информационного потока (рис. 1(б)). При небольших объемах получаемой информации ЧИ может вырабатывать рациональные, наиболее адекватные решения по сравнению пока еще обучающегося ИИ, но с повышением потока, преимущество и стабильность ИИ становится очевидным, человеческому интеллекту все более и более тяжело справиться с задачами с большими объемами входных параметров, тогда, когда ИИ начинает справляться все легче и легче. Но без накопления базы системных ошибок и путей их исправления, рост его эффективности без помощи ЧИ невозможно. Точку пересечения условных показателей адекватности ЧИ и ИИ здесь тоже называем точкой неизбежной синергии, а верхнюю потолок адекватности (100%), - точкой абсолютной зрелости ИИ, где необходимость дополнительного вмешательства ЧИ полностью отпадет. Необходимо подчеркнуть, что на данном этапе развития, ИИ очень далек от отмеченного идеального состояния, он пока еще находится на уровне зародыша и полностью зависит от уровня гиперавтоматизации и эффективности функционирования метасистемы RPA-ЧИ. Все вышеприведенное является и будет являться еще на долгие годы самыми весомыми аргументами неизбежности синергии ЧИ и ИИ.

Следовательно, можно утверждать, что главной особенностью новой парадигмы синергии ЧИ и ИИ будет являться ново введенный инструментарий временного акцепторного контроля адекватности ИИ, под которого подразумевается осуществление постоянного интеллектуального контроля правильности принятых ИИ-м прогнозных или планировочно-операционных решений, группой профессиональных кадров, имеющей богатый опыт планирования и управления данными производственными процессами. При обнаружении технико-технологических ошибок, или экономико-экологического неприемлемых решений, ЧИ должен откорректировать заданный алгоритм работы системы RPA-ИИ в живом рабочем процессе и осуществить последовательно повторную проверку оптимальности принятых ИИ-м решений. В случае

высокой приближенности выдаваемой ИИ-м данных к желаемым результатам, ЧИ акцептирует действия ИИ и дает ему свое цифровое согласие на независимое принятие решения в подобном раскладе технологических факторов. Этот этап запоминает ИИ в качестве логического дедуктивного примера (шаблона) исправления операционных ошибок и самообучается, - создает и запускает дополнительную вспомогательную нейросеть опорных информационно-программных данных, что в дальнейшем должно применяться в качестве инструментария для предупреждения повторения подобных ошибок. После накопления большого массива необходимых опорных данных, появится возможность запуска новой smart системы самооценки и исправления ошибок, которая может быть основана на применении архитектуры нечеткой нейронной сети ANFIS (Adaptive Network based Fuzzy Inference System), основанной на создании и применении аппроксимирующих моделей [19, 20]. Предложенный подход к интеграции принципов функционирования нейронных сетей с принципами нечеткой человеческой логики может привести к глубокому и адекватному обучению применяемого предприятия ИИ.

Заключение

Исходя из вышеприведенного анализа и предложений, можно сделать заключение о том, что при рассматриваемой парадигме синергии человеческого и искусственного интеллекта в решении проблемной задачи циркулярной трансформации металлургических предприятий, исходя из необходимости решения многослойных, мультифакторных задач технико-технологической, финансово-экономической и экологической эффективности промышленного рециклинга, центральным звеном принятия генеральных решений должен оставаться человеческий, естественный интеллект ЧИ, а искусственный должен исполнять функции экспресс-аналитика, планировщика и цифрового иллюстратора всех возможных сценариев развития (технико-экономико-экологического последствия) управляемого производственного процесса. Такой подход должен применяться до достижения уровня глубокого обучения ИИ.

Для достижения высоких показателей эффективности функционирования синергической метасистемы ЧИ-ИИ, необходимым станет осуществление сетевой кооперации (IoT) информационных систем целевого производственного предприятия с потенциальными партнерами, поставщиками минеральных и энергоресурсов, реализаторами продукции, институтами-разработчиками технологических процессов и норм безопасности, с потенциальными инвесторами и государственными контролирующими органами по экономической политике, экологии, и т.д. Организация таких сетей способна упростить внутри и вне отраслевые экономические и маркетинговые процессы, и в перспективе, - исключить из алгоритма обязательных действий и операций, необходимость участия человека. Без наличия полноценной базы опорных информационных данных построение и адекватное

глубокое обучение нейросетей ИИ будет недостижимо. Такая обязательная, уровнево дифференцированная, но полностью взаимосвязанная и взаимозависимая синергия ЧИ и ИИ должно быть реализовано и функционировать до достижения приемлемой для целевого технологического процесса зрелости ИИ.

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МАТЕМАТИЧЕСКАЯ МОДЕЛЬ ВЫБРОСА УГЛЯ И ГАЗА

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MATHEMATICAL MODEL OF COAL AND GAS EMISSION

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АННОТАЦИЯ

Предложена физико–математическая модель процесса выброса угля и газа, которая базируется на уравнении фильтрации газа. Модель учитывает напряженное состояние угольного массива, при этом не учитывает свойств выбросоопасных углей: электретный потенциал, степень химической активности, роль дополнительного запаса энергии микроструктуры угля и активную генерацию газа непосредственно в процессе выброса угля в выработанное пространство. Показано, что абсолютные значения критериев опасности выбросов угля, не известны.

ABSTRACT

A physico mathematical model of the process of coal and gas ejection is proposed, which is based on the gas filtration equation. The model takes into account the stress state of the coal mass, but does not take into account the properties of outburst hazardous coals: electret potential, the degree of chemical activity, the role of the additional energy reserve of the coal microstructure, and active gas generation directly in the in the process of ejection of the hive into the mined-out space. It is shown that the absolute values of the coal emission hazard criteria are not known.

Ключевые слова: фильтрация газа, напряженное состояние, газодинамическое явление, дифференциальные уравнения, численные решения.

Keywords: gas filtration, stress state, gas dynamic phenomenon, differential equations, numerical solutions.

Несмотря на большое количество критериальных параметров внезапного выброса, вошедших в нормативные документы по безопасной разработке угольных пластов, физическая или математическая связь между ними в настоящее время не установлена. В этом нет ничего удивительного, поскольку решаемая задача включает достаточно много параметров, характеризующих физико-химические свойства угля и газа [1], напряженного состояния среды [2], техногенного воздействия на угольный массив [3].

Газодинамическое явление в форме выброса угля и газа условно можно разбить на три фазы: первая – формирование условий для его протекания, вторая – собственно сам выброс, третья – затухание этого процесса [4]. С точки зрения безопасности проведения работ при добыче угля наибольший интерес представляет первая фаза, поскольку сдерживать процесс выброса невозможно или малоэффективно. Считается общепризнанным и все еще актуальным направлением исследований вопрос развития первой фазы, которая обусловлена фильтрационными процессами газа в углях (в частности, образованием вторичной фильтрационной сети), т. е. пористой среды, а вторая фаза – газодинамическое движение двухфазной среды газ+уголь. Исследуем закономерности формирования начальной стадии внезапного выброса. Очевидно, что для

проверки каких-либо физических моделей, гипотез, эффективности проводимых мероприятий и т.д. необходимо математическое моделирование, которое способно наиболее полно описать реальные процессы в углях.

В настоящей работе предложена математическая модель, в которой использована теория численного решения дифференциального уравнения фильтрации и учтены реальные параметры напряженного состояния угольного пласта.

Основным уравнением газовой динамики есть уравнение неразрывности:

$$\frac{\partial \rho}{\partial t} + \operatorname{div} \rho \vec{v} = 0. \quad (1)$$

Используем уравнение (1) к рассматриваемой нами задаче фильтрации газа в поровую среду.

Во-первых, сделаем замену:

$$\rho \rightarrow \rho(p)m(p),$$

где $\rho(p)$ – истинная плотность газа, $m(p)$ – пористость материала. Во-вторых, воспользуемся законом фильтрации газа – законом Дарси: $\vec{v} = -k(p)\operatorname{grad}P$, где \vec{v} – скорость движения флюида, $k(p)$ – коэффициент фильтрации – функция давления.

В этом случае уравнение (1) преобразуется к виду:

$$\frac{\partial}{\partial t}(\rho(p)m(p)) = \text{div}(\rho(p)k(p)gradp).$$

Для одномерных задач это уравнение имеет вид:

$$\frac{\partial}{\partial t}(\rho(p)m(p)) = \frac{1}{r^n} \cdot \frac{\partial}{\partial r} \left(r^n \rho(p)k(p) \frac{\partial p}{\partial r} \right),$$

где $n = 0, 1, 2$ для плоской, цилиндрической, сферической симметрий соответственно.

Большинство явлений, проявляющихся при гидродинамическом воздействии на горные породы, обусловлены таким их качеством, как пористость. Количественной характеристикой пористости является отношение объема пор к общему объему породы. Естественно считать, что пористость зависит от напряженного состояния, в котором находится порода. Разумным упрощением рассматриваемой задачи может служить предположение о неизменности плотности скелета угля при нагружении. Другими словами, объем рассматриваемой породы может изменяться только за счет изменения объема пор.

Выделим из угольного пласта некоторый элементарный объем V , который представим в виде

$$dV = dV_n + dV_{ск},$$

где $dV_{\tilde{v}}$ – объем порового пространства $V_{\tilde{v}}$ – объем скелета.

Если этот объем находится в ненагруженном состоянии, то истинная (исходная) пористость определится выражением

$$m_0 = \frac{dV - dV_{ск}}{dV} \Big|_{\sigma_{ij}=0}. \quad (2)$$

В нагруженном состоянии выделенная область вещества займет объем dV' . Учитывая условие несжимаемости кристаллического материала, представим выражение для пористости нагруженного вещества в виде

$$m = \frac{dV' - dV_{ск}}{dV'} \Big|_{\sigma_{ij} \neq 0}. \quad (3)$$

Из механики сплошных сред известно, что в первом приближении изменение объема при деформировании можно представить в виде

$$dV' = dV(1 + \varepsilon_{ii}),$$

где $\varepsilon_{ii} = \varepsilon_x + \varepsilon_y + \varepsilon_z$ – сумма главных значений тензора деформации.

Подставив это выражение в формулу (3), получим

$$m = \frac{m_0 + \varepsilon_{ii}}{1 + \varepsilon_{ii}}. \quad (4)$$

Уравнение устанавливает связь пористости деформированного материала с истинной пористостью вещества (не подверженного каким-либо воздействиям).

Дальнейшее рассмотрение задачи будем проводить в приближении теории упругости. Воспользуемся обобщенным законом Гука

$$\varepsilon_{ij} = \left(\frac{1+\nu}{E} \cdot \sigma \right)_{ij} - \delta_{ij} \left(\frac{\nu\sigma}{E} \right)_{kk},$$

где ν – коэффициент Пуассона, E – модуль Юнга.

Таким образом,

$$dV' = dV \left(1 - \frac{1-2\nu}{E} (\sigma_x + \sigma_y + \sigma_z) \right).$$

В нетронутом горно-техническими работами угольном пласте имеют место соотношения

$$\sigma_x = \gamma H - P_{nl}, \quad \sigma_y = \lambda \gamma H - P_{nl},$$

$$\sigma_z = \lambda \gamma H - P_{nl},$$

где γ – удельный вес вышележащих пород, H – глубина залегания угольного массива, λ – коэффициент бокового распора.

В процессе ведения горных работ напряженное состояние естественно, изменится и в общем случае, учитывая движение флюида в поровом пространстве при гидродинамическом воздействии, будет иметь вид:

$$\sigma_z = Z - P, \quad \sigma_y = Y - P, \quad \sigma_x = X - P,$$

где X, Y, Z – напряжения по осям x, y, z соответственно – функции координат и времени, P – давление газа в угольном пласте.

Для нетронутого пластового состояния можно ввести пластовую пористость $m_{пл}$, которая равна

$$m_{nl} = \frac{m_0 - \frac{(1-2\nu)}{E} (\gamma H (1+2\lambda) - 3P_{nl})}{1 - \frac{(1-2\nu)}{E} (\gamma H (1+2\lambda) - 3P_{nl})}. \quad (5)$$

Так как на практике приходится пользоваться не величиной m_0 , а $m_{пл}$, то желательно установить функциональную связь пористости материала, подверженного технологическим воздействиям, с пористостью нетронутого пласта – $m(m_{пл})$. Исключая m_0 из уравнений (4), (5), получаем:

$$m = 1 - (1 - m_{nl}) \frac{1 - \frac{(1-2\nu)}{E} (\gamma H (1+2\lambda) - 3P_{nl})}{1 - \frac{(1-2\nu)}{E} (X + Y + Z - 3P)}. \quad (6)$$

Таким образом, получена функциональная зависимость пористости материала от напряженного состояния (X, Y, Z) и давления газа (P) при гидродинамическом воздействии на этот материал. Этот подход был разработан совместно с Софийским К.К.

Описание движения газа в поровой среде принципиально отличается от описания фильтра-

ции жидкости. Это обусловлено в основном необходимостью учета сжимаемости газа. В первом приближении воспользуемся уравнением изотермы

$$\rho = B \cdot P.$$

где B – константа.

Подставив это выражение в левую часть уравнения неразрывности, получим

$$\frac{\partial m}{\partial P} = 3(1 - m_{nl}) \cdot \frac{\left(1 - \frac{1-2\nu}{E} (\gamma H(1+2\lambda) - 3P_{nl})\right)}{\left(1 - \frac{1-2\nu}{E} (X+Y+Z - 3P)\right)^2} \cdot \frac{1-2\nu}{E}.$$

Учитывая предыдущие рассуждения (выводы), получаем выражение для левой части уравнения

$$B \frac{\partial P}{\partial t} \left[1 - (1 - m_{nl}) \cdot \frac{\left(1 - \frac{1-2\nu}{E} (X+Y+Z)\right) \left(1 - \frac{1-2\nu}{E} (\gamma H(1+2\lambda) - 3P_{nl})\right)}{\left(1 - \frac{1-2\nu}{E} (X+Y+Z - 3P)\right)^2} \right].$$

Правую часть уравнения представим в виде:

$$B \frac{1}{r^n} \frac{\partial}{\partial r} \left(r^n P k(P) \frac{\partial P}{\partial r} \right).$$

В результате получаем такое выражение для уравнения неразрывности:

$$\frac{\partial P}{\partial t} = H \frac{1}{r^n} \frac{\partial}{\partial r} \left(r^n P \cdot k(P) \frac{\partial P}{\partial r} \right),$$

где

$$H = \frac{\left(1 - \frac{1-2\nu}{E} \cdot (X+Y+Z - 3P)\right)^2}{1 - (1 - m_{nl}) \left(1 - \frac{1-2\nu}{E} \cdot (X+Y+Z)\right) \left(1 - \frac{1-2\nu}{E} \cdot (\gamma H(1+2\lambda) - 3P_{nl})\right)}.$$

Общая постановка задачи гидродинамического течения газа в пористой среде сводится к решению уравнения фильтрации с меняющимися в определенные моменты времени краевыми условиями. Это происходит при возникновении отколов пористой среды в результате фильтрации газа. Поэтому если использовать аналитические методы решения, то задача разбивается на несколько подзадач: задачу фильтрации для всей рассматриваемой области и задачи фильтрации для подобластей, возникающих при разрушении материала. Естественно, что такой подход является слишком громоздким и, если учесть нелинейность уравнения фильтрации, – практически нереальным для осуществления. Единственным выходом из этого положения может быть применение численных методов решения дифференциальных уравнений в частных производных. Среди них наибольшее распространение получили разностные методы решения задач, основанные на замене производных конечными разностями.

Теория построения разностных схем для различных по типу уравнений и систем уравнений детально изложена в работе [5]. Прежде чем перейти к разработке разностной схемы численного расчета

$$\frac{\partial}{\partial t} (\rho m) = B \cdot \frac{\partial P}{\partial t} \left[P \frac{\partial m}{\partial P} + m \right].$$

Используя функциональную зависимость $m(P)$, получим

сформулируем общую постановку математической задачи.

Уравнение фильтрации

$$\frac{\partial P}{\partial t} = H(P) \frac{1}{r^n} \frac{\partial}{\partial r} \left(r^n K(P) \frac{\partial P}{\partial r} \right),$$

краевые условия

$$P(r_0, t) = f(t) + P_{nl}, \quad P(\infty, t) = P_{nl}, \quad f(0) = 0,$$

где $f(t)$ – функция изменения давления на границе среды, P_{nl} – поровое давление газа в угольном пласте.

Для решения задачи систему уравнений необходимо дополнить условием разрыва материала – критерием разрушения. Физическая картина процесса разрушения сводится к следующему. В результате случайного обнажения какой-либо поверхности в угольном веществе происходит быстрая фильтрация газа из пористой среды в забой. При этом, градиент давления флюида на данной поверхности резко возрастает. Величина градиента зависит от фильтрационных свойств угля (вязкости, коэффициента проницаемости). Наличие градиента давления вызывает движение газа в порах, а следовательно, имеет место перенос импульса, плотность потока которого равна дополнительным

напряжениям в конденсированной среде, вызванным этим движением. В зависимости от знака градиента давления сила может быть направлена или в сторону свободного пространства или в сторону нагружаемого материала. В рамках рассматриваемой задачи в дальнейшем будем учитывать растягивающие напряжения, которые и являются причиной разрушения материала при внезапных выбросах угля.

Прежде всего, введем понятие "силового" критерия разрушения, суть которого сводится к следующему: разрушение материала наступает только в том случае, если на какой-либо поверхности растягивающие напряжения превышают соответствующий предел прочности:

$$\sigma_s \geq \sigma_p,$$

где σ_s – величина растягивающих напряжений, σ_p – предел прочности материала на растяжение.

В плоском случае сила, действующая на элементарный объем длиной dr и площадью сечения S_0 , равна

$$S_0 \frac{dP}{dr} \cdot dr,$$

где r – линейная координата выбранного объема.

В квазистатическом приближении, когда можно принимать величину скорости распространения упругих возмущений равной бесконечности, сила в сечении с координатой R равняется

$$F(R) = m \cdot S_0 \int_0^R \frac{dP}{dr} dr = m \cdot S_0 (P(R) - P(0)),$$

где m – пористость вещества, учитывающая тот факт, что в создании напряженного состояния участвует только флюидная часть материала.

В результате получаем, получаем силовой критерий разрушения:

$$\sigma_s(R) = \frac{F(R)}{S_0} = [P(R) - P(0)] \cdot m \geq \sigma_p,$$

Гидродинамический разрыв материала возможен только в том случае, когда в некотором сечении выполняется как силовой критерий, так и энергетический. Суть энергетического критерия сводится к следующему. При обратной фильтрации силы гидродинамического давления в порах выполняют работу по перемещению флюида, часть которой затрачивается на растяжение остова пористой среды, а именно:

$$\omega = \{(r_i, t_j) \mid r_{i+1} = r_i + h_i, \quad t_{j+1} = t_j + \tau_j,$$

$$i = 0, 1, 2, \dots, N, \quad j = 0, 1, 2, \dots, \quad r_0 = R_0, \quad r_N = R_N, \quad t_0 = 0\},$$

где N – количество счетных точек по пространственной координате r , R_0 – начальная координата счетной области, R_N – конечная координата счетной области, h_i – пространственный шаг, τ_i – временной шаг.

Разностный аналог уравнения (1) имеет вид [5]:

$$dA = mpudt.$$

Учитывая, что $u = -k \frac{\partial P}{\partial r}$, получаем математическое выражение для энергетического критерия разрушения:

$$-m \int_0^{t_j} k(p) \left(\frac{\partial P}{\partial r} \right) \cdot P dt \geq 2g_s,$$

где g_s – удельная энергия образования новой поверхности.

Знак "-" в левой части взят по той причине, что нас интересуют только те объемы вещества, где $u < 0$, ($\frac{dP}{dr} > 0$), то есть те объемы, где вещество испытывает растягивающее воздействие со стороны движущегося флюида.

Образование свободной поверхности при отколе резко меняет условия задачи, а именно, в точке разрыва (обозначим ее как r_i) давление следует приравнять давлению газа в выработке

$$P(r_i, t) = P(r_0, t), \quad t \geq t_j.$$

Физическим обоснованием этого условия является следующее. Так как скорость переноса упругих возмущений в твердой пористой среде очень высока – порядка километра в секунду, то можно принять, что при образовании свободной поверхности давление флюида в порах в месте разрыва материала "мгновенно" устанавливается равным давлению на границе области воздействия. В настоящей постановке задачи учитываются реальные характеристики среды, симметрия задачи (плоская, цилиндрическая, сферическая), размеры границы области нагружения r_0 , характеристики процесса гидродинамического воздействия.

Для численного решения дифференциальных уравнений рассматриваемого типа чаще всего используются неявные разностные схемы, несмотря на их громоздкость и трудности реализации. Обусловлено это, в первую очередь, большой их устойчивостью к неточностям машинного вычисления и изменениям входных данных. Кроме того, по сравнению с явными разностными схемами, ограничение на величину шага по времени является не слишком жестким, что значительно ускоряет скорость расчета.

В области определения функции $P(r,t)$ введем пространственно-временную сетку

$$\frac{P_i^{j+1} - P_i^j}{\tau} = \frac{H_i^j}{\hbar_i r_i^n} \left\{ r_{i+1/2}^n a_{i+1/2}^j \left[\sigma \frac{P_{i+1}^{j+1} - P_i^{j+1}}{h_{i+1}} + (1 - \sigma) \frac{P_{i+1}^j - P_i^j}{h_{i+1}} \right] - \right. \\ \left. r_{i-1/2}^n a_{i-1/2}^j \left[\sigma \frac{P_i^{j+1} - P_{i-1}^{j+1}}{h_{i-1}} + (1 - \sigma) \frac{P_i^j - P_{i-1}^j}{h_{i-1}} \right] \right\} + \varphi_i^j,$$

где $0 \leq i \leq N$, $j \geq 0$, $\hbar_i = 0,5(h_i + h_{i-1})$, $h_{i+1} = r_{i+1} - r_i$, $a_{i+1/2}^j = 0,5(K_{i+1}^j + K_i^j)$.

Эта неявная разностная схема решалась методом прогонки. Точность аппроксимации при поординате и времени при $\sigma = 0,5$ равнялась двум.

Здесь шаг по времени обозначен как τ вместо τ_j . Кроме этого, для решения более сложных задач в уравнении добавлена функция φ_i^j , то есть вместо однородного уравнения рассматривается более общее уравнение – неоднородное.

Установление общих закономерностей гидродинамического воздействия на угольный массив в настоящее время является довольно сложной задачей, решение которой связано с необходимостью преодоления как чисто математических трудностей, обусловленных резкой сменой граничных условий, большим объемом вычислительных операций, так и с многопараметричностью задачи. Таким образом, для решения этой задачи теории оптимального управления, а значит, решения самостоятельной сложной проблемы. В связи с этим необходимо установить частные закономерности, знание которых является необходимым условием при проведении экспериментальных исследований и для усовершенствования математической модели.

Перечислим основные параметры задачи:

$\nu = 0,18$ коэффициент Пуассона; $E = 2,5 \cdot 10^4$ Па – модуль Юнга; $H = 1000$ м – глубина залегания угольного пласта; $m_{пл} = 0,05$ – пористость угля; $P_{пл} = 2 \cdot 10^6$ Па – давление газа в угольном пласте; $k_0 = 4,4 \cdot 10^{-12}$ (м²/((Па·с))) – коэффициент фильтрации газа, представляемый в виде $k = k_0 + k_1 p$; $P_k = 10^5$ Па – давление газа в лаве; $\sigma_p = 10^5$ Па – прочность угля на разрыв; $g_s = 10$ Па· м – удельная энергия образования свежей поверхности; $T_c = 0,1$ с – время сброса давления на поверхности обнажения.

Исследуем влияние основных параметров задачи на инициирование процесса внезапного выброса, а именно, на инициирование трещинообразования угольного массива. В настоящих расчетах

размер расчетной области был выбран $R_N = 4$ м, количество счетных точек $N = 1000$. Все остальные параметры равны приведенным выше.

Скорость сброса давления определялась по формуле

$$P(0) = P_{пл} - \frac{t}{T_c} (P_{пл} - P_k).$$

В качестве изменяемого параметра была выбрана прочность угля на разрыв σ_p , равная $\sim 10^5$ Па. Как показали расчеты, величина σ_p проявляет характер критической величины: если этот параметр меньше определенного значения, то процесс сброса давления и последующего вытекания газа сопровождается трещинообразованием угольного массива, то есть создаются условия для реализации процесса внезапного выброса. В случае если прочность угля на разрыв превышает критическую величину, то при сбросе давления газ вытекает в свободное пространство без генерации каких-либо разрушений угольного массива.

При указанных выше параметрах задачи критическое значение прочности угля $\sigma_{кр} = 0,9$ атм. Это означает, что если $\sigma_p \leq \sigma_{кр}$, то реализуется процесс трещинообразования, динамика которого показана на рис. 1 и рис. 2. На верхних графиках представлены распределения давления газа в порах угля в зависимости от расстояния до плоскости обнажения массива $P(R)$ в моменты времени (s), указанные на графиках. Средние графики представляют такие же зависимости для плотности энергии, передаваемой угольному материалу в результате фильтрации газа $E(R)$. Отрицательные значения этой энергии указывают на то, что газ движется в обратную по отношению к направлению оси R . Нижние графики – подобные зависимости для напряжений в угле, возникающих в результате фильтрации газа $S(R)$.

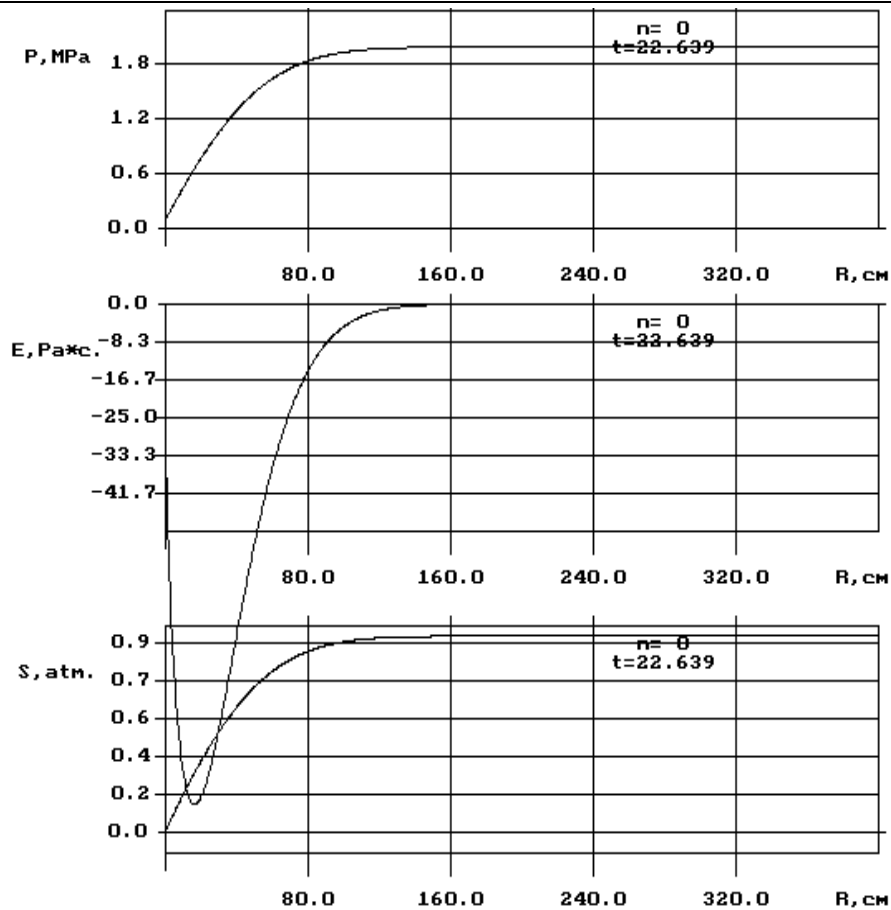


Рис. 1. Динамика процесса, предшествующего образованию первой трещины

Рис. 1 соответствует моменту времени, предшествующему образованию первой трещины, рис. 2 соответствует моменту времени образования первой трещины и зарождению второй. В этих случаях прочность угля была на несколько процентов меньше критической величины.

Можно сделать следующее заключение: несмотря на то, что угольное вещество в результате фильтрации газа запасает внутреннюю энергию, значительно превосходящую энергию образования свежей поверхности $g_s=10$ Па·м, разрыва вещества не происходит по той причине, что не выполняется

силовой критерий разрушения. Другими словами, процесс трещинообразования требует выполнения двух критериев: силового и энергетического одновременно каком-либо сечении вещества. При более низких значениях прочности угля реализуется самоподдерживающийся процесс дробления угля – выброс угля (рис. 3). Вертикальные линии, пересекающие средний и нижний графики, указывают на места образования разрывов.

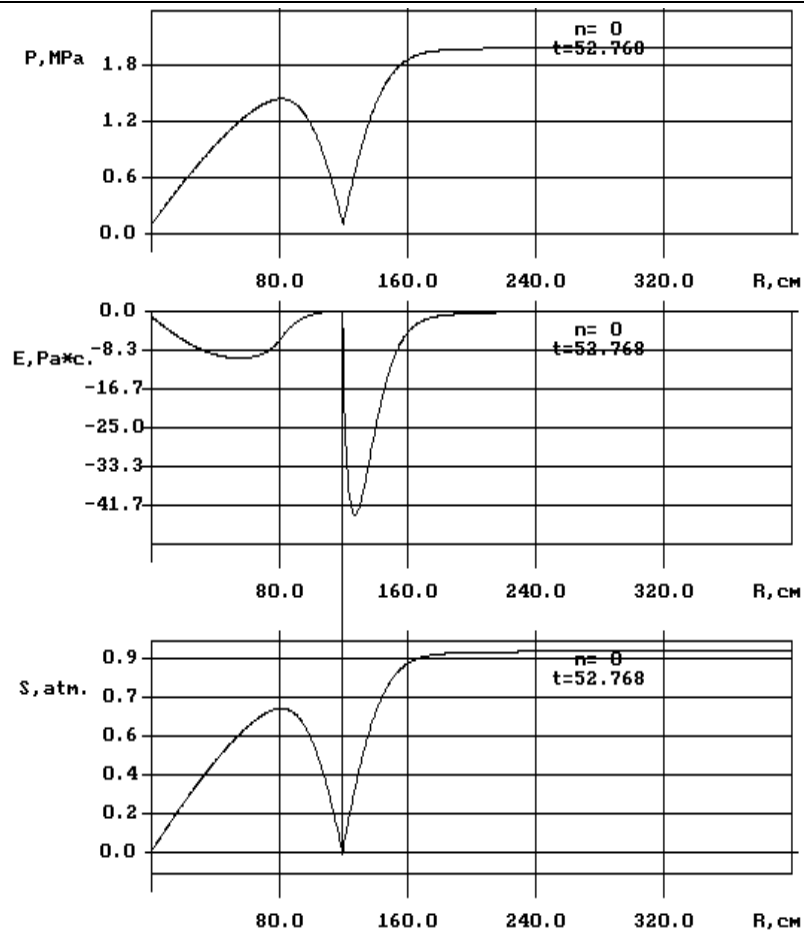


Рис.2. Динамика процесса в момент времени образования первой трещины и зарождению второй

Удельная энергия образования свежей поверхности. К сожалению, в настоящее время отсутствует теория или, хотя бы эмпирический подход, позволяющие установить взаимосвязь между σ_p и g_s . В расчетах будем изменять величину g_s независимо от параметра σ_p .

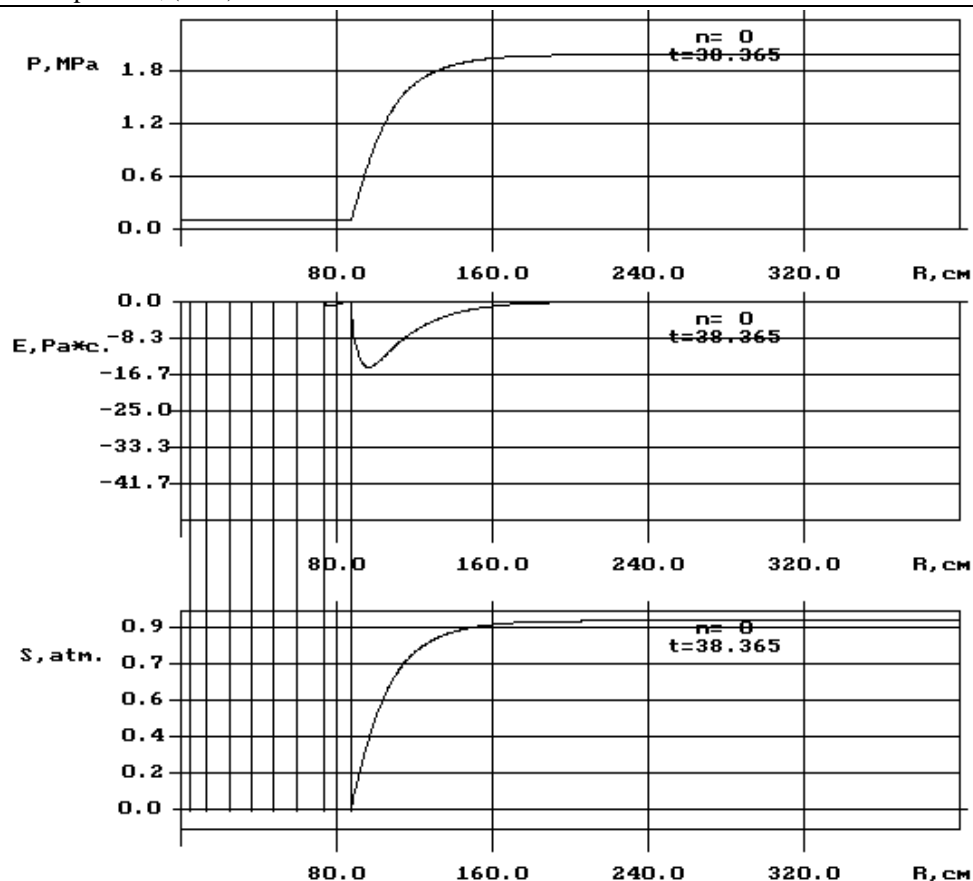


Рис. 3. Иллюстрация выброса угля и газа

Для определенности примем, что прочность угля на разрыв близка к критическому значению, полученному выше, а именно, $\sigma_p = 0,88$ атм. Результаты расчетов показали, что критическое значение поверхностной плотности энергии образования трещины равно $g_{кр} = 16,5$ Па·м, то есть, если $g_s > 16,5$ Па·с, то трещинообразование не наблюдается. Этот результат интересен тем, что он указывает на исключительно важную роль прочностных характеристик угольного вещества при гидродинамическом воздействии. Незначительное изменение σ_p , а именно, от величины 0,89 до 0,88 Па·с приводит к дестабилизации состояния угля с точки зрения возможного его трещинообразования. Для стабильного состояния угля необходимо, чтобы энергия трещинообразования была больше 16,5 Па·с, что значительно превышает величину $g_s = 10$ Па·с., при которой уголь сохраняет свою целостность, если $\sigma_p = 0,89$ атм.

Пористость угольного вещества. Кроме условия напряженного состояния угольного массива пористость играет не последнюю роль как в сохранении выбросоопасного состояния, так и в создании условий выброса угля и газа. Чем больше пористость, тем большее количество газа участвует в процессе фильтрации, а следовательно, тем больше перенос импульса и выполняемая при этом работа газа. Чтобы убедиться в этом были проведены расчеты инициирования трещинообразования при значениях пористости $m=0,06$ и $m=0,04$ при $g_s = 10$ Па·с и $P_{пл} = 20$ атм.. Расчеты подтвердили сделанный ранее вывод: для пористости $m=0,06$ критическое напряжение равно $\sigma_{кр} = 1,1$ атм., а для пористости $m=0,04$ – $\sigma_{кр} = 0,72$ атм.

На процесс развязывания внезапного выброса влияние опорного давления незначительно, однако влияние связанного газа существенное: критические значения параметров задачи снижаются на несколько десятков процентов.

Таким образом, предварительная апробация математической модели инициирования процесса внезапного выброса, основанная на численном решении задачи фильтрации газа в угольном материале, показывает, что абсолютных значений критических параметров не существует. Их необходимо учитывать в общей взаимосвязи, что представляет собой довольно сложную математическую задачу, решение которой требует привлечения теории оптимального управления. Кроме этого, следует подчеркнуть, что представленная математическая модель может служить в качестве математической лаборатории, на основе которой можно будет проверять различные физические модели зарождения и развития процесса внезапного выброса.

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АЛГОРИТМ РАБОТЫ ОНЛАЙН ПЛАТФОРМЫ ДЛЯ АВТОМАТИЗАЦИИ ПОИСКА ВАКАНСИЙ

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ALGORITHM OF THE ONLINE PLATFORM FOR JOB SEARCH AUTOMATION

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АННОТАЦИЯ

В статье рассматриваются алгоритм сайта-агрегатора поиска работы и то, как он работает. В целом, алгоритм сайта-агрегатора поиска работы – это мощный инструмент, который может помочь соискателям быстро и легко найти соответствующие вакансии. Используя комбинацию очистки данных, обработки поисковых запросов, расчета оценки релевантности, ранжирования, персонализации, фильтрации и сортировки, алгоритм может обеспечить персонализированный и эффективный поиск работы.

ABSTRACT

The article discusses the algorithm of the job search aggregator site and how it works. In general, the algorithm of the job search aggregator site is a powerful tool that can help job seekers quickly and easily find relevant vacancies. Using a combination of data cleaning, search query processing, relevance score calculation, ranking, personalization, filtering and sorting, the algorithm can provide a personalized and efficient job search.

Ключевые слова: запрос, релевантность, ранжирования, персонализация, фильтрация, сортировка, сайт-агрегатор.

Keywords: query, relevance, ranking, personalization, filtering, sorting, aggregator site.

Сайт-агрегатор поиска работы - это платформа, которая помогает соискателям находить вакансии из различных источников, таких как доски объявлений о вакансиях, страницы карьеры компании и социальные сети. Сайт собирает и индекси-

рует объявления о вакансиях из нескольких источников, что облегчает соискателям поиск работы в одном месте (рис. 1). Чтобы обеспечить наилучшие результаты поиска, сайт-агрегатор поиска работы использует алгоритм, учитывающий различные факторы [1].

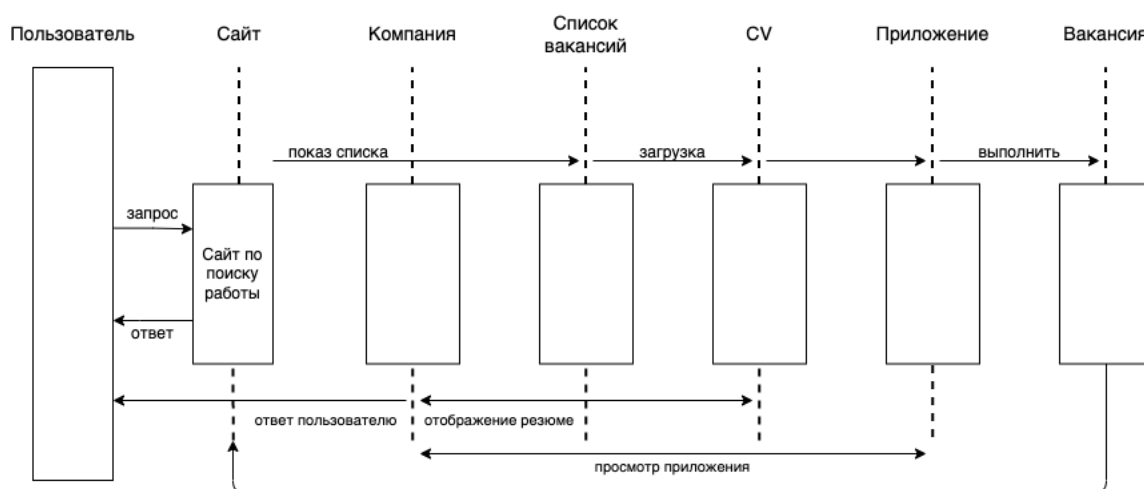


Рис. 1. Схема последовательности работы системы

Алгоритм сайта-агрегатора поиска работы направлен на то, чтобы предоставлять соискателю релевантные объявления о вакансиях на основе его поискового запроса. Алгоритм учитывает несколько факторов для определения релевантности объявления о вакансии конкретному поисковому запросу. Эти факторы включают название должности, описание должностных обязанностей, местоположение, зарплату, тип работы. Рассмотрим принцип работы алгоритма.

Сканирование и индексация. Первым шагом в алгоритме онлайн-агрегаторов поиска работы обычно является сканирование и индексация объявлений о вакансиях из разных источников. Это важный шаг в процессе сбора и консолидации объявлений о вакансиях со всего Интернета.

Процесс начинается с обхода различных досок объявлений о вакансиях, страниц карьеры компании, сайтов социальных сетей и других источников объявлений о вакансиях. Агрегаторы поиска работы обычно используют веб-сканеры или "пауки" для посещения этих сайтов и сбора информации о списках вакансий. Эти поисковые системы могут быть настроены на переход по ссылкам на другие страницы сайта, что позволяет им собирать как можно больше информации.

После того, как поисковый робот собрал информацию о вакансии, он обычно извлекает ключевые данные, такие как название должности, местоположение, зарплата, описание должностных обязанностей и инструкции по подаче заявления [2]. Затем эти данные сохраняются в базе данных или в индексе, где соискатели могут осуществлять поиск и фильтрацию по ним.

Чтобы гарантировать актуальность объявлений о вакансиях, агрегаторы поиска работы обычно регулярно просматривают источники, от ежедневных до еженедельных, в зависимости от агрегатора. Это гарантирует, что объявления о вакансиях являются актуальными и релевантными для лиц, ищущих работу.

Важно отметить, что разные агрегаторы поиска работы могут использовать несколько разные алгоритмы для сканирования и индексации объявлений о вакансиях. Некоторые могут отдавать приоритет определенным источникам или типам объявлений о вакансиях, в то время как другие могут использовать алгоритмы машинного обучения для выявления и фильтрации спама или некачественных объявлений о вакансиях.

В дополнение к сканированию и индексации объявлений о вакансиях многие агрегаторы поиска работы также предлагают дополнительные функции и сервисы, такие как инструменты составления резюме, алгоритмы подбора вакансий и отзывы работодателей. Эти функции могут помочь соискателям усовершенствовать свой поиск и найти вакансии, которые хорошо соответствуют их навыкам и опыту.

В целом, первый шаг в алгоритме онлайн-агрегаторов поиска работы имеет решающее значение для их функционирования.

Очистка и нормализация данных. Вторым шагом алгоритма онлайн-агрегаторов поиска работы обычно является очистка и нормализация данных. Этот шаг имеет решающее значение для обеспечения точности, согласованности и простоты поиска и фильтрации объявлений о вакансиях.

Очистка данных включает в себя удаление любой посторонней или не относящейся к делу информации из объявлений о вакансиях. Например, агрегаторы поиска работы могут удалять любые HTML-теги или форматирование, которые могут присутствовать в объявлениях о вакансиях.

Нормализация включает стандартизацию данных в объявлениях о вакансиях таким образом, чтобы они были согласованными и их было легко искать и фильтровать. Это может включать, например, стандартизацию названий должностей или местоположений. Нормализация помогает гарантировать, что объявления о вакансиях отображаются точно и последовательно по всей платформе.

Для очистки и нормализации данных агрегаторы поиска работы обычно используют комбинацию автоматизированных алгоритмов и анализа данных человеком. Автоматизированные алгоритмы могут выявлять и исправлять распространенные ошибки, такие как орфографические ошибки или несогласованное форматирование [3]. Проверка человеком часто необходима для того, чтобы убедиться, что данные были точно нормализованы и очищены.

В дополнение к очистке и нормализации данных агрегаторы поиска работы могут также использовать обогащение данных для предоставления дополнительной информации о вакансиях. Например, они могут использовать алгоритмы машинного обучения для извлечения дополнительной информации из объявлений о вакансиях, такой как требуемые навыки или уровень опыта.

Стандартизируя и очищая данные в объявлениях о вакансиях, агрегаторы могут гарантировать, что объявления о вакансиях являются точными, непротиворечивыми и простыми для поиска и фильтрации.

Обработка поисковых запросов. Этапом алгоритма онлайн-агрегаторов поиска работы, который следует за очисткой и нормализацией данных, обычно является обработка поисковых запросов. Этот шаг включает в себя поисковый запрос, введенный соискателем, и сопоставление его с соответствующими объявлениями о вакансиях в базе данных агрегатора.

Для обработки поисковых запросов агрегаторы поиска работы используют комбинацию подбора ключевых слов и продвинутых алгоритмов поиска. Подбор ключевых слов включает поиск определенных слов или фраз в объявлениях о вакансиях, которые соответствуют поисковому запросу, введенному соискателем. Например, если соискатель ищет "менеджер по маркетингу", алгоритм агрегатора будет искать объявления о вакансиях, содержащие эти ключевые слова.

Расширенные алгоритмы поиска могут дополнительно улучшать результаты поиска на основе

дополнительных критериев, таких как местоположение работы, диапазон заработной платы или отрасль. Эти алгоритмы используют машинное обучение и обработку естественного языка, чтобы понять смысл поискового запроса соискателя и предоставить наиболее релевантные объявления о вакансиях.

В дополнение к обработке поисковых запросов агрегаторы поиска работы могут также использовать алгоритмы рекомендаций, чтобы предлагать соискателям соответствующие объявления о вакансиях на основе их истории поиска или других релевантных данных. Эти алгоритмы могут помочь соискателям обнаружить новые возможности трудоустройства, которые они, возможно, не нашли бы иначе.

Чтобы повысить точность результатов поиска, агрегаторы поиска работы могут также использовать отзывы пользователей и данные о поведении для уточнения своих алгоритмов. Например, если соискатели часто нажимают на определенные объявления о вакансиях или подают заявки на определенные вакансии, алгоритм агрегатора может расставить приоритеты для этих объявлений о вакансиях в будущих результатах поиска.

Расчет оценки релевантности. Следующим шагом в алгоритме онлайн-агрегаторов поиска работы является вычисление показателя релевантности каждой публикации о вакансиях заданному поисковому запросу. Этот шаг включает в себя использование комбинации факторов для определения того, насколько близко каждая вакансия соответствует критериям поиска соискателя.

Для расчета показателя релевантности агрегаторы поиска работы обычно используют комбинацию таких факторов, как:

- Соответствие ключевым словам: степень, в которой объявление о вакансии включает ключевые слова, введенные в поисковом запросе соискателя.
- Местоположение: близость объявления о приеме на работу к местоположению, указанному соискателем.
- Тип работы: является ли вакансия полной, неполной, контрактной или внештатной.
- Дата публикации: как недавно объявление о вакансии было добавлено в базу данных агрегатора.
- Уровень должности: является ли вакансия начального, среднего или старшего уровня.
- Зарплата: диапазон окладов, указанный в объявлении о приеме на работу.
- Репутация работодателя: репутация работодателя, основанная на отзывах пользователей и других источниках данных.

Как только эти факторы были оценены для каждой публикации вакансий, алгоритм агрегатора присваивает каждой публикации оценку релевантности. Этот балл обычно отображается соискателям, чтобы помочь им быстро определить наиболее релевантные вакансии.

Важно отметить, что вес, присваиваемый каждому фактору, может варьироваться в зависимости

от алгоритма агрегатора и критериев поиска соискателя. Например, если соискатель ищет конкретную должность, сопоставлению ключевых слов может быть придано большее значение при расчете показателя релевантности.

Присваивая каждой публикации о вакансиях оценку релевантности, агрегаторы могут помочь соискателям быстро определить наиболее релевантные вакансии [4].

Ранжирование. Ранжирование объявлений о вакансиях на основе их оценки релевантности включает в себя упорядочивание объявлений о вакансиях таким образом, чтобы наиболее релевантные объявления о вакансиях отображались в верхней части результатов поиска.

Для ранжирования объявлений о вакансиях агрегаторы поиска работы обычно используют комбинацию показателя релевантности и других факторов, таких как данные о поведении пользователей, предпочтения соискателей и предпочтения работодателя. Например, если соискатель часто обращается за вакансиями в определенной отрасли или местоположении, алгоритм агрегатора может определять приоритетность объявлений о вакансиях в этой отрасли или местоположении для этого соискателя [5].

В дополнение к данным о поведении пользователей агрегаторы поиска работы могут также использовать предпочтения работодателей для ранжирования объявлений о вакансиях. Например, если конкретный работодатель имеет опыт привлечения высококачественных кандидатов, алгоритм агрегатора может расставлять приоритеты в результатах поиска по объявлениям о вакансиях от этого работодателя.

В целом, этап ранжирования важен для того, чтобы помочь соискателям быстро определить наиболее релевантные вакансии и помочь работодателям привлечь высококачественных кандидатов. Используя комбинацию показателей релевантности, данных о поведении пользователей, предпочтениях соискателей и предпочтениях работодателей, агрегаторы поиска работы могут обеспечить персонализированный и эффективный поиск работы для соискателей, а также помочь работодателям найти лучших кандидатов на их открытые вакансии.

Персонализация. Этот шаг включает в себя настройку результатов поиска и пользовательского интерфейса на основе предпочтений конкретного соискателя, истории поиска и данных о поведении.

Чтобы персонализировать результаты поиска, агрегаторы поиска работы могут использовать различные методы. Один из распространенных подходов заключается в отслеживании истории поиска соискателя работы и данных о поведении, чтобы лучше понять его предпочтения и интересы. Например, если соискатель часто ищет работу в определенной отрасли или местоположении, алгоритм агрегатора может расставлять приоритеты для объявлений о вакансиях в этой отрасли или местоположении для этого соискателя.

Другой подход к персонализации заключается в предоставлении рекомендаций по трудоустройству на основе истории поиска соискателя и данных о его поведении. Например, если соискатель часто обращается за вакансиями с определенным набором квалификаций или навыков, алгоритм агрегатора может рекомендовать аналогичные объявления о вакансиях.

Персонализация может также включать в себя настройку пользовательского интерфейса или пользовательского опыта для отдельных соискателей. Например, агрегаторы поиска работы могут предлагать соискателям возможность сохранять объявления о вакансиях, настраивать оповещения по электронной почте о новых вакансиях или даже предоставлять персонализированный коучинг или консультацию по поиску работы.

Настраивая результаты поиска и пользовательский интерфейс на основе индивидуальных предпочтений соискателей и данных о поведении, агрегаторы поиска работы могут обеспечить более эффективный поиск работы.

Фильтрация и сортировка. Фильтрация и сортировка — важные шаги в алгоритме онлайн-агрегаторов поиска работы. Эти шаги позволяют соискателям сузить результаты поиска и определить наиболее релевантные объявления о вакансиях.

Фильтрация позволяет соискателям указать критерии для объявлений о вакансиях, которые их интересуют. Общие фильтры включают местоположение, тип работы, диапазон заработной платы и уровень должности. Например, соискатель может захотеть увидеть только объявления о вакансиях на полную ставку в своем городе с зарплатой в диапазоне от 5 000 до 7 000 долларов.

Сортировка позволяет соискателям упорядочивать результаты поиска по определенным критериям. Общие параметры сортировки включают релевантность, дату публикации, зарплату и рейтинг работодателя. Например, соискатель может захотеть отсортировать результаты поиска по зарплате, чтобы увидеть самые высокооплачиваемые вакансии в верхней части списка.

Вместе фильтрация и сортировка позволяют соискателям быстро и эффективно находить наиболее релевантные объявления о вакансиях. Позволяя соискателям настраивать свои критерии поиска и упорядочивать результаты поиска в соответствии

со своими предпочтениями, агрегаторы поиска работы могут обеспечить персонализированный и эффективный поиск работы [6].

Важно отметить, что конкретные параметры фильтрации и сортировки могут различаться в зависимости от алгоритма агрегатора и критериев поиска соискателя. Кроме того, некоторые агрегаторы могут предлагать более продвинутые параметры фильтрации и сортировки, такие как фильтрация по названию должности или сортировка по времени в пути.

Позволяя соискателям настраивать свои критерии поиска и упорядочивать результаты поиска в соответствии со своими предпочтениями, агрегаторы могут обеспечить более эффективный и действенный поиск работы.

Выводы: В заключение, алгоритм сайта-агрегатора поиска работы разработан для того, чтобы помочь соискателям быстро и легко находить соответствующие объявления о вакансиях. Используя комбинацию очистки данных, обработки поисковых запросов, расчета оценки релевантности, ранжирования и оповещений о вакансиях, алгоритм может обеспечить персонализированный и эффективный поиск работы.

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