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ANTIBIOTIC RESISTANCE OF HELICOBACTER PYLORI AND MODERN STRATEGIES FOR OPTIMIZING ERADICATION THERAPY

Abstract:
The article is devoted to the critical problem of modern gastroenterology — the growth of antibiotic resistance of Helicobacter pylori and the search for effective ways to optimize eradication therapy. The purpose of the work is the analysis of modern trends in microorganism resistance to key antibacterial drugs and the evaluation of the effectiveness of the latest treatment protocols according to Maastricht VI/Florence recommendations. The work uses methods of systematic data analysis of clinical studies and meta-analyses of recent years. The results indicate that the use of standard triple therapy without prior susceptibility testing in regions with high resistance to clarithromycin is inappropriate. The prospects for the use of quadrotherapy with bismuth drugs have been determined, sequential therapy and the addition of probiotics to increase patient compliance. Particular attention is paid to the use of proton pump inhibitors (PPIs) of the new generation and vonoprazan. The conclusions emphasize the need for a personalized approach to treatment, taking into account the regional profile of resistance.

Key words*: Helicobacter pylori, antibiotic resistance, eradication therapy, clarithromycin, bismuth drugs, Maastricht VI.*

Introduction

Helicobacter pylori infection remains the main etiological factor in the development of chronic gastritis, peptic ulcer disease of the stomach and duodenum, as well as gastric adenocarcinoma. Despite many years of experience in combating this pathogen, the effectiveness of standard eradication schemes is constantly decreasing [1]. The main reason for this phenomenon is the rapid growth of bacterial resistance to antibiotics, especially to clarithromycin, metronidazole, and levofloxacin.

Relevance of the topic

Today, WHO classifies H. pylori as a priority pathogen with a high level of resistance, which requires the development of new treatment strategies. In many countries of Europe and Asia, resistance to clarithromycin exceeds 20%, which makes the classic triple therapy ineffective [2].

The relevance of the problem of antibiotic resistance of H. pylori is due to the global crisis of resistance of microorganisms to antimicrobial agents. In 2017, the World Health Organization included H. pylori in the list of 12 priority pathogens that pose the greatest threat to human health due to high resistance to clarithromycin [2].

The main factors determining the relevance of this research:

1. Rapid growth of resistance to key antibiotics: According to data of the European registry Hp-EuReg, the level of resistance to clarithromycin in many countries exceeds 15–25%. A similar situation is observed with metronidazole and levofloxacin. This leads to the fact that the empirical assignment of standard schemes without taking into account the regional profile of resistance becomes the cause of treatment failures and contributes to the further spread of multiresistant strains [11].

2. The problem of compliance and side effects: Modern eradication schemes (in particular, quadrotherapy) involve taking a large number of tablets every day, which is often accompanied by dyspeptic disorders and dysbiosis. This leads to premature discontinuation of medication by patients, which is a direct path to the formation of secondary resistance.

3.Insufficient effectiveness of classic PPIs: Genetic polymorphism of metabolism of proton pump inhibitors (through the cytochrome P450 2C19 system) in many patients does not allow to achieve a stable pH level in the stomach (above 6.0). This is critically important, since H. pylori becomes susceptible to the action of antibiotics only in the phase of active division, which is possible only at low acidity [5].

4. The need for individualization of therapy: The latest recommendations of the Maastricht VI (2022) and Florence consensus emphasize the transition from "universal" schemes to a "test and cure" strategy based on molecular genetic methods. The development and implementation of algorithms for the selection of therapy depending on the genetic profile of both the bacteria and the patient is a priority task of modern gastroenterology [12].

Thus, the search for methods to optimize eradication — through the use of new classes of drugs (P-CAB), adjuvant support with probiotics, and prolonging the duration of treatment — is not only a matter of clinical effectiveness, but also of strategic safety in the context of fighting antibiotic resistance.

HELICOBACTER PYLORI RESISTANCE MECHANISMS

The development of H. pylori resistance to antibacterial drugs is a complex evolutionary process based mainly on the vertical transfer of genetic mutations. Unlike many other bacteria, the plasmid route of resistance transfer is not characteristic for this pathogen [2]. 1. Resistance to clarithromycin: caused by point mutations in the region of the peptidyltransferase loop of 23S rRNA. The most common replacements are A2143G, A2142G and A2142C. These mutations reduce the affinity of the macrolide to the bacterial ribosome, which makes the drug ineffective even at high concentrations [3].

2. Resistance to metronidazole: has a multifactorial nature. Mainly the mechanism is the inactivation of the rdxA (nitroreductase) and frxA (NADPNOsidoreductase) genes. Normally, these enzymes reduce the nitro group of metronidazole to toxic radicals that destroy bacterial DNA. In case of mutation, this process is blocked [8].

3. Resistance to levofloxacin: occurs due to mutations in gyrA genes (less often gyrB) encoding DNA gyrase subunits. It interferes with bonding fluoroquinolones with an enzyme-DNA complex, blocking their bactericidal effect [11].

4 Resistance to amoxicillin: occurs rarely (less than 1–3%) and is associated with mutations in pbp1A genes encoding penicillin-binding proteins, which changes the structure of the pathogen's cell wall [14].

MODERN STRATEGIES FOR OPTIMIZATION OF ERADICATION THERAPY

Based on the fundamental provisions of the Maastricht VI / Florence international consensus, as well as taking into account the latest clinical guidelines of the world's leading gastroenterological associations (2024-2026), the modern strategy for the treatment of H. pylori infection has undergone radical changes. The main postulate today is a categorical rejection of the blind empirical prescription of drugs in favor of adapted therapy, which is based on the local or regional level of antibiotic resistance. Successful eradication requires a comprehensive approach: overcoming bacterial resistance, providing deep and continuous acid suppression, and minimizing side effects to maintain patient adherence to treatment.

1. Quadruple therapy with bismuth drugs (Bismuth Quadruple Therapy, BQT)

This regimen is today undisputedly recognized as the "gold standard" and first-line therapy in all geographic regions where the level of resistance to clarithromycin exceeds the critical mark of 15%.

• Scheme composition: The basic protocol includes a powerful proton pump inhibitor (for example, esomeprazole or rabeprazole in a double dose — 40 mg 2 times a day); bismuth subcitrate (120–240 mg 4 times a day); metronidazole (500 mg 3–4 times a day) and tetracycline (500 mg 4 times a day). The strictly regulated duration of the course is 14 days.

• Mechanism of effectiveness: A key element of success is the addition of bismuth salts. Bismuth has a direct bactericidal effect, destroys the cell wall of the pathogen, prevents its adhesion to gastric epitheliocytes and suppresses the enzymatic activity of the bacterium.Most importantly, bismuth has a unique ability to overcome primary and secondary metronidazole resistance through a synergistic effect. According to large-scale clinical observations, the use of 14-day BQT allows to achieve successful eradication in more than 90% of cases, even in patients with multiresistant strains [1, 4].

2. Innovative acid suppression: the use of vonoprazan (P-CAB)

The introduction into clinical practice of potassium-competitive acid blockers (P-CABs), among which vonoprazan is the leader, has become a real revolution in the optimization of eradication.

• Pharmacodynamic advantages: Unlike classical PPIs, vonoprazan does not require activation in an acidic environment, begins to act from the first dose, does not depend on food intake and, most importantly, is practically unaffected by genetic polymorphism of the CYP2C19 enzyme. This allows for ultra-fast and stable maintenance of intragastric pH above 6.0 for almost 24 hours a day.

• Eradication potential: The standard innovative regimen includes vonoprazan (20 mg 2 times a day) in combination with amoxicillin (1000 mg 2 times a day) and clarithromycin (500 mg 2 times a day). According to the latest global meta-analyses (2025–2026), creating an ideal alkaline environment puts H. pylori into the phase of active reproduction, making it as vulnerable as possible. This increases the bioavailability and stability of antibiotics in the mucous membrane to such an extent that vonoprazan-containing triple therapy allows successful destruction of the pathogen even in patients with confirmed clarithromycin-resistant strains [12, 15].

3. High-dose dual therapy (High-dose Dual Therapy)

In response to the problem of global antimicrobial resistance and the phenomenon of "pill burden", high-

dose dual therapy is rapidly gaining popularity as an elegant method to minimize the antibiotic burden on the macroorganism.

• Features of dosage: The scheme consists of only two components: a powerful acid suppressant (PPI of the new generation or vonoprazan) and amoxicillin in high doses (750–1000 mg 3–4 times a day).

• Clinical justification: Amoxicillin is an antibiotic with a time-dependent bactericidal effect. For its maximum effectiveness, it is critically important that the concentration of the drug in blood serum and gastric mucosa constantly exceeds the minimum inhibitory concentration (MIC) throughout the day. Frequent (3–4 times a day) administration of amoxicillin against the background of deep acid suppression completely blocks the recovery of the bacterial population. This method demonstrates an impressive efficiency of 87–91%, accompanied by a significantly lower number of side effects and a detrimental effect on the intestinal microbiome compared to quadrotherapy [16].

4. Adjuvant therapy and strategies to increase compliance

No, even the most powerful eradication scheme, will work if the patient voluntarily stops taking the medication due to adverse reactions. Therefore, modern protocols strongly recommend the use of adjuvant (concomitant) support.

• Probiotic correction: Targeted use of specific probiotic strains, such as the yeast Saccharomyces boulardii or multistrain combinations of lacto- and bifidobacteria, plays a protective role.Although probiotics cannot kill H. pylori by themselves, they compete with the pathogen for adhesion receptors and reliably reduce the risk of antibiotic-associated diarrhea and dyspepsia by 50%. This dramatically improves the tolerability of difficult 14-day courses [7, 17].

• Mucoprotectors (Rebamipide): Addition of stimulators of endogenous prostaglandin synthesis to treatment regimens, in particular rebamipide (100 mg 3 times a day), allows not only to accelerate the regeneration of the damaged mucous membrane and stop inflammation, but also to increase the overall frequency of eradication. Rebamipide prevents the adhesion of bacteria to the epithelium and reduces the production of pro-inflammatory cytokines, creating favorable conditions for the rapid healing of gastroduodenal lesions [18].

LATEST CLINICAL STUDIES (2024-2026)

Research in 2025 showed the high efficiency of stool PCR analysis for non-invasive determination of resistance, which allows to achieve eradication in 92% of cases without endoscopy [9]. At the same time, data from 2024 indicate the emergence of resistance to tetracycline (up to 3.5%), which requires careful monitoring [10]. In Ukraine, studies in 2025 confirmed that 14-day schemes are a mandatory standard for achieving the target eradication level of >90%

[13].

CONCLUSIONS

Optimizing treatment in conditions of resistance requires abandoning outdated schemes in favor of bismuth-containing quadrotherapy and using new drugs of the P-CAB class. The future of therapy lies in personalization based on molecular genetic testing and improving compliance through adjuvant support.

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БІОХІМІЧНІ МАРКЕРИ СТАНУ ТКАНИН ПОРОЖНИНИ РОТА У ЖІНОК-МОНАХИНЬ РІЗНОГО ВІКУ

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BIOCHEMICAL MARKERS OF ORAL TISSUE STATUS IN NUNS OF DIFFERENT AGE GROUPS

Анотація

Вікові зміни біохімічного гомеостазу ротової рідини відображають ремоделювання твердих і м'яких тканин порожнини рота, зміну протеолітичної активності, антиоксидантного статусу та мікробіологічного балансу, однак особливості цих процесів у жінок-монахинь вивчені недостатньо. Метою дослідження було встановити вікові особливості біохімічних показників ротової рідини, що характеризують стан твердих і м'яких тканин порожнини рота, мікробіологічну активність та антиоксидантно-запальний баланс у жінок-монахинь. Обстежено 29 монахинь віком 27–70 років, яких розподілено на вікові групи 25–44, 45–59 та 60–75 років. У ротовій рідині визначали активність кислої та лужної фосфатаз, еластази, каталази, уреази, лізоциму, вміст малонового діальдегіду (МДА), розраховували мінералізуючий індекс (ЛФ/КФ), антиоксидантно-прооксидантний індекс (АПІ) та ступінь дисбіозу. Виявлено вікове підвищення активності кислої фосфатази та зниження активності лужної фосфатази з відповідним зменшенням мінералізуючого індексу, що свідчить про зміщення ремоделювання у бік резорбції. З віком відзначено наростання протеолітичної активності та інтенсивності перекисного окиснення ліпідів (зростання еластази та МДА) у поєднанні зі зниженням активності каталази й АПІ, а також підвищення активності уреази, ступеня дисбіозу та зменшення активності лізоциму. Водночас абсолютні значення більшості біохімічних показників у монахинь залишалися суттєво нижчими за такі у пацієнтів із генералізованим пародонтитом, а клінічні параметри відповідали стану periodontal health on a reduced periodontium. Отримані результати свідчать про те, що вікові зміни у жінок-монахинь мають характер фізіологічної вікової втрати прикріплення на тлі відносно збереженого антиоксидантного та антимікробного потенціалу, а не запально-деструктивного ураження пародонта.

Abstract

Age-related changes in the biochemical homeostasis of oral fluid reflect the remodeling of hard and soft oral tissues, alterations in proteolytic activity, antioxidant status, and the microbiological balance; however, the features of these processes in nuns remain insufficiently studied. The aim of the study was to determine age-related characteristics of biochemical parameters of oral fluid reflecting the condition of hard and soft oral tissues, microbiological activity, and the antioxidant–inflammatory balance in women who are nuns. Twenty-nine nuns aged 27–70 years were examined and divided into age groups of 25–44, 45–59, and 60–75 years. In oral fluid, the activities of acid and alkaline phosphatases, elastase, catalase, urease, and lysozyme, as well as the content of malondialdehyde (MDA), were determined; the mineralization index (ALP/ACP ratio), antioxidant–prooxidant index (API), and dysbiosis degree were calculated. An age-related increase in acid phosphatase activity and a decrease in alkaline phosphatase activity were revealed, along with a progressive reduction of the mineralization index, indicating a shift in remodeling towards resorption. With age, there was an increase in proteolytic activity and the intensity of lipid peroxidation (elevated elastase and MDA levels) combined with a decrease in catalase activity and API, as well as an increase in urease activity, dysbiosis degree, and a reduction in lysozyme activity. At the same time, the absolute values of most biochemical parameters in nuns remained markedly lower than those in patients with generalized periodontitis, and clinical parameters corresponded to periodontal health on a reduced periodontium. The findings suggest that age-related changes in nuns predominantly reflect physiologic

age-related attachment loss against a background of relatively preserved antioxidant and antimicrobial potential, rather than inflammatory-destructive periodontal involvement.

***Ключові слова**: жінки-монахині, ротова рідина, біохімічні показники, оксидативний стрес, антиоксидантна система, мікробіологічна активність, пародонт, вікова втрата прикріплення.*

***Key words**: nuns, oral fluid, biochemical parameters, oxidative stress, antioxidant system, microbiological activity, periodontium, age-related attachment loss.*

Вступ. Вікові зміни біохімічного гомеостазу ротової рідини відображають складні процеси ремоделювання твердих і м'яких тканин порожнини рота, зміну протеолітичної активності, стану антиоксидантної системи та мікробіологічної рівноваги [1, 2]. Погіршення мікроциркуляції, посилення оксидативного стресу, зниження активності репаративних механізмів і поступове формування дисбіозу є характерними компонентами вікової дистрофії пародонтальних тканин, що описані в низці клініко-біохімічних досліджень [3-5].

Однак більшість робіт присвячена змінам у загальній популяції, тоді як лабораторні й мікробіологічні особливості ротової рідини у специфічних соціально-поведінкових групах, зокрема в жінок-монахинь, практично не вивчені.

Чернечі спільноти характеризуються особливим укладом життя, відмінним від умов життя загальної популяції: стабільним режимом дня, контрольованими харчовими звичками, мінімізацією шкідливих факторів, низьким рівнем стресових впливів та ретельно дотримуваною гігієною порожнини рота. Ці фактори потенційно можуть впливати на стан біохімічних і мікробіологічних показників ротової рідини, визначаючи індивідуальний профіль вікового ремоделювання пародонта [6, 7].

Разом із тим у жінок старших вікових груп закономірно посилюються процеси резорбції, зменшується мінералізуюча здатність тканин, підвищується інтенсивність перекисного окиснення ліпідів, що може впливати на стан пародонта навіть за відсутності запального компоненту [8-12].

Актуальність даного дослідження зумовлена необхідністю поглибленого вивчення біохімічних механізмів вікового ремоделювання тканин порожнини рота у жінок-монахинь та визначення, чи мають їхні вікові зміни характер фізіологічної вікової атрофії, чи можуть бути інтерпретовані як прояви запально-деструктивних процесів. Особливе значення має диференціація між physiologic age-related attachment loss та патологічною втратою прикріплення, що, згідно з класифікацією AAP/EFP (2017), є ключовим для правильної оцінки стану пародонтальних тканин.

Мета дослідження. Встановити вікові особливості біохімічних показників ротової рідини, що характеризують стан твердих і м'яких тканин порожнини рота, мікробіологічну активність та антиоксидантно-запальний баланс у жінок-монахинь.

Матеріали та методи дослідження. Дослідження проведене відповідно до Гельсінської декларації Всесвітньої медичної асоціації (2013), Міжнародних етичних принципів CIOMS (2016) та чинного законодавства України щодо біоетики і захисту персональних даних.

У дослідженні взяли участь 29 жінок-монахинь віком 27-70 років жіночого монастиря на честь Боянської ікони Божої Матері, розташованого в Чернівецькій області.

Критеріями включення були: приналежність до чернечої спільноти та постійне проживання в монастирі; жіноча стать; вік від 25 до 75 років; відсутність гострих інфекційних та загострень хронічних захворювань на момент обстеження; можливість надати інформовану згоду на участь у дослідженні.

Критерії виключення включали: наявність гострих запальних захворювань порожнини рота; проведення інтенсивного стоматологічного лікування протягом попередніх трьох місяців; прийом лікарських препаратів, що можуть значно впливати на слиновиділення (антихолінергічні засоби, антидепресанти у високих дозах тощо); системні стани, що унеможливлювали коректне проведення клінічного обстеження.

Обстежені жінки були розподілені на вікові групи за рекомендаціями ВООЗ: 25-44 роки (n = 15), 45-59 років (n = 10) та 60-75 років (n = 4), що дозволило проаналізувати вікові особливості біохімічного гомеостазу ротової рідини монахинь.

Ротову рідину збирали вранці, натщесерце, до проведення ранкової гігієни порожнини рота та прийому їжі, шляхом спльовування у стерильні пробірки.

В ротовій рідини визначали визначали вміст малонового діальдегіду (МДА) по реакції із тіобарбітуровою кислотою; активність еластази по гідролізу Nt-BOC-L-alanin-p-nitrophenyl ester за методом Visser; активність каталази за допомогою молібдату амонію; активність кислої фосфатази (КФ) по гідролізу пара-нітрофенілфосфата (pH 4,8); активність лужної фосфатази (ЛФ) по гідролізу пара-нітрофенілфосфата (pH 10,5); активність уреази по реакції із реактивом Неслера; активність лізоциму за допомогою Micrococcus lysodeikticus [13].

Антиоксидантно-прооксидантний індекс (АПІ) розраховували за співвідношенням активності каталази та вмісту МДА. Індекс мінералізації розраховували по співвідношенню активностей ЛФ/КФ. За співвідношенням відносних активностей уреази та лізоциму розраховували ступінь дисбіозу [14].

Біохімічні дослідження проведені в лабораторії біохімії Державної установи «Інститут стоматології та щелепно-лицевої хірургії Національної академії медичних наук України» (м. Одеса).

Статистичну обробку результатів проводили варіаційно-статистичним методом аналізу за допомогою програми STATISTICA 6.1 [15].

Результати дослідження та їх обговорення. Показники мінерального обміну ротової рідини у жінок-монахинь демонструють виражені вікові зміни з формуванням дисбалансу між процесами резорбції та мінералізації тканин порожнини рота (табл. 1).

Таблиця 1

Показники мінерального обміну ротової рідини у жінок-монахинь залежно від віку

Показники	Норма (референтні значення)	Вікові групи пацієнтів		
		25-44 роки	45-59 років	60-74 роки
Активність кислої фосфатази, мк-кат/л	0,300 ± 0,021	0,322 ± 0,017 p > 0,01	0,312 ± 0,020 ppppppo- oooop > 0,05 p_1 > 0,05	0,376 ± 0,024 p < 0,05 p_1 > 0,05 p_2 < 0,1
Активність лужної фосфатази, мк-кат/л	1,90 ± 0,12	1,68 ± 0,011 p > 0,05	1,50 ± 0,012 p < 0,01 p_1 < 0,05	1,39 ± 0,010 p < 0,001 p_1 < 0,05 p_2 < 0,05
Мінералізуючий індекс (ЛФ/КФ)	6,33	5,21	4,80	3,69

Примітка. p – показник достовірності, порахований по відношенню до норми (референтні значення), p_1 – до вікової групи 25-44 роки, p_2 – до вікової групи 45-59 років.

Активність кислої фосфатази у вікових групах 25–44 та 45–59 років не відрізнялася від референтних значень (p > 0,01 та p > 0,05 відповідно). У жінок віком 60–74 років її рівень був достовірно підвищеним порівняно з нормою (p < 0,05), що узгоджується з тенденцією до переважання резорбтивних процесів, однак міжгрупові відмінності з молодшими групами залишалися статистично недостовірними (p_1 > 0,05; p_2 > 0,1).

Активність лужної фосфатази, навпаки, демонструвала чітке та достовірне вікове зниження. У жінок 25–44 років її рівень не відрізнявся від референтних значень (p > 0,05), тоді як у групах 45–59 та 60–74 років спостерігалося достовірне зниження порівняно з нормою (p < 0,01 та p < 0,001 відповідно). Відмінності між віковими групами також були статистично значущими (p_1 < 0,05; p_2 < 0,05).

Мінералізуючий індекс характеризував виразну вікову негативну динаміку: від 5,21 у групі 25–44 років до 3,69 у групі 60–74 років порівняно з референтним значенням 6,33. Це свідчить про поступове зниження мінералізуючої здатності та зміщення балансу ремоделювання у бік переважання резорбції з віком.

В цілому отримані дані свідчать про вікове формування дисбалансу мінерального обміну, що може бути раннім біохімічним маркером послаблення репаративних механізмів та зростання резорбтивної активності в тканинах порожнини рота у жінок-монахинь.

У жінок-монахинь встановлено виражені вікові зміни протеолітичної та антиоксидантної активності ротової рідини (табл. 2).

Таблиця 2

Показники протеолітичної активності, антиоксидантного статусу та інтенсивності перекисного окислення ліпідів у ротовій рідині жінок-монахинь залежно від віку

Показники	Норма (референтні значення)	Вікові групи пацієнтів		
		25-44 роки	45-59 років	60-74 роки
Активність еластази, мк-кат/л	0,38 ± 0,02	0,64 ± 0,03 p < 0,01	0,85 ± 0,05 p < 0,01 p_1 < 0,01	0,97 ± 0,06 p < 0,01 p_1 < 0,01 p_2 > 0,05
Активність каталази, мкат/л	0,25 ± 0,02	0,23 ± 0,01 p > 0,05	0,20 ± 0,01 p < 0,05 p_1 < 0,05	0,18 ± 0,01 p < 0,01 p_1 < 0,05 p_2 < 0,05
Вміст МДА, ммоль/л	0,19 ± 0,01	0,22 ± 0,01 p > 0,05	0,24 ± 0,01 p < 0,05 p_1 > 0,05	0,29 ± 0,02 p < 0,05 p_1 < 0,01 p_1 < 0,05
Індекс АПІ	13,15 ± 1,0	10,45 ± 0,85 p > 0,05	8,33 ± 0,60 p < 0,01 p_1 > 0,05	6,20 ± 0,45 p < 0,001 p_1 < 0,05 p_2 > 0,05

Примітка. p – показник достовірності, порахований по відношенню до норми (референтні значення), p_1 – до вікової групи 25-44 роки, p_2 – до вікової групи 45-59 років.

Активність еластази у всіх вікових групах перевищувала референтні значення ($p < 0,01$), при цьому у жінок 45–59 років вона була достовірно вищою, ніж у групі 25–44 років ($p_1 < 0,01$). У найстаршій групі (60–74 років) спостерігалося подальше зростання показника, хоча відмінності з групою 45–59 років були статистично недостовірними ($p_2 > 0,05$).

Активність каталази мала зворотну вікову тенденцію: у групі 45–59 років показник був нижчим за норму ($p < 0,05$), а у віці 60–74 років — достовірно знижувався як відносно референтних значень ($p < 0,01$), так і порівняно з молодшою групою ($p_1 < 0,05$) та групою 45–59 років ($p_2 < 0,05$).

Вміст МДА демонстрував поступове підвищення від 25–44 до 60–74 років. Достовірні відмінності відносно норми визначалися у групах 45–59 та 60–74 років ($p < 0,05$), а у найстаршої групи – також щодо вікових груп 25–44 років ($p_1 < 0,01$) і 45–59 років ($p_2 < 0,05$), що свідчить про посилення оксидативного стресу.

Індекс АПІ знижувався з віком: у групі 45–59 років показник був достовірно нижчим за референтний рівень ($p < 0,01$), а у віці 60–74 років – максимально зниженим із достовірними відмінностями порівняно з нормою ($p < 0,001$) та жінками 25–44 років ($p_1 < 0,05$). Міжгрупова різниця між 45–59 та 60–74 роками була статистично недостовірною ($p_2 > 0,05$).

Таким чином, можна зробити висновок про поступове вікове наростання протеолітичної активності та перекисного окиснення ліпідів у поєднанні зі зниженням антиоксидантного потенціалу ротової рідини, що відображає розвиток оксидативно-запального дисбалансу у жінок-монахинь.

У обстежених жінок встановлено чіткі вікові зміни мікробіологічної активності та показників природного антимікробного захисту ротової рідини (табл. 3).

Таблиця 3

Показники мікробіологічної активності та стану природного антимікробного захисту ротової рідини у жінок-монахинь залежно від віку

Показники	Норма (референтні значення)	Вікові групи пацієнтів		
		25-44 роки	45-59 років	60-74 роки
Активність уреази, мк-кат/л	0,065 ± 0,003	0,096 ± 0,005 $p < 0,01$	0,118 ± 0,009 $p < 0,01$ $p_1 < 0,05$	0,129 ± 0,008 $p < 0,01$ $p_1 < 0,01$ $p_2 > 0,05$
Активність лізоциму од/л	148 ± 9	100 ± 7 $p < 0,001$	95 ± 5 $p < 0,001$ $p_1 > 0,05$	72 ± 4 $p < 0,001$ $p_1 < 0,05$ $p_2 > 0,05$
СД, ум.од	1,0 ± 0,09	2,18 ± 0,11 $p < 0,05$	2,83 ± 0,15 $p < 0,001$ $p_1 < 0,05$	4,08 ± 0,21 $p < 0,001$ $p_1 < 0,05$ $p_2 < 0,05$

Примітка. p – показник достовірності, порахований по відношенню до норми (референтні значення), p_1 – до вікової групи 25-44 роки, p_2 – до вікової групи 45-59 років.

Активність уреази у всіх вікових групах була достовірно підвищеною порівняно з референтними значеннями ($p < 0,001$), причому найвищі значення встановлено у групі 60–74 років. Міжгрупові відмінності були статистично значущими для порівнянь 25–44 та 45–59 років ($p_1 < 0,05$), а також 25–44 та 60–74 років ($p_1 < 0,01$).

Активність лізоциму, навпаки, знижувалася з віком. У всіх вікових групах показник був достовірно нижчим від норми ($p < 0,01$), а порівняння між групами 45–59 та 60–74 років виявило достовірні відмінності ($p_2 < 0,05$), що свідчить про прогресуюче ослаблення неспецифічного антимікробного захисту.

Ступінь дисбіозу (СД) збільшувався у всіх вікових групах порівняно з референтними значеннями ($p < 0,001$), досягаючи максимальних значень у віці 60–74 років. Відмінності між групами 25–44 та 45–59 років ($p_1 < 0,01$), а також 45–59 та 60–74 років ($p_2 < 0,01$) були достовірними, що вказує на прогресуюче порушення мікробіологічного балансу ротової рідини з віком.

За результатами дослідження встановлено поступове посилення мікробної активності та зниження ефективності природних захисних механізмів ротової порожнини у жінок-монахинь, що сприяє формуванню вікового мікробіологічного дисбалансу.

Однак отримані дані свідчать, що, незважаючи на вікові відмінності біохімічних та мікробіологічних показників ротової рідини у жінок-монахинь, їх рівні загалом залишаються в межах фізіологічних коливань або помірно відхиляються від референтних значень, не досягаючи величин, характерних для запальних та деструктивних уражень пародонта. Збережена антиоксидантна активність, відносно низькі показники протеолізу, помірна мікробіологічна активність та відсутність клінічно виражених запальних змін за пародонтальними запальними індексами (встановлено нами раніше) свідчать про стабільний стан тканин пародонта у

представниць цієї когорти. Для оцінки клінічної значущості виявлених змін доцільним є порівняння отриманих показників із даними, наведеними у літературі для пацієнтів із генералізованим пародонтитом.

Тому для уточнення клініко-біохімічних особливостей стану тканин пародонта у жінок-монахинь отримані нами показники було порівняно з відповідними даними, отриманими в тій же лабораторії біохімії та наведеними в літературі для пацієнтів із захворюваннями пародонта [16, 17]. Таке порівняння дозволяє оцінити інтенсивність протеолітичних, оксидативних та мікробіологічних процесів у ротовій рідині жінок-монахинь у контексті патологічних значень, характерних для пародонтиту, і визначити, наскільки отримані відхилення мають клінічну значущість. Узагальнені дані представлено в таблиці 4.

Таблиця 4

Порівняльний аналіз біохімічних показників ротової рідини монахинь із даними пацієнтів із генералізованим пародонтитом

Показник	Групи пацієнтів		
	Пацієнти з ГП початкового-I ст., n = 21 25-45 років /за даними Фурдичко А.І. [16]/	Пацієнти з ГП II-III ст., n = 17 35-55 років /за даними Вишневської Г.О. [17]/	Жінки-монахині 60-75 років
Активність каталази, мкат/л	0,14 ± 0,02	0,06 ± 0,001	0,18 ± 0,01 p > 0,05 p_1 < 0,001
Активність еластази, мккат/л	4,09 ± 0,48	3,27 ± 0,24	0,97 ± 0,06 p < 0,05 p_1 < 0,001 p_1 < 0,001
Вміст МДА, ммоль/л	0,77 ± 0,05	0,76 ± 0,05	0,29 ± 0,02 p < 0,001 p_1 < 0,001
Активність уреази, мккат/л	0,370 ± 0,060	0,272 ± 0,018	0,129 ± 0,008 p > 0,05 p_1 < 0,01
Активність лізоциму, од/л	66 ± 5	65 ± 3	72 ± 4 p > 0,05 p_1 > 0,05

Примітка. p – достовірність, порахована по відношенню до пацієнтів з ГП поч. –I ст. за даними Фурдичко А.І. [16], p_1 – по відношенню до пацієнтів з ГП II-III ст. за даними Вишневської Г.О. [17].

Порівняння біохімічних показників ротової рідини жінок-монахинь із даними пацієнтів, хворих на генералізований пародонтит (ГП), засвідчило істотні відмінності, що характеризують значно нижчу інтенсивність оксидативно-запальних і протеолітичних процесів у монахинь. Активність каталази у монахинь була вищою, ніж у пацієнтів із ГП II–III ст. (p_1 < 0,001) і майже не відрізнялася від показників при початковому–I ст. захворювання (p > 0,05). Активність еластази у монахинь була достовірно нижчою порівняно з обома групами пацієнтів із ГП (p < 0,05 і p_1 < 0,001), що свідчить про відсутність вираженої протеолітичної деструкції тканин.

Рівень МДА у монахинь був у кілька разів нижчим за аналогічні показники при пародонтиті незалежно від ступеня тяжкості (p < 0,001), що відображає значно меншу інтенсивність перекисного окиснення ліпідів. Активність уреази у монахинь була нижчою порівняно з пацієнтами з ГП II–III ст. (p_1 < 0,01), тоді як відмінності з групою початкового–I ст. були статистично недостовірними (p > 0,05).

Активність лізоциму не мала достовірних відмінностей між групами (p > 0,05), що свідчить про збереження рівня природного антимікробного захисту у монахинь.

У цілому отримані дані підтверджують, що біохімічні параметри ротової рідини жінок-монахинь характеризуються мінімальною активністю оксидативного стресу, протеолізу та бактеріальних ферментів на тлі збереженого антиоксидантного та антимікробного потенціалу, що суттєво відрізняє їх від пацієнтів із генералізованим пародонтитом різного ступеня тяжкості.

Незважаючи на наявність вікової втрати прикріплення у старших вікових групах (втрата епітеліального прикріплення – 6,22 мм, медіана 6,50 мм), у жінок-монахинь не виявлено ознак активного запалення: глибина пародонтальних кишень залишалася в межах 2–3 мм, рівень кровоточивості був мінімальним або відсутнім, а біохімічні маркери оксидативно-запальних процесів суттєво поступалися значенням, характерним для пацієнтів із генералізованим пародонтитом. Згідно з класифікацією AAP/EFP (2017), такі показники відповідають стану *periodontal health on a reduced periodontium* та можуть бути інтерпретовані як *physiologic age-related attachment loss*, що відображає вікові дистрофічні зміни пародонтальних тканин, а не запальну деструкцію.

Висновки.

1. У жінок-монахинь відзначено виражені вікові зміни мінерального обміну ротової рідини, що проявлялися зростанням активності кислої фосфатази та зниженням активності лужної фосфатази у старших вікових групах, а також поступовим зменшенням мінералізуючого індексу (ЛФ/КФ). Це свідчить про вікове зміщення балансу ремоделювання у бік переважання резорбтивних процесів.

2. Вікове підвищення протеолітичної активності та інтенсивності перекисного окиснення ліпідів супроводжувалося зниженням активності каталази та зменшенням антиоксидантно-прооксидантного індексу, що вказує на посилення оксидативно-запального дисбалансу у ротовій рідині з віком.

3. Показники мікробіологічної активності ротової рідини демонстрували вікове зростання активності уреази, зниження активності лізоциму та підвищення ступеня дисбіозу, що відображає поступове послаблення природних антимікробних механізмів порожнини рота у старших вікових групах.

4. Попри вікові зміни біохімічних і мікробіологічних показників, їх абсолютні значення у монахинь залишалися значно нижчими за такі у пацієнтів із генералізованим пародонтитом. Це стосується активності еластази, рівня МДА, активності уреази та зниження каталази, що вказує на низьку інтенсивність деструктивних процесів у тканинах пародонта.

5. Клінічні параметри пародонта у жінок-монахинь відповідали стану *periodontal health on a reduced periodontium*, що згідно з класифікацією AAP/EFP (2017) характерно для *physiologic age-related periodontal attachment loss* і не є проявом запального або деструктивного пародонтиту.

6. Отримані дані вказують на збереження стабільного стану пародонта у жінок-монахинь, незважаючи на вікові біохімічні зміни, що може бути пов'язано зі сприятливими поведінковими, гігієнічними та загальними факторами їх способу життя.

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АНЕМІЯ БЛЕКФЕНА-ДАЙМОНДА (ОГЛЯД ЛІТЕРАТУРИ)

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DIAMOND BLACKFAN ANEMIA (LITERATURE REVIEW)

Анотація.
Анемія Даймонда–Блекфена (АБД) (Diamond Blackfan anemia, DBA) - це рідкісна вроджена аплазія еритроцитів, що характеризується макроцитарною анемією, ретикулоцитопенією та нестачею еритроїдних попередників у кістковому мозку. Перший клінічний консенсус був розроблений у 2008 році з метою вдосконалення діагностичних критеріїв та аналізу існуючих терапевтичних підходів. Однак подальші наукові здобутки, такі як відкриття нових генів, пов'язаних з АБД, прогрес у методах оцінки, а також поглиблення знань про онкологічні ризики продемонстрували потребу в оновленні та розширені наявних рекомендацій. Нові міжнародні настанови створені для стандартизації процесів діагностики та лікування, а також для поліпшення довгострокового прогнозу для пацієнтів з АБД у всьому світі.

Abstract.
Diamond Blackfan anemia (DBA) is a rare congenital erythrocyte aplasia characterized by macrocytic anemia, reticulocytopenia, and a lack of erythroid precursors in the bone marrow. The first clinical consensus was developed in 2008 with the aim of improving diagnostic criteria and analyzing existing therapeutic approaches. However, subsequent scientific advances, such as the discovery of new genes associated with ABD, progress in assessment methods, and deepening knowledge of oncological risks, demonstrated the need to update and expand the existing recommendations. The new international guidelines were created to standardize diagnosis and treatment processes and to improve the long-term prognosis for patients with ABC worldwide.

Ключові слова: *анемія Даймонда-Блекфена, гематологія, діти.*
Keywords: *Diamond-Blackfan anemia, hematology, children.*

Вперше описана приблизно 80 років тому, анемія Блекфена-Даймонда є вродженим порушенням еритропоезу, що має тенденцію до асоціації з вродженими вадами розвитку та підвищеним ризиком розвитку онкологічних захворювань [1]. Незважаючи на наукові досягнення, цей розлад залишається психологічно та фізично важким для пацієнтів, а також фінансово та емоційно виснажливим для їхніх сімей. Медичні потреби пацієнтів, що страждають на дане захворювання досі вимагають спеціалізованого досвіду та мультидисциплінарної допомоги. Проте, існують складнощі з ефективною імплементацією наукових відкриттів у клінічну практику та поширенням новітніх знань і найкращих методик серед медичних працівників. Оскільки перший опублікований консенсус датується 2008 роком, виникла нагальна потреба в оновленні підходів до діагностики та лікування, що призвело до створення нового консенсусу. Тому з 2014 по 2024 рік у Фрайбурзі проходили зустрічі 53 експертів з 27 країн, результатом яких стало створення нових рекомендацій. Нова номенклатура "синдром DBA" (DBA syndrome) була прийнята задля врахування різних фенотипів, включаючи прояви без анемій. Ключові зміни в настанові 2024 року включають: запровадження нових спрощених критеріїв для діагностики; опис генетики синдрому DBA та його фенокопій; значні корективи в терапевтичних стандартах: підтримуюча доза преднізолону зменшена до 0,3 мг/кг/добу; рекомендовані рівень гемоглобіну перед трансфузією підвищено до 90-100 г/літр, незалежно від віку пацієнта; наголошено на необхідності ранньої та агресивних хелаційної терапії; розширено показання для трансплантації гемопоетичних стовбурових клітин; рекомендовано

систематичне клінічне спостереження, включаючи ранній скринінг колоректального раку. Нові настанови стандартизують діагностику, лікування та довгострокове спостереження за пацієнтами з синдромом всіх вікових груп у всьому світі [2].

О Анемія Даймонда–Блекфена - захворювання із частотою приблизно 1 : 500 000 живонароджених. Зазвичай дебютує протягом першого року життя [1]. Поширеність є подібною серед різних етнічних груп і обох статей [3].

Опубліковані дані свідчать, що у 70–80% пацієнтів із синдромом DBA можна виявити певний генетичний дефект. Експерти визначили дві генетичні категорії синдрому: Рибосомопатія - мутації в генах, які безпосередньо беруть участь у біогенезі рибосом, включаючи 11 генів RPS та 13 генів RPL, а також шаперони рибосомних білків TSR2 та HEATR3. Інші - мутації GATA1 і TP53 з gain-of-function (на відміну від loss-of-function при синдромі Лі–Фраумені) [4]. Ці стани можуть проявлятися гіпорегенаторною анемією, з порушенням сигнальних шляхів, асоційованих з рибосомопатією. Додатково, 7 генів RP-кандидатів потребують подальшої валідації. Дослідження виключно мутації еритропоетину (EPO) та дефіцит ADA2, оскільки вони є окремими фенокопіями зі своїми механізмами та відмінними клінічними ознаками й не належать до спектра синдрому DBA. Більшість асоційованих генів успадковуються за аутосомно-домінантним типом. Вісім генів становлять 50–65% усіх випадків, серед них найпоширеніші: RPS19 (~25%), RPL5 (7–10%), RPL11 (~5%), RPS26 (3–6%), RPS10 (3–6%), RPS24 (2–4%), RPL35A (2–4%), RPS17 (1–3%) [2]. Синдром DBA виникає de novo або спорадично у ⅔ пацієнтів, тоді як сімейні випадки складають близько ⅓ [3]. Велика частка генетичних змін уражають гени рибосомних білків (RP) і найчастіше спричинені однонуклеотидними варіантами у старт-кодоні, нонсенс-мутаціями, інделами або мутаціями сайтів сплайсингу, що призводять до деградації транскриптів за механізмом безглуздого опосередкованого розпаду, або ж геномними делеціями (окремих екзонів, цілого гена чи мультигенними делеціями). Рекомендовано проводити генетичний аналіз кожному пацієнту з підозрою на DBA. Через варіабельну пенетрантність, після виявлення патогенного варіанта, слід обстежувати й членів сім'ї, бажано проводити одночасне тестування на гени синдрому, його фенокопії (наприклад, дефіцит ADA2 або синдром Швахмана-Даймонда) та інші гени, пов'язані зі спадковими синдром недостатності кісткового мозку(IBNFS), оскільки тестування може змінити очікуваний діагноз. Інтерпретація варіантів повинна відповідати рекомендаціям ACMG/AMP [2].

Приблизно у 90% пацієнтів анемія Даймонда-Блекфана зазвичай починається до 12 місяців. Зазвичай вона проявляється вродженими вадами розвитку кісток (у 50% випадків) та затримкою росту (у 30% випадків). Середній вік початку прояву та встановлення діагнозу становить 2 місяці [1]. Анемія може проявлятися in utero (гідропс плода). Пацієнти з генотипом RPL35A можуть мати виражену нейтропенію та імунодефіцит. Порушення імунітету (дефіцити сироваткових імуноглобулінів, T-, NK- та B-клітин) спостерігаються у 55% пацієнтів, незалежно від лікування стероїдами чи RP-генотипу [3]; для мутації GATA1 характерні є тромбоцитопенія та нейтропенія. Гемоліз, гепатомегалія/спленомегалія не є типовими для синдрому DBA. Дослідження кісткового мозку зазвичай показує відсутність чи зниження еритроїдної активності з "лівим зсувом" (рідкісне прогресування далі стадії пронормобластів) при нормальній морфології інших клітин. Спочатку кістковий мозок нормоцелюлярний, але з віком він часто стає гіпоцелюлярним [1]. Фізичні аномалії присутні у 50% випадків. Найпоширенішими вродженими фізичними аномаліями є вади розвитку великого пальця та верхніх кінцівок, краніофаціальні аномалії (наприклад, мікротія) та низький зріст. *RPL26* сприяє змінним аномаліям променевої промені. Пацієнт також може мати кирпатий ніс та широко розставлені очі. Вони можуть проявлятися вродженою глаукомою або катарактою, а також косоокістю. Характерні аномалії анемії Даймонда-Блекфана включають чіткий вигляд обличчя разом із трифаланговими великими пальцями. Мутація *PRL5* пов'язана з розщелиною губи або м'якого піднебіння, тоді як *RPL11* значною мірою корелює з аномаліями великого пальця, але також спостерігається у випадках розщелини губи або піднебіння. Інші фізичні аномалії включають урогенітальні (наприклад, відсутність або підковоподібна нирка), дефекти міжпередсердної та міжшлуночкової перегородок, а також коарктацію аорти. Через аномалії шийного відділу хребта у пацієнтів може проявлятися деформація Кліппеля-Фейля [5].

Діагностика ДБА зазвичай є складною через її часткові фенотипи та значну невідповідність клінічних проявів. З огляду на цю варіабельність, Міжнародна клінічна консенсусна конференція визначила діагностичні та допоміжні критерії для діагностики ДБА (рисунок 1). Діагноз ДБА ставиться, коли виконуються вимоги основних критеріїв та виключені парвовірусна інфекція та анемія Фанконі [3].

Діагностичні критерії
• Нормохромна, часто макроцитарна анемія, що розвивається в перший рік життя
• Глибока ретикулоцитопенія
• Нормоцелюлярний кістковий мозок із селективним дефіцитом еритроїдних попередників
• Нормальна або дещо знижена кількість лейкоцитів
• Нормальний або незначно підвищений рівень тромбоцитів
Основні допоміжні критерії
• Генна мутація, описана в «класичній» DBA
• Позитивний сімейний анамнез
Незначні допоміжні критерії
• Підвищена активність аденозиндезамінази еритроцитів
• Вроджені аномалії, описані в «класичній» DBA
• Підвищений рівень гемоглобіну F
• Немає доказів іншого спадкового синдрому кістковомозкової недостатності

Рисунок 1. Діагностичні критерії ДБА.
(https://pmc.ncbi.nlm.nih.gov/articles/PMC6416817/)

Сучасні терапевтичні стратегії лікування ДБА включають глюкокортикостероїди (ГК), переливання крові та трансплантацію гемопоетичних стовбурових клітин (ТГСК), кожна з яких має свій власний набір обмежень. Глюкокортикостероїди, незважаючи на широке використання, можуть з часом втрачати ефективність, особливо у пацієнтів, які не реагують на тривале лікування. Більше того, тривала або високодозова терапія ГК може призвести до низки побічних ефектів, включаючи остеопороз, атрофію шкіри, діабет, абдомінальне ожиріння, глаукому, катаракту, аваскулярний некроз та інфекцію, затримку росту та гіпертензію [6]. Переливання крові слугують життєво важливим підтримуючим заходом для полегшення симптомів та лікування анемії у пацієнтів з ДБА, але важливо зазначити, що існує токсичність, пов'язана з перевантаженням залізом [7]. ТГСК є єдиним лікувальним методом лікування ДБА, і хоча він може бути варіантом для пацієнтів зі стероїдорезистентністю та залежністю від переливання, він створює труднощі, такі як пошук відповідних донорів та ризик імунологічних ускладнень [8]. Серед цих труднощів генна терапія стає перспективним інструментом для лікування ДБА.

Генна терапія має значну важливість у лікуванні ДБА через обмеження сучасних методів лікування. Нещодавні досягнення в генній терапії, зокрема використання лентивірусних векторів, є перспективними для лікування ДБА. Ці методи терапії спрямовані на виправлення генетичних дефектів, що викликають ДБА, шляхом введення функціональних копій мутованих генів у клітини пацієнта. З розвитком досліджень у цій галузі зростає потенціал генної терапії для виправлення основних генетичних мутацій, пов'язаних з ДБА, за допомогою таких методів, як інструмент редагування CRISPR/Cas9 [4].

Таким чином, анемія Даймонда–Блекфена залишається однією з найскладніших діагностичних та терапевтичних проблем дитячої гематології. За останні роки відбувся суттєвий прогрес у розумінні її патофізіології, генетики та лікування, проте особливу увагу слід приділяти контролю за розвитком вторинного гемосидерозу та моніторингу підвищеного ризику онкотрансформації. І лише глибше вивчення генотип-фенотипових кореляцій та розробка генної інженерії дозволить мінімізувати токсичний вплив стандартного лікування та покращить якість життя дітей з даною патологією.

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ЕПІДЕМІОЛОГІЧНА ДИНАМІКА ПРАВЦЯ В УКРАЇНІ (2020-2024 РР.)

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EPIDEMIOLOGICAL DYNAMICS OF TETANUS IN UKRAINE (2020-2024)

Анотація:
В роботі проведений аналіз сучасних тенденцій захворюваності на правець, оцінка епідеміологічних особливостей перебігу хвороби та визначення основних чинників, що впливають на рівень захворюваності в Україні. Незважаючи на наявність ефективної вакцинації, правець залишається актуальною проблемою громадського здоров'я, особливо в країнах із низьким економічним статусом, недостатнім рівнем імунізації населення, обмеженим доступом до медичної допомоги та серед осіб груп ризику.

Abstract:
The paper analyzes modern trends in the incidence of tetanus, assesses the epidemiological features of the course of the disease, and determines the main factors affecting the incidence rate in Ukraine. Despite the availability of effective vaccination, tetanus remains an urgent public health problem, especially in countries with low economic status, insufficient population immunization levels, limited access to medical care, and among individuals from risk groups.

Ключові слова: *правець, тетанотоксин, вакцинація, захворюваність*
Keywords: *tetanus, tetanotoxin, vaccination, morbidity*

Materials and methods: we conducted a literature review based on foreign and domestic articles published in scientometric databases, as well as official statistical data. Current information on the dynamics of the incidence of tetanus in the period 2020-2024 in Ukraine was analyzed.

Objective is to analyze scientific works, literary sources, statistical sources and determine the dynamics of the incidence of tetanus in the period 2020-2024 in Ukraine.

Introduction. Tetanus remains an urgent public health problem, despite the availability of effective specific prevention. The disease is characterized by a severe course, a high mortality rate and a completely preventable nature, provided that there is adequate vaccination coverage and timely emergency prevention in case of injuries. The peculiarity of tetanus is the lack of transmission from person to person, and its occurrence is directly related to the contamination of wounds with spores of Clostridium tetani against the background of an insufficient level of immunity.

In the conditions of Ukraine, the epidemiological situation regarding tetanus remains unstable, which is due to fluctuations in the coverage of preventive vaccinations, the impact of the COVID-19 pandemic on scheduled immunization, as well as military operations from 2022, which led to an increase in injuries and the complication of access to medical care. A decrease in the level of revaccination among the adult population forms a layer of susceptible individuals, which supports sporadic morbidity.

Main part. Tetanus is an acute infectious disease caused by tetanotoxin produced by the bacterium Clostridium tetani [1,2]. This is a fairly common bacterium whose natural habitat is soil, but the bacterium can also be isolated from the feces of domestic animals and humans. Tetanus spores are completely destroyed by boiling, but are removed by autoclaving at a pressure of 1 atmosphere and a temperature of 120°C for 15 minutes. The DNA of this toxin is contained in a plasmid. The presence of bacteria does not indicate infection, as not all strains have a plasmid.

Tetanus is characterized by a contact (wound) transmission mechanism. Infection occurs when spores of Cl enter. tetani in damaged tissues. Spores are extremely resistant to environmental factors and can persist for a long time in soil, dust, and on environmental objects. Table 1 shows the ways of tetanus infection depending on the nature of tissue damage.

Table 1.

Ways of tetanus infection depending on the nature of tissue damage.

Path of infection	Nature of damage	Typical examples of situations	Epidemiological significance
Traumatic	Deep, punctured, lacerated, contaminated wounds; injuries with anaerobic conditions	Wounds with a nail, metal fragments, injuries during agricultural work, burns, frostbite, animal bites	The most common way of infection; high risk of soil contamination
Postoperative	Violation of tissue integrity during surgical interventions	Operations in conditions of non-compliance with asepsis and antiseptics	Rare in countries with proper infection control
Postpartum / postabortion	Traumatization of the birth canal or uterus	Delivery or abortion outside a medical facility, non-sterile instruments	Relevant in regions with limited access to medical care
Neonatal	Infection of the umbilical wound	Use of non-sterile instruments or dressings when processing the umbilical cord	Important cause of infant mortality in countries with low vaccination coverage

A key epidemiological factor is the presence of a deep wound, since it is in conditions of low oxygen content that spores germinate and produce toxin [2,4].

The most significant factors of infection transmission: soil is the main reservoir of Cl spores. tetany; dust and contaminated equipment (nails, wire); animal feces — the pathogen parasitizes in the intestines of herbivores and is excreted with feces, which contributes to soil contamination; non-sterile medical instruments and dressing materials. In modern conditions in Ukraine and countries with sufficient vaccination coverage, tetanus is most often associated with: puncture wounds of the lower extremities; injuries during work on the homestead; agricultural injuries; absence or untimely revaccination.

The prodromal period of labor is not always pronounced; its symptoms are extremely nonspecific. The first and most frequent symptom of the developed clinical picture is a change in the tone of the masticatory muscles. At the same time, a muscle spasm occurs: the corners of the mouth are pulled down, the mouth takes on a half-moon shape, the lips protrude with a "proboscis". All this gives the face a characteristic expression, which is designated as a "sardonic smile". The increased tone of the extensor muscles of the back prevails, pronounced opisthotonus appears. At first, convulsions occur rarely, attacks are short-lived, later their frequency increases, and the duration increases [4]. Spasms can be almost continuous, which leads to respiratory failure. Pharyngeal spasms are often accompanied by laryngeal spasms and are associated with aspiration and life-threatening acute airway obstruction [3]. Increasing bradycardia and loss of consciousness during seizures are unfavorable prognostic signs. A developed clinical picture with general convulsions usually lasts from 10 to 20 days [4].

The most common form of tetanus, generalized tetanus, affects muscles throughout the body. The muscles of the head and neck are usually affected first with progressive caudal spread of rigidity and spasm affecting the whole body. With lower toxin loads and peripheral injuries, local tetanus is observed. Spasm and stiffness are limited to a limited area of the body [3].

In 2014, the overall reported incidence of tetanus in the European Union was 0.01 per 100,000 population, with 65% of cases occurring in those aged ≥65 years [5].According to statistics, in 2019, more than 30,000 deaths from tetanus and more than 73,000 cases of tetanus disease were registered in the world [2].

Groups at high risk of tetanus infection include the elderly, people with weakened immunity, and unvaccinated children [1].

In developing countries, neonatal tetanus - when babies are infected through unsterile births - is the leading cause of infant mortality [6]. Risk factors for mortality among adult patients with tetanus include generalized involvement, diabetes, autonomic dysfunction, shorter incubation time, opisthotonus, and cardiovascular disease [2]. Tetanus is rare in developed countries due to routine immunization and wound care [7,8]. The first active immunization with tetanus toxoid was described in 1890 [6].

Results and discussion: The aim of our work was to assess the dynamics of tetanus incidence in Ukraine in the period 2020-2024. Official statistical sources were used to analyze morbidity. So, it was found that in 2020, 12 people fell ill with tetanus, approximately 0.27 cases per 1 million population. Regarding the distribution by regions of Ukraine, cases of tetanus were detected in Volyn (2 cases), Mykolaiv (2 cases), Vinnytsia (2 cases), Rivne, Lviv, Chernihiv, Kyiv, Poltava and Kharkiv (1 case each) regions.

In 2021, 7 cases of tetanus were detected - 0.17 cases per 1 million population, which is almost 2 times less than in 2020. In 2022, there was an increase in incidence: 12 people became ill, approximately 0.29 cases per 1 million population. In 2023, there was a decrease to 6 cases of infection, which is equivalent to approximately 0.16 cases per 1 million population. Data by region for the years 2021-2024 have not been made public in official sources.

Since tetanus is not transmitted from person to person and its prevalence is controlled by mass vaccination, fluctuations in incidence may be explained by the failure of vaccination campaigns due to the COVID-19 pandemic and war. Also, due to the fact that

tetanus infection occurs through contaminated wounds, a large part of the population of Ukraine is at risk of infection due to active hostilities on the territory of Ukraine.

According to the World Health Organization (WHO) and UNICEF in 2020, the coverage of the first and third doses of the ADPKN vaccine was 93% and 81%, respectively. In 2021, these indicators were 91% and 80%. In 2022, these indicators were 78% and 73%, which is 14.3% and 8.8% less than the similar indicators of 2021. For 2023-2024, there is no freely available information on vaccination coverage.

Conclusion: Tetanus is a dangerous bacterial disease that affects nerve cells and leads to disruption of their functioning, which is manifested in the form of tonic convulsions and spasms of transverse smooth muscles. In Ukraine, the incidence rate remains low, varying from 6 to 12 cases of tetanus per year or 0.16-0.29 cases per 1 million population. Fluctuations in morbidity, in our opinion, are explained by failures of vaccination campaigns and hostilities on the territory of Ukraine.

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КЛІНІКО-ПАРАКЛІНІЧНІ ОСОБЛИВОСТІ ПЕРВИННОЇ ТА ВТОРИННОЇ ТРОМБОЦИТОПЕНІЇ У ДІТЕЙ (ОГЛЯД ЛІТЕРАТУРИ)

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CLINICAL AND PARACLINICAL FEATURES OF PRIMARY AND SECONDARY THROMBOCYTOPENIA IN CHILDREN (LITERATURE REVIEW)

***Анотація**:*
Тромбоцитопенічна пурпура є гетерогенною групою захворювань, що характеризуються зниженням кількості тромбоцитів у периферичній крові та підвищеним ризиком геморагічних ускладнень. У структурі імунних порушень кровотворення вона посідає одне з провідних місць, а диференціація між первинною та вторинною формами має ключове клінічне значення.

Abstract:
Thrombocytopenic purpura is a heterogeneous group of diseases characterized by a decrease in the number of platelets in the peripheral blood and an increased risk of hemorrhagic complications. In the structure of immune disorders of hematopoiesis, it occupies one of the leading places, and the differentiation between primary and secondary forms is of key clinical importance.

***Ключові слова**: ідіопатична тромбоцитопенічна пурпура, вторинна тромбоцитопенія, діти.*
***Keywords**: idiopathic thrombocytopenic purpura, secondary thrombocytopenia, children.*

Матеріали та методи: нами проведений огляд літератури на основі статей, опублікованих у базах даних PubMed за останні 10 років. Аналізувалась актуальна інформація щодо клінічних аспектів первинної та вторинної тромбоцитопенії.

Мета: провести аналіз літературних джерел, досліджень та визначити клінічні аспекти первинної та вторинної тромбоцитопенії.

Актуальність: Ідіопатична тромбоцитопенічна пурпура – це аутоімунне захворювання з різними патогенетичними та клінічними особливостями у дітей та дорослих [1].

Хоча ідіопатична тромбоцитопенія зустрічається рідко, вона є найпоширенішою причиною набутої тромбоцитопенії в дитинстві, з поширеністю у 2–5 випадки на 100 000 дітей. У приблизно 20% дорослих ідіопатична тромбоцитопенічна пурпура є вторинною по відношенню до основного первинного захворювання імунної дисрегуляції або імунодефіциту, ревматологічного захворювання, трансплантації або провокуючого прийому ліків чи інфекції. Хоча первинна ідіопатична тромбоцитопенічна пурпура є типовою для дітей, вторинна - не є рідкістю, особливо при дуже ранньому початку захворювання, коли ймовірність основного імунодефіциту вища [2].

Тромбоцитопенія також є поширеним явищем у неонатальному періоді, особливо у критично хворих та передчасно народжених новонароджених. Поширеність тромбоцитопенії сягає 1-5% у немовлят при народженні та у 20-50% критично хворих новонароджених [3].

Результати та їх обговорення: Ідіопатична тромбоцитопенія характеризуються ізольованою тромбоцитопенією, що виражається кількістю тромбоцитів <100×109/л [4,5].

Оцінка мазка периферичної крові показана для виключення спадкової та вторинної тромбоцитопенії. Зазвичай виявляються деякі великі тромбоцити, але надмірна кількість гігантських тромбоцитів, а також малих тромбоцитів, повинна вказувати на інші діагнози. Хоча вважається, що аутоантитіла до тромбоцитів є основною причиною

ідіопатичної тромбоцитопенічної пурпури, тестування на аутоантитіла до тромбоцитів наразі не рекомендується для діагностики ідіопатичної тромбоцитопенічної пурпури через низьку точність існуючих тестів [4].

Як правило, у дітей з ідіопатичною тромбоцитопенічною пурпурою спостерігається ізольована тяжка тромбоцитопенія. Через 6 місяців після встановлення діагнозу більшість дітей одужують з повною нормалізацією кількості тромбоцитів. Кількість тромбоцитів також має тенденцію до спонтанного зростання з часом та лише у 20%, 9% та 6% дітей кількість тромбоцитів <20×10⁹/л через 2, 6 та 12 місяців відповідно після встановлення початкового діагнозу. В той час сильна кровотеча найімовірніше виникає при кількості тромбоцитів < 20×10⁹/л, у більшості дітей з такою кількістю тромбоцитів не буде значної кровотечі. Ремісія, тобто кількість тромбоцитів >150×10⁹/л спостерігається приблизно у 60% дітей з ідіопатичною тромбоцитопенічною пурпурою через 6 місяців після постановки діагнозу та ще у 10% дітей віком від 6 до 12 місяців після постановки діагнозу. У 30% дітей з хронічною ідіопатичною тромбоцитопенічною пурпурою можливість ремісії зберігається протягом багатьох років після постановки діагнозу.

У більшості дітей з ідіопатичною тромбоцитопенічною пурпурою спостерігаються симптоми кровотечі, ізольовані на шкірі, включаючи петехії та екхімози. Приблизно у 20% спостерігається помірна шкірна або слизова кровотеча, а до 3% – сильна кровотеча. Менш ніж у 2% дітей протягом першого місяця після встановлення діагнозу спостерігається сильна кровотеча. Прогностичними факторами майбутньої сильної кровотечі можуть бути травма, сильна кровотеча в анамнезі, наявність вторинної ідіопатичною тромбоцитопенічною пурпурою, інша основна схильність до кровотечі, використання антикоагулянтів або ліків, що викликають дисфункцію тромбоцитів та антитіла до тромбоцитів, які впливають на функцію тромбоцитів [2].

Вторинні форми тромбоцитопенії включають тромбоцитопенії, зумовлені основним захворюванням або впливом ліків та вірусів. Прикладами вторинної тромбоцитопенії є вірусна тромбоцитопенічна пурпура, тромбоцитопенічна пурпура внаслідок ураження кісткового мозку та на фоні інших захворювань [6].

Первинна ідіопатична тромбоцитопенія пурпура залишається діагнозом виключення та проведення диференціальної діагностики з вторинної тромбоцитопенічною пурпурою часто буває непростим завданням [4].

Вторинна тромбоцитопенічна пурпура зустрічаються рідко та іноді її важко розпізнати. Більше того, інші прояви основного захворювання можуть з'явитися лише протягом періоду спостереження. Тривожні сигнали, що викликають підозру щодо вторинної тромбоцитопенії та інших неімунніх причин тромбоцитопенії включають позитивний сімейний анамнез, підлітковий вік, розмір тромбоцитів вище або нижче норми, помірну тромбоцитопенію при першому зверненні, відсутність відповіді на лікування першої лінії та нові симптоми або лабораторні відхилення під час перебігу захворювання.

Причина та частота вторинної тромбоцитопенічної пурпури залежать від демографічних та соціально-економічних факторів. Частота вторинної тромбоцитопенії, пов'язаної з інфекцією (наприклад, вірус гепатиту С, Helicobacter pylori) різниться залежності від регіону. Відомі причини вторинної тромбоцитопенії включають інші системні аутоімунні захворювання, первинний або вторинний імунодефіцит, інфекційні захворювання, паранеопластичний синдром та лікарсько-залежні антитіла [7].

Вірусні інфекції значною мірою сприяють клінічній картині тромбоцитопенічної пурпури у дітей. Звичайні вірусні тригери, такі як вірус Епштейна-Барр, цитомегаловірус та вірус вітряної віспи, можуть ініціювати імунну відповідь, яка помилково вражає тромбоцити, що призводить до їх руйнування. Клінічно у дітей з тромбоцитопенією на фоні вірусної інфекції часто спостерігається раптова поява петехій, пурпури та кровотечі слизової оболонки, які можуть посилюватися після вірусного захворювання. Діагностика тромбоцитопенії у контексті нещодавно перенесеної вірусної інфекції вимагає ретельної оцінки анамнезу пацієнта, фізикального обстеження та лабораторних досліджень, включаючи загальний аналіз крові, що виявляє ізольовану тромбоцитопенію та виключає інші потенційні причини. Серологічні тести можуть ідентифікувати специфічні вірусні інфекції, допомагаючи диференціювати первинну ідіопатичну тромбоцитопенічну пурпуру та вторинну тромбоцитопенію, пов'язану з основним вірусним захворюванням.

У дітей лейкемію слід враховувати при диференціальній діагностиці тромбоцитопенічної пурпури через її властивості проявлятися подібними клінічними ознаками, такими як ізольована тромбоцитопенія, петехії та синці. На відміну від ідіопатичної тромбоцитопенічної пурпури, лейкемія часто проявляється ще характерними ознаками, такими як гепатоспленомегалія, лімфаденопатія та аномальними показниками кількості лейкоцитів.

Ураження кісткового мозку в контексті вторинної тромбоцитопенічної пурпури є критично важливим для врахування під час діагностики, оскільки воно може імітувати або співіснувати разом з ідіопатичною тромбоцитопенічною пурпурою. Клінічно ці розлади можуть проявлятися стійкою тромбоцитопенією, панцитопенією або атиповими ознаками, такими як значна лімфаденопатія або гепатоспленомегалія.

Висновок: Отже, тромбоцитопенії є поширеним явищем у педіатричній практиці, які поділяють на первинну ідіопатичну тромбоцитопенічну пурпуру та вторинну тромбоцитопенію. Вторинна тромбоцитопенія виникає при інфекційних, аутоімунних та неопластичних процесах. Вторинна

тромбоцитопенія може мати складності у діагностиці адже симптоми основного характеру захворювання можуть бути не поміченими або виникати пізніше. В той час первинна ідіопатична тромбоцитопенічна пурпура є самостійним захворюванням.

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METABOLIC-ASSOCIATED STEATOTIC LIVER DISEASE (LITERATURE REVIEW)

Abstract

Metabolic dysfunction-associated steatotic liver disease (MASLD) is one of the most prevalent chronic liver diseases worldwide and is considered the hepatic manifestation of metabolic syndrome. The disease is characterized by excessive fat accumulation in hepatocytes in the absence of significant alcohol consumption or other secondary causes of hepatic steatosis. The main risk factors include obesity, insulin resistance, type 2 diabetes mellitus, dyslipidemia, and arterial hypertension.

Insulin resistance, lipid metabolism disorders, oxidative stress, chronic low-grade inflammation, and mitochondrial dysfunction play a central role in the pathogenesis of MASLD. Disease progression may lead to the development of metabolic dysfunction-associated steatohepatitis (MASH), liver fibrosis, cirrhosis, and hepatocellular carcinoma.

Diagnosis is based on a combination of clinical, laboratory, and instrumental methods, including ultrasound imaging, elastography, and non-invasive fibrosis markers. The cornerstone of treatment is lifestyle modification, weight reduction, correction of metabolic disturbances, and pharmacological management of comorbid conditions.

Thus, MASLD is a multifactorial progressive disease with a high risk of complications, requiring early diagnosis and a comprehensive approach to treatment and prevention.

Keywords: *metabolic dysfunction-associated steatotic liver disease (MASLD), metabolic dysfunction-associated steatohepatitis (MASH), insulin resistance, hepatic steatosis, liver fibrosis, metabolic syndrome, type 2 diabetes mellitus, obesity.*

In recent years, the terms “metabolic-associated fatty liver disease (MAFLD)” and “metabolic dysfunction-associated steatotic liver disease (MASLD)” have been introduced to improve the reflection of metabolic dysregulation in this patient population, as well as to avoid the negative and stigmatizing terms “non-alcoholic” and “fatty” [2]. Metabolic dysfunction associated with steatotic liver disease (MASLD) has become the most common chronic liver disease worldwide, affecting ~25%–30% of the adult population, with a higher prevalence in individuals with obesity and type 2 diabetes. Among reported cases of MASLD, the prevalence is consistently higher in men than in women, and the global incidence has increased by ~50% over the past two decades, reflecting the global rise in obesity and the metabolic syndrome. MASLD encompasses a spectrum of liver pathologies ranging from simple steatosis to steatohepatitis, fibrosis and cirrhosis. Despite its high prevalence, the heterogeneity of disease progression and the relative lack of approved pharmacological therapy pose challenges for effective clinical management [1]. There is evidence to suggest an association between MASLD and coronary heart disease (CHD), heart failure (HF), atrial fibrillation (AF), stroke, peripheral artery disease (PAD), and chronic kidney disease (CKD), although the data for HF, AF, stroke, and PAD are smaller. Physicians should consider the relationship between MASLD and cardiovascular disease in their daily practice. Based on this knowledge and current guidelines, they should also assess and manage risks and comorbidities in such patients. It is important to further investigate the impact of MASLD on cardiovascular outcomes, knowledge that will help clarify the clinical implications of this “new” hepatic entity [2].

The purpose of the assignment and research. Metabolic dysfunction-associated steatotic liver disease (MASLD), which includes an inflammatory subtype of metabolic dysfunction associated with steatohepatitis, is a prominent cause of chronic liver disease with systemic consequences. Insulin resistance,

obesity, and dyslipidemia cause MASLD in more than 30% of adults. This is a global health problem. During the transition from MASLD to MASH, liver inflammation and fibrosis increase, leading to cirrhosis, hepatocellular carcinoma, and extrahepatic complications such as CVD, CKD, and sarcopenia. The effect of MASLD on MASH is mediated by mechanisms that include inflammation, oxidative stress, dysbiosis, and genetic predisposition. Advances in diagnostic nomenclature over the past few years have shifted the emphasis from NAFLD to MASLD, focusing on the metabolic etiology and de-stigmatizing the alcohol-related condition. Epidemiological data show great geographic variability and an increasing prevalence in younger populations, particularly in regions with high-carbohydrate diets and central obesity. Lifestyle modification is currently considered the main approach to the management of MASLD. This may include dietary intervention, exercise and weight loss management. Pharmaceutical treatment primarily targets metabolic dysfunction, with promising findings for GLP-1 receptor agonists, pioglitazone, and SGLT-2 inhibitors, which may improve both hepatic and systemic outcomes.However, this still depends on well-integrated multidisciplinary care models given the complex relationships between MASLD and its extrahepatic effects. Identifying complications at an early stage, developing precision medicine strategies, and exploring new therapeutic targets will be crucial factors in improving their outcomes. This review discusses the systemic nature of MASLD and calls for multi-stakeholder collaboration to reduce its far-reaching health impact and our quest to understand its pathological mechanisms. Thus, the collective effort required to address MASLD spans the domains of public health, clinical care, and research to effectively curb its rapidly increasing burden [3].

Materials and methods. This study was performed as a systematic review of the literature aimed at summarizing the current scientific data on metabolic-associated steatotic liver disease (MASLD). The analysis of the literature was carried out in accordance with international standards of a systematic review, in compliance with the principles of evidence-based medicine and structured data synthesis. The search for scientific publications was carried out in PubMed/MEDLINE, Scopus and Google Scholar databases, using keywords and terms: "metabolic dysfunction-associated steatotic liver disease", "MASLD", "steatohepatitis", "metabolic syndrome", "epidemiology", "pathogenesis", "therapy". The search covered the period from 2019 to May 2025, focusing on the last 3 years of publications to reflect the most current scientific data.

The following were involved in the review:

1. original clinical studies,

2. systematic reviews and meta-analyses,

3. review articles published in peer-reviewed international journals with available full texts or extended abstracts in English.

The selection of articles was carried out with a preliminary check of relevance by title and abstract, after which the full texts were evaluated according to the following criteria:

• compliance with the topic of MASLD and its key aspects (epidemiology, pathogenesis, clinical manifestations, therapy);

• availability of a description of the methodology, results and discussion in the IMRaD format

(Introduction, Methods, Results, Discussion);

• high scientific level of the evidence base (randomized trials, multicenter studies, reviews with an assessment of the quality of included works).

Statistical analysis of epidemiological indicators was performed on the basis of data from selected studies from PubMed: calculation of the prevalence of MASLD in the general population and groups with metabolic disorders, with 95% confidence intervals established where provided by the authors of the original papers.

Evaluation of mechanistic and therapeutic aspects was carried out by cascading thematic synthesis of data with subdivision into key blocks: molecular mechanisms, cardiometabolic relationships, influence of lifestyle modifications and pharmacological interventions. The obtained results were summarized in comparison tables. The sources were grouped by the level of evidence and the quality of the methodology in accordance with the recommendations of international guidelines and scientific practice, which meets the general requirements of the Colloquium-journal regarding scientific rigor.

Presentation of the main material. Epidemiology and prevalence. The global increase in obesity-related metabolic disorders has made metabolic dysfunction associated with steatotic liver disease (MASLD) one of the most common chronic liver diseases worldwide. Despite growing concern, the exact pathogenesis of MASLD remains unclear, and no definitive treatments have been developed. Therefore, the need for comprehensive research on MASLD is more critical than ever. Understanding disease mechanisms may lay the foundation for the discovery of new therapeutics and may facilitate the development of diagnostic tools that allow early detection and intervention of MASLD. Studies have revealed a multifactorial etiology for MASLD, suggesting that potential therapeutic strategies should be considered from different perspectives. This review delves into the pathogenesis of MASLD, current diagnostic approaches, potential therapeutic targets, clinical trial status of new drugs, and the most promising treatments available today. By focusing on therapeutic targets, the aim is to offer fresh insights and guidance for future research in the treatment of MASLD [4].

Pathogenesis and mechanisms. MASLD results from metabolic dysfunction with an emphasis on insulin resistance, obesity, dyslipidemia, and systemic inflammation. Pathogenetic mechanisms include:

• excessive accumulation of triglycerides in hepatocytes;

• dysregulation of lipogenesis, which leads to steatosis;

• participation of intestinal microbiota in pathogenesis by influencing metabolites and barrier function;

• oxidative stress and inflammatory response.

A review in the International Journal of Molecular Medicine describes these key mechanisms, including their impact on the progression from simple steatosis to active steatohepatitis and fibrosis [5].

Clinical manifestations and comorbid conditions. MASLD is often asymptomatic in its early stages, but may have nonspecific symptoms such as fatigue or discomfort in the right hypochondrium. Also, the disease is associated with a significant risk of cardiovascular disease (CVD), which is an important component of systemic consequences for patients. MASLD is associated not only with individual liver pathologies, but also with cardiometabolic and metabolic comorbid conditions, including heart failure, coronary artery disease, and a significant increase in cardiovascular risk [10].

Diagnosis of MASLD

• Hepatic steatosis (using imaging, biomarkers, or biopsy)

• At least 1 cardiometabolic risk factor

• Limited history of alcohol use (no more than 2 drinks per day for women or 3 drinks per day for men)

• Serology to rule out hepatitis B and C

The diagnosis of MASLD should be suspected in patients with the metabolic syndrome or metabolic risk factors (usually obesity, type 2 diabetes or high fasting plasma glucose, hypertension, and dyslipidemia), a limited history of alcohol consumption, and patients with unexplained laboratory abnormalities suggestive of liver disease.

A formal diagnosis of MASLD requires evidence of hepatic steatosis and at least 1 cardiometabolic risk factor (1). Cardiometabolic risk factors important to meet diagnostic criteria include at least 1 of these 5 factors:

• BMI > 25 kg/m2 (BMI > 23 in Asian populations) or waist circumference > 94 cm (men) or 80 cm (women)

• Fasting serum glucose > 100 mg/dL or HgbA1c > 5.7% or type 2 diabetes or

current treatment of type 2 diabetes

• Blood pressure > 130/85 mm/Hg. or is currently being treated with antihypertensive drugs

• Triglycerides > 150 or currently being treated with lipid-lowering therapy

• HDL cholesterol 40 mg/dL (men) or HDL 50 mg/dL (women) or currently being treated with lipid medications (2)

The diagnosis of MASH requires evidence of liver inflammation as well as steatosis, and requires a biopsy showing histological evidence of hepatocellular injury and inflammation with or without fibrosis. Cirrhosis may also be present [6].

Treatment. Lifestyle changes are recommended for all patients with MASLD, even without MASH, because these patients have metabolic abnormalities and are at risk for developing cardiovascular disease. Recommended weight loss is 3% to 5% for simple steatosis and 7% to 10% for NASH. Adequate control of risk factors, such as hyperlipidemia with statins (which also protect against cardiovascular risks) and hypertension, as well as adequate glycemic control, is required.Resmetirom (thyroid hormone receptor beta agonist):

Resmetirom is used for patients with MASH and stage F2 or F3 fibrosis without significant weight loss. Cirrhotic patients were excluded from previous clinical trials, but ongoing studies are evaluating its safety in this group. The recommended dose for patients weighing less than 100 kg is 80 mg orally once daily; for those weighing 100 kg or more, 100 mg orally once daily should be administered. Before prescribing resmetir, clinicians should evaluate potential drug interactions. Resmetir should not be used with OATP 1B1/1B3 inhibitors (eg cyclosporine) or strong CYP2C8 inhibitors (eg gemfibrozil) [3].

Vitamin E is recommended for patients with MASH (fibrosis stage 2 or higher) who do not have diabetes at a dose of 800 IU daily. The risks and benefits should be discussed with the patient, as high doses of vitamin E may slightly increase all-cause mortality based on observational studies [7].

The incidence and prevalence of nonalcoholic fatty liver disease (NAFLD) is steadily increasing worldwide, with an enormous social and economic burden. Recently, NAFLD and nonalcoholic steatohepatitis have been renamed and redefined as metabolic dysfunction associated with steatotic liver disease (MASLD) and steatohepatitis (metabolic dysfunction associated with steatohepatitis (MASH)), which result from an imbalance between metabolic and inflammatory stress (mainly due to adipose tissue dysfunction and insulin resistance) and defense mechanisms and restoration of steatosis liver. Once MASLD progresses to end-stage liver disease, treatment efficacy becomes limited and may require liver transplantation. Early detection and intervention are critical. Therefore, lifestyle modification is the cornerstone of its management. Timely consideration of bariatric surgery should be given to patients who meet certain criteria. A multidisciplinary approach is warranted, starting with the concept that MASLD/MASH is at the heart of the cardiovascular-hepatic metabolic syndrome. In some cases, pharmacological treatment can complement lifestyle modification.Several drugs used to treat cardiometabolic comorbidities have some potential efficacy in slowing the progression of Down's disease, and some have demonstrated efficacy on histologic endpoints that are likely to translate into long-term clinical benefits. Thus, optimizing the use of these drugs within their licensed indications is of paramount importance for patients with MASLD. Several specific MASH drugs are on the horizon and are likely to enrich our therapeutic arsenal in the near future, especially in non-cirrhotic stages diseaseю Much work remains to be done to understand the specific features of MASH cirrhosis and to develop effective treatments for this stage of the disease [8].

Conclusions. Metabolic-associated steatotic liver disease (MASLD) is a common chronic liver disease closely associated with metabolic syndrome, obesity, and diabetes. Current evidence suggests that MASLD may remain asymptomatic in the early stages, but gradually progress to steatohepatitis (MASH), fibrosis,

cirrhosis, and an increased risk of hepatocellular carcinoma. The diagnosis of MASLD is based on a combination of clinical findings, laboratory findings, and noninvasive methods to assess liver fibrosis, such as FIB 4 and elastography. Liver biopsy remains the gold standard in difficult cases. Treatment of MASLD is primarily aimed at lifestyle modification: weight loss, a balanced diet and physical activity. Control of metabolic risk factors (glycemia, lipid profile, blood pressure) significantly improves the prognosis of patients. Among pharmacological strategies promising are GLP 1 agonists and new THR β receptor modifiers, but there is no universal therapy yet. The prognosis of MASLD largely depends on early detection and comprehensive management of the patient. Systematic monitoring of liver functions, assessment of fibrosis and correction of accompanying metabolic disorders can significantly reduce the risk of disease progression and cardiovascular complications.

Therefore, MASLD is an important global health problem that requires a multidisciplinary approach, including early diagnosis, individualized therapy and systematic monitoring of patients with metabolic risks [9].

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ВИКОРИСТАННЯ МОНОКЛОНАЛЬНИХ АНТИТІЛ В ПЕДІАТРІЇ У ХВОРИХ ІЗ ІНФЕКЦІЄЮ COVID-19 (ОГЛЯД ЛІТЕРАТУРИ)

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THE USE OF MONOCLONAL ANTIBODIES IN PEDIATRIC PATIENTS WITH COVID-19 INFECTION (LITERATURE REVIEW)

***Анотація**:*
Хоча інфекція COVID-19 у дітей зазвичай протікає в легшій формі порівняно з дорослими, пацієнти педіатричного профілю із супутніми захворюваннями мають підвищений ризик тяжкого перебігу хвороби та госпіталізації. Моноклональні антитіла (МАТ) стали інноваційним та дієвим інструментом специфічної противірусної терапії. У цьому огляді літератури проаналізовано сучасні дані щодо ефективності, безпеки та особливостей застосування МАТ у дітей та підлітків, хворих на COVID-19, на основі досліджень 2021–2025 років.

Abstract:
Although COVID-19 infection in children generally has a milder course compared to adults, pediatric patients with underlying conditions are at an increased risk for severe disease and hospitalization. Monoclonal antibodies (mAbs) have become an innovative and effective tool for specific antiviral therapy. This literature review analyzes current data on the efficacy, safety, and specifics of mAb use in children and adolescents with COVID-19, based on studies from 2021–2025.

***Ключові слова:** COVID-19, педіатрія, моноклональні антитіла, противірусна терапія, діти, SARS-CoV-2.*
***Key words:** COVID-19, pediatrics, monoclonal antibodies, antiviral therapy, children, SARS-CoV-2.*

Вступ. Пандемія коронавірусної хвороби 2019 (COVID-19) кинула безпрецедентний виклик системам охорони здоров'я в усьому світі. З початку пандемії стало зрозуміло, що діти та підлітки рідше страждають від тяжких форм захворювання порівняно з дорослими [8]. Однак певні групи педіатричних пацієнтів, зокрема ті, що мають імунодефіцитні стани, ожиріння, хронічні захворювання дихальної та серцево-судинної систем, залишаються вразливими до розвитку ускладнень [7]. Для запобігання прогресуванню хвороби у таких пацієнтів були розроблені препарати на основі віруснейтралізуючих моноклональних антитіл.

Механізм дії та обґрунтування застосування. Моноклональні антитіла — це лабораторно створені білки, що імітують здатність імунної системи боротися зі шкідливими патогенами, такими як віруси. У випадку SARS-CoV-2 вони специфічно зв'язуються зі спайковим (S) білком вірусу, блокуючи його здатність проникати в клітини людини [7]. Цей механізм дозволяє швидко знизити вірусне навантаження на ранніх стадіях захворювання, що є критично важливим для пацієнтів з груп ризику [8].

Клінічна ефективність у педіатрії. Ранні рекомендації щодо застосування терапії моноклональними антитілами наголошували на важливості їх використання саме у дітей та підлітків з факторами ризику тяжкого перебігу COVID-19 [8]. Накопичений клінічний досвід підтвердив доцільність такого підходу:

Використання МАТ та іншої противірусної терапії при легкому та середньотяжкому перебігу COVID-19 у педіатричних пацієнтів дозволяє запобігти госпіталізації та розвитку важких респіраторних симптомів [2].

Багатоцентрові ретроспективні дослідження продемонстрували, що застосування МАТ у дітей значно знижує ризик прогресування хвороби, демонструючи високу клінічну ефективність у реальній практиці [3].

Аналіз даних амбулаторного лікування дітей та підлітків також засвідчив високу результативність МАТ у запобіганні ускладненням, дозволяючи уникнути перевантаження стаціонарних відділень [4].

Як зазначають дослідники, аналіз серій клінічних випадків є лише початком у розумінні повного потенціалу МАТ у педіатрії, і їх застосування має стати стандартом для вразливих груп [1].

Безпека та переносимість. Одним із головних питань при впровадженні нових методів лікування в педіатрії є їх безпека. Згідно з наявними даними:

Терапія моноклональними антитілами добре переноситься педіатричними пацієнтами. Дослідження безпеки не виявили значних або небезпечних для життя побічних ефектів у більшості дітей [5].

Окремі амбулаторні дослідження також підтверджують сприятливий профіль безпеки: небажані явища (такі як легкі інфузійні реакції) зустрічаються рідко і легко купіруються [4].

Європейська серія випадків показала, що МАТ можна успішно і безпечно застосовувати не лише у підлітків, але й у немовлят та дітей молодшого віку з високим ризиком [6].

Висновок. Аналіз сучасної літератури свідчить, що моноклональні антитіла є ефективним та безпечним методом лікування легкої та середньотяжкої форми COVID-19 у дітей та підлітків із груп високого ризику [7]. Їх раннє амбулаторне або стаціонарне застосування запобігає прогресуванню хвороби та значно знижує частоту госпіталізацій [2, 4]. Враховуючи мутаційну мінливість вірусу SARS-CoV-2, необхідний подальший моніторинг ефективності існуючих МАТ щодо нових штамів, проте їх місце в сучасних педіатричних протоколах лікування є обґрунтованим та доведеним [8].

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ANALYSIS OF THE DYNAMICS OF INCIDENCE OF VIRAL HEPATITIS B AND C IN UKRAINE DURING 2020–2024

Abstract:
This article analyzes the dynamics of the incidence of viral hepatitis B and C during 2020–2024 in Ukraine. Viral hepatitis B and C remain among the leading global medical and social problems, causing a significant burden of chronic liver diseases, including cirrhosis and hepatocellular carcinoma. It is estimated that 2 billion people worldwide have been infected with viral hepatitis, and 350 million suffer from chronic viral hepatitis. Such high prevalence is due to transmission mechanisms, insufficient diagnosis at early stages, limited access to treatment, and a high frequency of comorbid conditions.

Key words*: viral hepatitis B, viral hepatitis C, prevalence, acute course, chronic course, liver cirrhosis*

Introduction: Viral hepatitis B (HBV) and viral hepatitis C (HCV) are dangerous liver diseases caused by viruses: HBV from the Hepadnaviridae family and HCV from the Flaviviridae family, leading to liver inflammation with subsequent development of cirrhosis and hepatocellular carcinoma. HBV and HCV occur in acute (up to 6 months) and chronic (more than 6 months) forms.

Materials and Methods: A literature review was conducted based on articles published in PubMed over the past 10 years and official data from the Public Health Center of Ukraine. Current information regarding the dynamics of incidence of viral hepatitis B and C during 2020–2024 in Ukraine was analyzed.

Objective: To analyze scientific publications, literature sources, and official data from the Public Health Center of Ukraine and determine the dynamics of the incidence of viral hepatitis B and C during 2020–2024 in Ukraine.

Relevance: Acute HBV is defined as a discrete onset of symptoms, the presence of jaundice or elevated serum transaminases, and the presence of HBsAg.

Chronic HBV is defined as persistence of hepatitis B surface antigen for more than six months. Individuals with chronic HBV are at risk of developing hepatocellular carcinoma and cirrhosis, although mortality decreases with adequate treatment.

Occult HBV infection is another subcategory characterized by detection of HBV DNA with undetectable HBsAg or serological markers of previous viral exposure in plasma.

HBV infection is a serious global public health problem, as 2 billion people worldwide are infected and 350 million suffer from chronic HBV infection. In 2016, global HBsAg positivity was estimated at 3.9%.

HBV infection is the tenth leading cause of death worldwide and results in 500,000 to 1.2 million deaths annually due to chronic hepatitis, cirrhosis, and hepatocellular carcinoma; 320,000 people die each year from hepatocellular carcinoma. In Western countries, the disease is relatively rare and usually acquired in adulthood, whereas in Asia and most of Africa, chronic HBV infection is common and infection usually occurs in the perinatal period or early childhood.

In the United States, according to the Centers for Disease Control and Prevention (CDC), only one-third of patients infected with HBV are aware of their condition. Reasons for low detection and treatment rates include the asymptomatic nature of chronic HBV until late stages, lack of curative therapy of limited duration, complex natural history, and insufficient patient awareness.

Regarding HCV, approximately 71 million people worldwide are chronically infected, of whom 15 million live in Europe. Despite the availability of highly effective direct-acting antiviral therapy, many people remain undiagnosed. It is estimated that only about one-third of chronically infected patients in Europe are aware of their diagnosis. According to the European Centre for Disease Prevention and Control (ECDC), HCV prevalence in the European Union is 0.5% of the population.

HCV occurs worldwide, with the highest prevalence observed in sub-Saharan Africa, the Eastern Mediterranean, and the Western Pacific regions (5.3%, 4.6%, and 3.9%, respectively). In the United States, approximately 4 million people are chronically infected, with an estimated prevalence among children of 0.2%–

0.4%. Due to the high prevalence, the World Health Organization (WHO) adopted a resolution to improve prevention, diagnosis, and treatment of viral hepatitis. WHO targets include a 65% reduction in liver-related deaths, a 90% reduction in new cases, and diagnosing 90% of people with viral hepatitis by 2030.

Results and Discussion: The aim of our study was to assess the dynamics of the incidence of viral hepatitis from 2020 to 2024. Data were obtained from official sources of the Public Health Center of Ukraine. In 2020, 6.6 thousand cases of total viral hepatitis were registered. In 2021, a decrease was observed: 5.4 thousand cases were registered, which is 22% less than in 2020.

HBV and HCV are transmitted via blood contact, sexual, and vertical routes.

The risk of infection through blood contact, most often during transfusion, depends on the circulating infectious agent, antibodies bound to virions, stage of infection in the donor, volume of blood received, degree of immunosuppression in the recipient, and type of blood product. Mother-to-child transmission remains a global public health problem. If newborns born to HBeAg-positive mothers do not receive hepatitis B immunoglobulin and vaccination shortly after birth, 70%–90% develop HBV infection. If born to HBeAg-negative mothers without prophylaxis, 10%–20% develop infection. Newborns have a 90% probability of developing chronic infection compared to 50% in children under 3 years and 5% in adults after HBV infection.

Historically, men who have sex with men have had the highest risk of HBV infection due to specific sexual practices and higher numbers of partners. HBV and HCV share similarities including global prevalence, transmission routes, hepatotropism, and the ability to cause chronic infection leading to cirrhosis and hepatocellular carcinoma. Dual infection is identified by positive HBsAg and anti-HCV, with viral genome detection needed for confirmation. Since 2022, separate reporting of HBV and HCV has been introduced: 1,416 HBV cases and 3,972 HCV cases were registered in 2022.

In 2023, 2,150 HBV cases were registered (51% more than in 2022) and 6,583 HCV cases (65% more than in 2022).

In 2024, 2,364 HBV cases were registered (9.9% more than in 2023) and 8,031 HCV cases (22% more than in 2023).

Conclusion: Since 2022, Ukraine has observed an increase in newly detected cases of viral hepatitis. In 2023, 51% more HBV cases and 65% more HCV cases were registered compared to 2022. In 2024, 9.9% more HBV cases and 22% more HCV cases were registered compared to 2023.

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PEDAGOGICAL SCIENCES

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INTEGRATING DIGITAL TECHNOLOGIES INTO FOREIGN LANGUAGE TEACHING: TOOLS AND BEST PRACTICES

Abstract

The article examines the role of digital technologies in modern foreign language teaching and their impact on the effectiveness of the educational process. It analyzes key digital tools, including learning management systems, mobile applications, multimedia resources and immersive technologies, as well as methodological approaches such as blended learning, task-based learning and gamification. The study highlights the pedagogical benefits and challenges of technology integration and provides practical recommendations for effective implementation in higher and secondary education contexts.

Keywords: *digital technologies, foreign language teaching, blended learning, mobile learning, gamification, educational technology.*

The rapid development of digital technologies since 2020 has significantly transformed the educational landscape, particularly in the field of foreign language teaching. Traditional teacher-centered approaches are increasingly complemented or replaced by learner-centered, technology-enhanced methods that promote interaction, autonomy and lifelong learning. In the context of globalization and digitalization, the integration of digital tools into foreign language education is no longer optional but essential for preparing learners to communicate effectively in multicultural and professional environments [1].

Digital technologies offer numerous pedagogical advantages that enhance the effectiveness of foreign language instruction. One of the key benefits is increased learner motivation, as interactive and multimedia-based tasks tend to be more engaging than traditional textbook-based activities [2]. Technologies also support differentiated and personalized learning allowing students to progress at their own pace and according to their individual needs.

Furthermore, digital tools facilitate authentic language exposure through access to real-world materials such as videos, podcasts, online articles and social media content. This exposure helps learners develop communicative competence and intercultural awareness [3]. Another important advantage is flexibility, as online and mobile learning environments enable students to practice language skills anytime and anywhere.

Learning Management Systems (LMS) such as Moodle, Google Classroom and Microsoft Teams play a central role in organizing and delivering digital language courses. These platforms allow teachers to upload learning materials, assign tasks, provide feedback and monitor learners' progress. Research confirms that LMS-based instruction supports learner autonomy and improves learning outcomes in blended and online language courses.

Mobile applications for language learning, including Duolingo, Quizlet and Memrise, are widely used to practice vocabulary, grammar and pronunciation. These applications often employ gamification elements such as points, levels and rewards, which increase learner engagement and motivation [4]. Mobile-assisted language learning has proven particularly effective for vocabulary acquisition and formative assessment.

Multimedia tools, including videos, audio recordings and interactive exercises, enhance the development of listening and speaking skills. Platforms such as YouTube, TED Talks and educational podcasts provide authentic language input and expose learners to different accents and communication styles [5]. Online dictionaries, corpora and AI-based writing tools also support vocabulary acquisition and language analysis.

Virtual Reality (VR) and Augmented Reality (AR) technologies represent innovative approaches to immersive language learning. By simulating real-life communication scenarios, such as traveling, shopping or professional interactions, these technologies help learners practice language use in meaningful contexts. Recent studies highlight the potential of VR and AR for enhancing speaking confidence and intercultural competence [6].

Digital technologies effectively support communicative and task-based approaches to language teaching. Online discussions, video conferencing, collaborative documents and project-based tasks encourage meaningful communication and interaction in the target language. Such activities promote active learning and help students develop real-world language skills [7].

Blended learning combines traditional face-to-face instruction with online learning components. This approach allows teachers to use classroom time for interaction and communication while assigning digital resources and practice activities for independent study. Empirical research conducted after 2020 indicates that blended learning improves learner engagement and academic performance when pedagogically well-designed [8].

Gamification involves the use of game-like elements in educational contexts. Digital quizzes, competitions, badges and leaderboards can make language learning more enjoyable and reduce anxiety, especially among beginners. Studies show that gamification positively influences motivation and long-term retention of language material [9].

Despite its many advantages, the integration of digital technologies in foreign language teaching also presents challenges. One major issue is the insufficient digital competence of some teachers, which may limit the effective use of technology [10]. Technical problems, unequal access to digital devices and unstable internet connections can also hinder the learning process, particularly in developing regions.

Additionally, excessive reliance on technology may lead to cognitive overload or reduced face-to-face communication. Therefore, researchers emphasize the importance of maintaining pedagogical balance and aligning technology use with learning objectives [11].

To successfully integrate digital technologies into foreign language teaching, several recommendations should be considered. First, teachers should receive continuous professional development in digital pedagogy and educational technologies [12]. Second, digital tools should be selected based on their pedagogical value and relevance to learning objectives rather than novelty. Third, institutions should ensure adequate technical infrastructure and equal access to digital resources for all learners. Finally, regular evaluation and adaptation of digital practices are necessary to meet evolving educational needs.

The integration of digital technologies into foreign language teaching offers significant opportunities to enhance learning quality, learner engagement and communicative competence. By using learning management systems, mobile applications, multimedia resources and immersive technologies, educators can create dynamic and learner-centered environments. However, effective integration requires thoughtful pedagogical planning, teacher training and a balanced approach. When used strategically, digital technologies become powerful tools for developing language skills and preparing learners for successful communication in the post-2020 digital era.

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ВИЗНАЧЕННЯ КРИТЕРІЇВ, ПОКАЗНИКІВ ТА РІВНІВ СФОРМОВАНОСТІ АРТТЕРАПЕВТИЧНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ПСИХОЛОГІВ У ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ У ЗВО

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DETERMINING CRITERIA, INDICATORS, AND LEVELS OF DEVELOPING FUTURE PSYCHOLOGISTS' ART THERAPY COMPETENCE WHILE PROFESSIONAL TRAINING IN HIGHER EDUCATION INSTITUTIONS

Анотація

У статті визначено та обґрунтовано критерії, показники й схарактеризовано рівні сформованості арттерапевтичної компетентності майбутніх психологів під час навчання в закладах вищої освіти. З огляду на виокремлені компоненти досліджуваної здатності визначено відповідні однойменні критерії її сформованості, а саме: мотиваційно-ціннісний, когнітивний, діяльнісний, особистісно-рефлексійний. Для кожного критерію розроблено показники, за ступенем прояву яких визначались рівні сформованості відповідного компонента цієї здатності. На підставі визначених критеріїв і показників сформованості арттерапевтичної компетентності здобувачів вищої освіти та з урахуванням сучасних підходів до класифікації її рівнів виокремлено чотири рівні сформованості досліджуваної здатності майбутніх психологів: початковий, середній, достатній, високий.

Abstract

The article determines and substantiates the criteria, indicators, and levels of developing future psychologists' art therapy competence while studying in higher education institutions. Considering the highlighted competence components, the authors have identified the corresponding criteria for its development, including motivational and valuable criterion, cognitive criterion, activity criterion, and personal and reflexive criterion. The indicators have been defined for each criterion. According to the degree of their implementation, the authors have determined the levels of development of the relevant competence component. According to the defined criteria and indicators for developing higher education students' art therapy competence, and considering modern approaches to the classification of its levels, four levels of future psychologists' competence have been identified: initial, intermediate, sufficient, and high.

Ключові слова: *арттерапевтична компетентність, майбутні психологи, критерії, показники, рівні, професійна підготовка, заклади вищої освіти.*

Key words*: art therapy competence, future psychologists, criteria, indicators, levels, professional training, higher education institutions.*

Постановка проблеми у загальному вигляді. Сформованість арттерапевтичної компетентності майбутніх психологів характеризується відповідними показниками й рівнями.

Перш ніж визначати стан сформованості арттерапевтичної компетентності майбутніх психологів та описувати впровадження методики формувального впливу, необхідно розробити діагностичний

апарат дослідження, до складу якого належать критерії, показники та рівні сформованості арттерапевтичної компетентності майбутніх психологів.

Аналіз основних досліджень та публікацій. Проблему організації досліджень, визначення критеріїв, показників та рівнів сформованості професійної компетентності майбутніх фахівців під час навчання у ЗВО розглянуто в працях: А. Галімова, С. Гончаренка, О. Дудник, О. Крушельницької, Н. Молодиченко, Н. Ничкало Н. Тверезовської, Ю. Сухарнікової, Ю. Рибалко, О. Рудницької, Л. Шевчук та ін.

В «Академічному тлумачному словнику української мови» зазначається, що «критерій є підставою для оцінювання, визначення або класифікації чогось; є мірилом. Критерієм правильності теоретичних висновків є практика» [1].

Як тлумачить термінологічний словник, «критерії якості педагогічної діяльності – це ознаки, за якими визначається ступінь відповідності педагогічної діяльності визначеним цілям, встановленим стандартам, нормам. Критерії якості педагогічної діяльності забезпечують якісну характеристику педагогічної діяльності через кількісну міру досягнення проєктованої мети» [7, с. 84].

У праці з методології та організації науково-педагогічних досліджень автори визначають «критерій як міру певного процесу, якусь матеріалізовану ознаку» [3]. Г. Білецька трактує критерії як ознаки, за якими можна оцінити та порівняти педагогічні явища, процеси тощо [2].

У процесі аналізу наукових джерел були з'ясовані вимоги, які висуваються до критеріїв, а саме: узгодженість із компонентами досліджуваного феномену; достовірність; об'єктивність; зрозумілість і надійність; простота вимірювання тощо [4].

Критерій є засобом, інструментом оцінювання, складниками якого є показники. Показник – це те, за допомогою чого можна судити про розвиток та перебіг чого-небудь. У «Великому тлумачному словнику сучасної української мови» показник трактується як свідчення, доказ, ознака чого-небудь [5, с. 10]. В. Тернопільська й О. Дерев'янко зазначають, що показник – це кількісні або якісні характеристики сформованості якості, властивості, ознаки об'єкта, що вивчається, ступінь сформованості того чи іншого критерію [8, с. 265].

Кожний із зазначених критеріїв повинен бути оцінений за низкою показників. Дослідники В. Галузяк, С. Гончаренко, О. Єжова, М. Сметанський, В. Шахов та ін. дотримуються спільної думки, що в певних показниках виявляється якісна сформованість та визначеність критеріїв.

Мета статті. Визначення та обґрунтування критеріїв, показників та рівнів сформованості арттерапевтичної компетентності майбутніх психологів у процесі їхньої професійної підготовки в закладах вищої освіти.

Виклад основного матеріалу дослідження. Аналіз наукових праць вітчизняних і зарубіжних учених (А. Квінько, Е. Куцин, О. Сорока та ін.) показав, що науковці визначають різні критерії та показники сформованості арттерапевтичної компетентності здобувачів вищої освіти.

На попередньому етапі дослідження встановлено, що арттерапевтична компетентність є вагомим складником професійної компетентності майбутніх психологів, структурованим мотиваційно-ціннісним, когнітивним, діяльнісним та особистісно-рефлексійним компонентами. З огляду на виокремлені компоненти досліджуваної здатності визначено відповідні однойменні критерії її сформованості, а саме: мотиваційно-ціннісний, когнітивний, діяльнісний, особистісно-рефлексійний. Для кожного критерію розроблено показники, за ступенем прояву яких визначались рівні сформованості відповідного компонента цієї здатності.

Так, мотиваційно-ціннісний критерій передбачає визначення ступеня сформованості цінностей, мотивів, потреб та інтересів майбутніх психологів, що виражають усвідомлене спонукання до арттерапевтичної діяльності, сукупності всіх психічних процесів, якими визначається поведінка людини в цілому; прояву таких показників, як усвідомлення потреби в засвоєнні арттерапевтичних знань; ціннісне ставлення до арттерапевтичної діяльності; прагнення формувати та розвивати власну арттерапевтичну компетентність.

Когнітивний критерій характеризує ступінь опанування майбутніми психологами системи арттерапевтичних знань; розуміння можливостей використання арттерапевтичних технологій з огляду на потреби людей; знання методики застосування арттерапії в професійній діяльності.

Діяльнісний критерій спрямований на виявлення вміння застосовувати на практиці набуті арттерапевтичні знання; уміння використовувати арттерапевтичні технології з урахуванням потреб людей; володіння методиками щодо застосування арттерапії в професійній діяльності, а також у різних життєвих ситуаціях.

З урахуванням особистісно-рефлексійного критерію визначаємо розвиненість емпатії, вольових та гуманістичних (толерантність, справедливість, гуманізм, рефлексія) якостей особистості, здатність до усвідомлення та самооцінювання власного рівня арттерапевтичної компетентності; здатність до рефлексії та корекції власної арттерапевтичної діяльності.

Відповідність критеріїв і показників сформованості арттерапевтичної компетентності майбутніх психологів представлено в таблиці 1.

Таблиця 1

Компоненти, критерії та показники сформованості арттерапевтичної компетентності майбутніх психологів

Компоненти / Критерії	Показники
Мотиваційно-ціннісний	1. Усвідомлення потреби в засвоєнні арттерапевтичних знань.
	2. Ціннісне ставлення до арттерапевтичної діяльності.
	3. Прагнення розвивати власну арттерапевтичну компетентність.
Когнітивний	1. Система арттерапевтичних знань.
	2. Розуміння можливостей використання арттерапевтичних технологій з огляду на потреби людей.
	3. Знання методики застосування арттерапії в професійній діяльності.
Діяльнісний	1. Уміння застосовувати на практиці набуті арттерапевтичні знання.
	2. Уміння використовувати арттерапевтичні технології з урахуванням потреб людей.
	3. Володіння методиками щодо застосування арттерапії в професійній діяльності.
Особистісно-рефлексійний	1. Розвиненість емпатії, вольових та гуманістичних якостей особистості.
	2. Здатність до самооцінювання власного рівня арттерапевтичної компетентності.
	3. Здатність до рефлексії та корекції власної арттерапевтичної діяльності.

Для узагальнення та якісної характеристики результатів дослідження виокремлено та схарактеризовано рівні сформованості арттерапевтичної компетентності означених фахівців.

Під рівнем розуміємо «ступінь якості, величину тощо, досягнуті в чому-небудь» [1].

Як показав аналіз літературних джерел, у виокремленні рівнів сформованості арттерапевтичної компетентності фахівців дослідники надають перевагу трирівневій градації, але послуговуються й п'ятирівневою.

Погоджуємося з думкою Н. Ткаченко, що для отримання вірогідних результатів статистичне групування відповідно до отриманих експериментальних даних потрібно здійснювати таким чином, щоб до кожного розряду ввійшло 20–25 % значень вимірюваної ознаки, із чого випливає, що 4–5 рівнів для характеристики певного феномену є оптимальною кількістю [6].

Таким чином, на підставі визначених критеріїв і показників сформованості арттерапевтичної компетентності здобувачів вищої освіти та з урахуванням сучасних підходів до класифікації її рівнів виокремлено чотири рівні сформованості досліджуваної здатності майбутніх психологів: початковий, середній, достатній, високий. Схарактеризуємо їх.

Початковий рівень характеризується об'єктним ставленням особистості до арттерапії, відсутністю інтересу до оволодіння арттерапевтичними засобами та прагнення формувати та розвивати власну арттерапевтичну компетентність; фрагментарними арттерапевтичними знаннями, відсутністю уявлення про арттерапевтичну компетентність майбутнього психолога та незнанням методики формування арттерапевтичної компетентності; невмінням застосовувати арттерапевтичні знання в професійній діяльності з огляду на потреби людей, несформованістю вміння обґрунтовувати арттерапевтичну доцільність використання засобів арттерапії, неволодінням методикою формування арттерапевтичної компетентності; нерозвиненістю вольових та гуманістичних (емпатійних) якостей особистості, слабким усвідомленням та несформованістю здатності до самооцінювання власного рівня арттерапевтичної компетентності, поверховим самоаналізом власної арттерапевтичної діяльності, без її корекції.

Середній рівень відзначається суб'єктно-об'єктним ставленням особистості до арттерапевтичної діяльності, слабко вираженим інтересом до вирішення арттерапевтичних проблем та прагненням формувати та розвивати власну арттерапевтичну компетентність; несистемними арттерапевтичними знаннями, нечіткими уявленнями про арттерапевтичну компетентність майбутнього психолога та фрагментарними знаннями методики формування арттерапевтичної компетентності; недостатнім умінням застосовувати арттерапевтичні знання в професійній діяльності з огляду на потреби людей, частково сформованими вміннями обґрунтовувати арттерапевтичну доцільність застосування арттерапевтичних засобів та оцінювати ефективність їх застосування, фрагментарним володінням методикою формування арттерапевтичної компетентності; розвиненістю в більшості випадків вольових та гуманістичних (емпатійних) якостей особистості, неповним усвідомленням та самооцінюванням власного рівня арттерапевтичної компетентності, частковим самоаналізом та слабкою корекцією власної арттерапевтичної діяльності.

Достатній рівень супроводжується ситуативним суб'єктним ставленням особистості до арттерапевтичної діяльності, ситуативним інтересом до вирішення арттерапевтичних проблем та прагнен-

ням формувати та розвивати власну арттерапевтичну компетентність; базовими арттерапевтичними знаннями та знаннями методики формування арттерапевтичної компетентності; умінням застосовувати арттерапевтичні знання в професійній діяльності з огляду на потреби людей, умінням обґрунтовувати доцільність застосування арттерапевтичних засобів, володінням методикою формування арттерапевтичної компетентності майбутніх психологів; здебільшого розвиненістю вольових та гуманістичних (емпатії) якостей особистості, достатнім усвідомленням та самооцінюванням власного рівня арттерапевтичної компетентності, належним самоаналізом та корекцією власної арттерапевтичної діяльності.

Високий рівень діагностується суб'єктним ставленням особистості до арттерапевтичної діяльності, стійким інтересом до вирішення арттерапевтичних проблем та прагненням формувати та розвивати власну арттерапевтичну компетентність; глибокими та системними арттерапевтичними знаннями, повним уявленням про арттерапевтичну компетентність психолога, досконалими знаннями методики формування арттерапевтичної компетентності; бездоганними вміннями застосовувати арттерапевтичні знання в професійній діяльності з огляду на потреби людей, досконалими вміннями обґрунтовувати доцільність застосування арттерапевтичних засобів та оцінювати їх ефективність, високим рівнем володіння методикою формування арттерапевтичної компетентності психологів; розвиненістю вольових та гуманістичних (емпатії) якостей особистості, повним усвідомленням та об'єктивним самооцінюванням власного рівня арттерапевтичної компетентності, глибоким самоаналізом, здатністю до рефлексії, корекції власної арттерапевтичної діяльності.

Висновки. Отже, визначені нами критерії (мотиваційно-ціннісний, когнітивний, діяльнісний, особистісно-рефлексійний), відповідні показники та схарактеризовані рівні (початковий, середній, достатній, високий) сформованості арттерапевтичної компетентності майбутніх психологів забезпечать об'єктивне оцінювання сформованості всіх компонентів досліджуваного феномену.

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THE PRACTICAL IMPLEMENTATION OF DIGITAL EDUCATIONAL TECHNOLOGIES IN THE INSTRUCTION OF ECONOMIC TEXT TRANSLATION

Annotation:

In the twenty-first century, digital technologies have permeated nearly all sectors of education. In translation studies, particularly in translating economic texts from English into Uzbek, digital tools are pivotal for developing students' translation competence. Economic texts are characterized by high terminological density, strict structural organization, and culturally specific expressions, making the integration of digital technologies alongside traditional pedagogical methods essential. Juan C. Sager's work on terminology processing, together with CAT (Computer-Assisted Translation) tools, Translation Memory, and terminology management systems, ensures terminological accuracy and consistency. These digital tools provide a conceptual and practical foundation for teaching economic text translation, enhancing instructional efficiency, and fostering students' professional competencies.

Аннотация:

В XXI веке цифровые технологии проникли практически во все сферы образования. В области переводоведения, особенно при переводе экономических текстов с английского на узбекский язык, цифровые инструменты играют ключевую роль в формировании переводческой компетенции студентов. Экономические тексты характеризуются высокой терминологической плотностью, строгой структурной организацией и культурно специфическими выражениями, что делает интеграцию цифровых технологий наряду с традиционными педагогическими методами необходимой. Работа Хуана С. Сагера по обработке терминологии, а также инструменты CAT (Computer-Assisted Translation), Translation Memory и системы управления терминологией обеспечивают терминологическую точность и согласованность. Эти цифровые инструменты создают концептуальную и практическую основу для преподавания перевода экономических текстов, повышая эффективность обучения и способствуя развитию профессиональных компетенций студентов.

Keywords: *digital technologies, translation education, economic texts, terminological competence, Computer-Assisted Translation, CAT tools, Translation Memory, terminology management system, pedagogical approaches, Uzbekistan educational system, Sh.S. Sharipov, Juan C. Sager*

Ключевые слова: *цифровые технологии, обучение переводу, экономические тексты, терминологическая компетенция, Computer-Assisted Translation, инструменты CAT, Translation Memory, системы управления терминологией, педагогические подходы, система образования Узбекистана, Ш.С. Шарипов, Хуан С. Сагер*

INTRODUCTION

In the second quarter of the twenty-first century, digital technologies have penetrated virtually all spheres of the educational system. In the field of translation studies, particularly in the process of translating economic texts from English into Uzbek, digital tools have not only created additional opportunities but have also become one of the key factors in the formation of students' translation competence. Economic texts differ from other text types due to their high terminological density, structural rigidity, and the prevalence of culturally specific expressions. Consequently, alongside traditional pedagogical approaches, the integration of modern digital technologies has become a methodological necessity in this area of instruction.

RESEARCH METHODLOGY AND LITERATURE REVIEW

In contemporary educational settings, the use of digital technologies is gaining increasing relevance, especially in complex and specialized domains such as the translation of economic texts. Such texts are characterized by specialized terminology, a strict stylistic framework, and precise semantic content, all of which require a high level of professional competence from translators. Juan C. Sager's book *A Practical Course in Terminology Processing* remains an essential reference for researchers and practitioners in terminology and translation studies. The theoretical foundations and practical guidelines presented in this work provide a solid framework for understanding the importance of terminological competence in the translation of specialized texts and for fostering its development.

Within the context of digital educational technologies, Sager's work also facilitates a deeper understanding of the theoretical principles underlying modern terminology management tools, such as Translation Memory (TM) systems and Translation Management Systems (TMS). It contributes significantly to ensuring terminological accuracy and consistency—factors that are crucial in the translation of economic documents, reports, and contracts.

Digital educational technologies create broad opportunities for optimizing the translation process, consolidating students' knowledge, and enhancing instructional effectiveness. Sh.S. Sharipov's monograph "*Raqamli ta'lim texnologiyalari"*(2021) represents a highly relevant and practically significant source in the context of the ongoing digital transformation of Uzbekistan's educational system. The work serves as an im-

portant guide for understanding the theoretical foundations, practical implementation, and future prospects of digital educational technologies within the national context. It provides a conceptual basis for the practical application of digital tools in teaching the translation of economic texts, particularly in terms of improving instructional efficiency, developing students' professional competences, and enhancing the overall quality of education.

The integration of Computer-Assisted Translation (CAT) tools into the teaching process is of particular importance. In the translation of economic texts, CAT technologies—such as Translation Memory and terminology management systems—should constitute an integral component of instruction. Translation Memory technologies enable the storage of previously translated segments and their automatic reuse in new texts containing repetitive structures. This not only increases translation speed but also ensures terminological consistency, which is especially critical in economic documentation, financial reports, and contractual agreements.

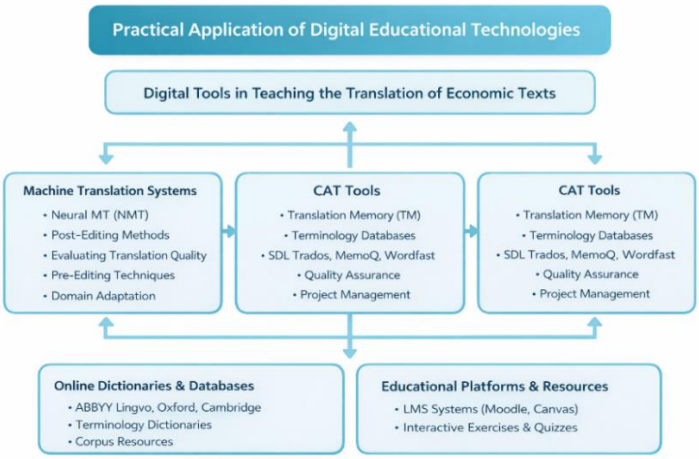
Lynne Bowker's seminal work *Computer-Aided Translation Technology: A Practical Introduction* (2002) is among the foundational practical guides devoted to computer-assisted translation technologies. Published at a time of rapid technological integration into the translation profession, the book is notable for systematically linking theoretical principles with practical applications. Although certain technological details have become outdated, the work remains valuable for understanding the fundamental principles of CAT tools and their impact on the translation process. Through engagement with such technologies, students acquire hands-on experience in real translation projects, thereby developing professional skills essential for their future careers.

RESULTS AND ANALYSIS

Machine Translation and Post-Editing Practice. Machine Translation (MT), particularly neural MT systems, has achieved significant progress in the rapid translation of economic texts. However, such systems do not always ensure contextual precision or the accurate use of domain-specific terminology. Dorothy Kenny's *Machine Translation: An Introductory Guide* provides a clear and systematic overview of the theoretical foundations, types, development, advantages, and limitations of MT. Although technological developments have advanced since its publication, the book remains a valuable starting point for understanding core MT principles. Therefore, incorporating post-editing practice into translation training is essential. Post-editing activities enhance students' linguistic and terminological competence while developing practical skills in revision and quality assurance, enabling them to combine the efficiency of MT with the quality standards of human translation.

Online Dictionaries and Terminological Resources. The use of specialized dictionaries, terminology databases, and corpora is indispensable in translating economic texts. Digital platforms should provide access to authoritative terminological resources such as those of the International Monetary Fund, World Bank, and European Central Bank. These resources assist students in identifying accurate equivalents and understanding economic concepts more comprehensively. Mona Baker's *In Other Words: A Coursebook on Translation* offers a solid theoretical framework for addressing equivalence, terminology, and stylistic challenges, reinforcing the view of translation as a cultural and pragmatic transfer rather than mere linguistic substitution.

Interactive Platforms and Simulations. Digital learning environments, such as Learning Management Systems (LMS), enable flexible access to materials, interactive practice, and effective communication. In teaching economic translation, simulated professional scenarios—such as virtual translation agencies or tasks based on authentic financial audio/video materials—can be employed to foster both translation competence and professional collaboration skills. The theoretical underpinnings of such approaches are reflected in Marc Prensky's article *Digital Natives, Digital Immigrants* and George Siemens's *Connectivism: A Learning Theory for the Digital Age*, which emphasize the transformation of learning in the digital era. These perspectives support the integration of CAT tools, MT, online resources, and collaborative platforms in translator training, promoting not only translation skills but also digital literacy, autonomous learning, and network-based knowledge acquisition.



1. Image caption / label: Practical Application of Digital Educational Technologies

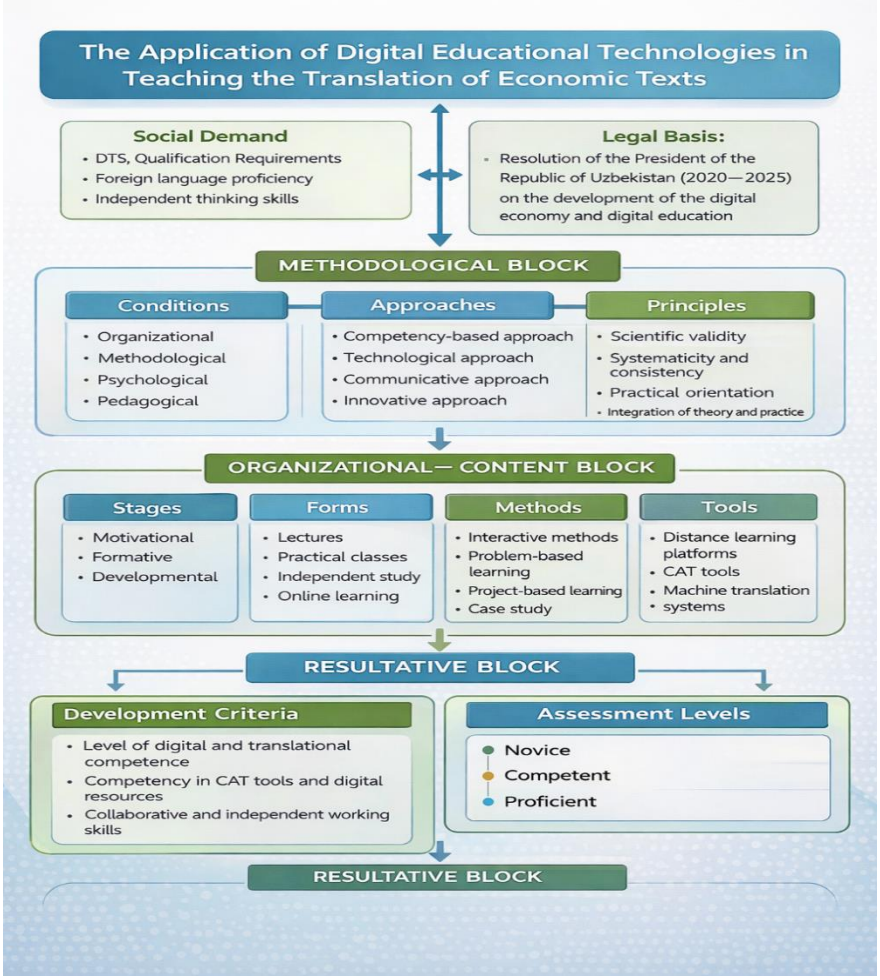
The integration of digital technologies into education has generated two contrasting perspectives: technological determinism, which assumes that technology automatically enhances educational quality, and the instrumental view, which regards technology merely as a supplementary tool. Effective pedagogy, however, requires a balanced position—pedagogical pragmatism—where technological affordances are maximized while remaining subordinated to clearly defined didactic objectives. The teaching of economic translation provides an appropriate context for such pragmatism, as it demands both solid theoretical knowledge and advanced technological competence.

This study approaches the practical application of digital technologies in economic translation training through Donald Kiraly's social-constructivist framework and Lynne Bowker's corpus-based translation pedagogy. Technology is conceptualized not as an end in itself but as a medium for collaborative knowledge construction and the simulation of authentic professional environments. Since contemporary translation projects are typically team-based, cloud platforms such as Smartcat, Phrase (Memsource), and Crowdin enable real-time collaboration, shared translation memories, and terminological consistency. The proposed "real-time translation relay" model engages students in simultaneous project work, fostering cooperation, peer learning, and terminological standardization in line with Vygotskian principles of collaborative development.

To address terminological challenges, a "terminology incubator" model is introduced, where students justify translation choices using corpus evidence and authoritative sources, thereby developing argumentation and consensus-building skills. In line with Bowker's pedagogical recommendations, students are further involved in compiling and analyzing small specialized corpora using tools such as AntConc. This "DIY corpus" approach transforms learners from passive recipients of knowledge into data-driven researchers capable of independently identifying linguistic patterns in economic discourse.

An additional innovation is the "Interactive Translation Error Map," implemented through digital boards. Instead of receiving corrected texts passively, students classify, diagnose, and reflect upon their own errors, identifying root causes and documenting evidence-based solutions. This process strengthens metacognitive awareness and self-regulated learning, reframing errors as analytical resources rather than failures.

Overall, the practical integration of digital technologies in teaching economic translation signifies a shift in educational philosophy—from teacher-centered transmission to learner-centered knowledge construction. The methodological model developed within this study integrates collaborative platforms, corpus-based inquiry, and reflective error analysis to bridge theory and practice. It aims to cultivate technologically literate, critically thinking, and professionally competent translators capable of meeting the complex demands of the modern labor market.



2. **Model: Practical Application Model of Digital Educational Technologies in Teaching the Translation of Economic Texts**

The proposed model offers an integrated framework for modern translator training, ensuring the systematic incorporation of digital technologies into the process of teaching economic text translation. It consists of four interrelated components: the objective block, the methodological block, the organizational–content block, and the resultative block.

1. Objective Block. This component aims to develop students' competence in translating economic texts through the effective use of digital technologies. The objective aligns with the strategic priorities of higher education modernization and reflects the growing importance of technological competence in professional translation practice. In contemporary translation activity, digital literacy is no longer optional but an essential professional requirement.

2. Methodological Block. This block establishes the theoretical foundation of the model and includes three dimensions: conditions, approaches, and principles.

The conditions encompass organizational, methodological, technological, and pedagogical factors necessary for effective implementation.

The approaches integrate competency-based, technological, practice-oriented, and integrative perspectives, emphasizing the simultaneous development of linguistic and technological competencies. The principles include digital literacy, collaboration, integration, and effective data management, ensuring alignment with the demands of the modern translation industry.

3. Organizational–Content Block. This block operationalizes the model through stages, forms, methods, and tools. The instructional process progresses from motivation to theoretical instruction and practical skill development. Educational forms include lectures, workshops, project-based learning, online courses, and portfolio assessment.

Methods focus on translation memory use, terminology management, post-editing, analytical tasks, and collaborative translation. Digital tools comprise learning management systems, CAT tools, machine translation systems, and cloud-based resources, which enhance both efficiency and professional relevance.

4. Resultative Block. The final component reflects learning outcomes and assessment criteria. It evaluates students' development in digital literacy, CAT tool proficiency, and post-editing competence across three levels: high, intermediate, and basic. The primary outcome of the model is the preparation of competitive specialists capable of effectively applying digital technologies in the translation of economic texts. Overall, the model provides a comprehensive solution for modernizing translation education and aligning it with contemporary industry standards.

CONCLUSION

In conclusion, the practical integration of digital educational technologies into the teaching of economic text translation significantly enhances the effectiveness, interactivity, and professional relevance of the learning process. The incorporation of digital tools—such as CAT systems, machine translation technologies, terminology management resources, and online learning platforms—transforms traditional translation instruction into a dynamic, competence-oriented model aligned with current industry standards. By embedding technological components into the curriculum, the educational process becomes more practice-oriented and reflective of real-world translation workflows. This approach not only strengthens students' linguistic and analytical abilities but also systematically develops their digital literacy, technological proficiency, and capacity for collaborative and project-based work.

Ultimately, the application of digital educational technologies contributes to the formation of a comprehensive professional competence framework, equipping future translators with the practical skills and knowledge base required to remain competitive in the contemporary translation market. Such modernization of translation training ensures that graduates are prepared to meet the evolving demands of the digitalized global economy.

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MODERN METHODS IN DEVELOPING READING COMPETENCE: SQ3R AND INSERT STRATEGIES

Abstract.
This article investigates the cultivation of reading competence among students within contemporary educational settings, with particular focus on the development of text comprehension, information evaluation, and critical analytical thinking. Central to the study are two empirically validated pedagogical strategies: the SQ3R method (Survey, Question, Read, Recite, Review), a structured approach to systematic academic reading, and the INSERT technique (Interactive Notation System for Effective Reading and Thinking), an interactive framework for metacognitive engagement with textual content. The article examines the cognitive mechanisms underlying SQ3R, including its role in facilitating deep processing of academic material, reinforcing memory consolidation, and promoting long-term knowledge retention. It subsequently analyses the interactive dimensions of INSERT, with attention to how the method fosters active dialogue between reader and text, enables the critical comparison of prior and newly encountered knowledge, and supports the identification of comprehension gaps. The article further explores the applicability of both strategies within digital learning environments and advances a set of evidence-informed recommendations for classroom practitioners. The study concludes that the integrated application of these two complementary strategies constitutes an effective means of reorienting learners away from passive information reception and towards autonomous, inquiry-driven academic engagement.

Keywords: *Reading competence, SQ3R method, INSERT strategy, critical thinking, cognitive acquisition, interactive learning, metacognition, academic reading, text analysis.*

1. INTRODUCTION

Mere reading, without a deliberate strategic approach, frequently results in the rapid loss of information and an insufficient depth of understanding. By contrast, strategic reading has been demonstrated to significantly improve both concentration and comprehension. As the volume of information available to learners continues to expand in the contemporary knowledge society, the capacity to process, evaluate, and retain textual content has become an increasingly critical academic and professional skill. Against this backdrop, the present article examines two evidence-based pedagogical strategies — SQ3R and INSERT — that are recognised in the literature as highly effective tools for developing reading competence across educational levels and disciplines.

2. The SQ3R Method: Structure and Cognitive Rationale

First proposed by Francis P. Robinson in 1946, the SQ3R method was designed to facilitate the systematic study of complex and academic texts. Its name is an acronym derived from the five sequential stages it comprises:

S — Survey: Before reading, the learner conducts a rapid overview of the text's headings, subheadings, visual elements, and summary. This preliminary scan enables the formation of a conceptual "map" of the material, activating prior knowledge and establishing a framework for comprehension.

Q — Question: Each heading or section is reformulated as a question. For instance, the heading "The Process of Photosynthesis" is converted into "How does photosynthesis occur?". This technique primes the reader's attention and creates a purpose-driven orientation towards the text.

R^1 — Read: The learner reads the text carefully, seeking answers to the questions formulated in the preceding stage. Reading becomes a goal-directed activity rather than a passive exercise.

R^2 — Recite: After reading each section, the learner articulates the key information in their own words, either aloud or silently. This stage plays a critical role in transferring information from short-term to long-term memory.

R^3 — Review: The learner periodically revisits the material to reinforce retention and consolidate understanding over time.

2.1 Why SQ3R Works: A Cognitive Perspective

The efficacy of SQ3R is grounded in established principles of cognitive psychology. The "Question" stage functions by programming the brain to fill a specific knowledge gap — research indicates that text read in search of an answer to a pre-formed question is retained approximately 40% more effectively than text read without a guiding purpose. Furthermore, the "Recite" stage engages metacognitive monitoring: if the learner cannot explain the content in their own words, they recognise that a gap in understanding exists and return to the relevant passage. This self-regulatory mechanism is central to the method's effectiveness for academic study.

3. The INSERT Method: Interactive Notation and Critical Engagement

The INSERT method — Interactive Notation System for Effective Reading and Thinking — provides learners with a structured framework for engaging in an active "dialogue" with the text. Rather than reading passively, the reader annotates the text using a set of symbols in the margins or on a separate tracking sheet. These symbols prompt the reader to compare new information against prior knowledge and to flag areas of

uncertainty. The standard INSERT notation system is presented in the table below.

Symbol	Meaning	Description
✓	Known	I was already familiar with this information.
+	New	This is entirely new information for me.
–	Contradictory	This information conflicts with my prior knowledge or seems inaccurate.
?	Unclear	I did not understand this part; additional explanation is required.

3.1 Developing Selective and Analytical Thinking

A common difficulty observed when learners first adopt INSERT is the tendency to mark nearly every sentence, thereby undermining the method's selectivity. In practice, INSERT is intended to cultivate discriminatory reading: the ability to distinguish between information that is genuinely novel, information that confirms existing knowledge, information that challenges prior beliefs, and information that requires further clarification. Teachers may support this development by assigning the completion of an INSERT tracking table as a structured task, in which students record examples from each category after reading. Such a table subsequently provides a ready-made framework for classroom discussion and debate.

4. Comparative Merits and Complementary Application

While SQ3R is particularly well suited to the in-depth, systematic study of lengthy or complex academic texts, INSERT is most effective for rapid analytical engagement and the evaluation of factual claims against existing knowledge. Used in combination, the two methods address complementary dimensions of reading competence: SQ3R provides structural and mnemonic scaffolding, while INSERT fosters critical and metacognitive awareness. Together, they support the learner's transition from passive information reception to active intellectual inquiry.

Both methods cultivate the following competencies: critical thinking, through the habit of evaluating rather than simply accepting information; sustained attention, as learners remain cognitively active throughout the reading process; and independent learning, enabling learners to engage with complex material without direct teacher mediation.

5. Application in Digital Learning Environments

Contemporary learners increasingly encounter texts through digital interfaces, a context that tends to promote surface-level or "skim" reading patterns. Both SQ3R and INSERT can be effectively adapted for use with electronic texts. Digital annotation tools — such as Notion, Evernote, or integrated document comment functions — enable learners to apply INSERT markers to online materials. Similarly, the "Review" stage of SQ3R can be enriched through hyperlinked supplementary resources, extending the learner's engagement with the topic beyond the primary text. Educators are therefore encouraged to model the application of these methods explicitly in digital contexts, thereby equipping learners with transferable skills for the contemporary information landscape.

6. Practical Recommendations for Educators

Effective classroom integration of SQ3R and INSERT requires deliberate pedagogical scaffolding. The following sequenced approach is recommended:

Modelling: The teacher first demonstrates the application of INSERT annotation or SQ3R question formulation using a shared text, making the cognitive processes visible and explicit.

Collaborative practice: Learners work in pairs or small groups to compare their INSERT annotations, responding to each other's "?" markers and discussing discrepancies in interpretation.

Reflective consolidation: At the close of the lesson, learners are invited to reflect on which strategy was most effective for their engagement with the particular text, fostering metacognitive awareness.

7. CONCLUSION

In an era defined by information abundance, the capacity to read with strategic depth, evaluative rigour, and critical awareness is of paramount importance. SQ3R and INSERT are not merely reading techniques; they are cognitive tools that enable learners to regulate their own comprehension and knowledge-building processes. Their disciplinary scope is not limited to language and literacy instruction: both methods are equally applicable in science, history, economics, and other fields where learners must engage critically with complex written material.

Reading, properly understood, is not the mere recognition of words on a page, but the active construction of meaning — the interpretation, evaluation, and integration of an author's ideas into the learner's existing knowledge framework. SQ3R and INSERT serve as reliable navigational instruments in this complex intellectual journey. Their consistent application fosters not only improved academic performance but also the enduring disposition towards lifelong learning that modern educational systems aspire to cultivate.

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PERSPECTIVES OF THE TURKESTAN JADIDS ON WOMEN'S RIGHTS AND EQUALITY

Abstract.
This article is about the views of Turkestan intellectuals of the late 19th and early 20th centuries on the issue of women, in particular the place and role of women in society, their level of literacy, the efforts made by the moderns in this regard, educating women, sending them to new method schools. views such as attraction are analyzed.

Key words: *Female teachers, modern schools, Sadriddin Ayniy, Fitrat, Behbudi, education.*

INTRODUCTION

The question of the status of women, their role in social life, and the conditions for their full and equal participation in the civic, intellectual, and political spheres is among the enduring concerns of any society undergoing modernization. In Uzbekistan today, this question has acquired renewed urgency, as the state pursues a deliberate policy of expanding women's access to education, securing their employment, and elevating their standing in socio-political life. Yet the impulse to reconsider the place of women in society is not new to the region. More than a century ago, at the turn of the nineteenth and twentieth centuries, the progressive intellectuals of Turkestan—the Jadids—confronted essentially the same problem, and they did so under conditions far more constraining than those of the present.

This article examines the views of the Turkestan Jadids on the equality of women, with particular attention to their conviction that the education of women was the indispensable precondition for the moral, intellectual, and social advancement of the nation as a whole. The relevance of the topic is twofold. First, the Jadids' reformist program offers a historically grounded illustration of how educational enlightenment and the emancipation of women were understood as inseparable. Second, recovering and analyzing these views, and introducing the relevant primary sources into scholarly circulation, contributes to a fuller understanding of the intellectual foundations of modern reformist thought in Central Asia.

To this end, the study draws upon the writings and pedagogical initiatives of leading figures of the movement—among them Ismoilbek Gasprinskiy, Mahmudxo'ja Behbudiy, Abdurauf Fitrat, Sadriddin Ayniy, Abdulla Avloniy, and Tavallo—as well as the publicistic debates carried in the periodical press of the time, notably the "Newspaper of the Turkestan Province." Through an analysis of these sources, the article seeks to demonstrate how the Jadids reframed the education and equality of women not as a marginal concern but as a central pillar of national renewal. In our country today, effective work is being carried out to enhance in every respect the role of women, their prestige in the life of society, their access to education, their employment, and the improvement of their status. Addressing the issue of women in his speeches, the President of the Republic of Uzbekistan, Sh. M. Mirziyoyev, expresses the following thoughts: "We consider it our most important task to continue the state policy of protecting the health of mothers and children, providing employment while taking into account the living conditions of women, creating every opportunity to ease the burdens of our sisters, and raising the role and prestige of women in our socio-political life" [1, 12]. These thoughts demonstrate that the comprehensive restoration of women's prestige and status is acquiring pressing significance. Nearly a century ago, in the land of Turkestan, the progressive Jadids—on this issue as on many others in the life of society—stood in the foremost ranks in raising the prestige of women in society, in their access to education and their rights, in changing the general view of and attitude toward women in society, and above all in educating them to become knowledgeable; and they became the cause of bringing these views to realization. Thus, just as the question of women's role in the life of society holds great importance in the present age, so too at the end of the nineteenth and the beginning of the twentieth century it stood out for its topicality. Studying and analyzing this situation, and introducing the views of our Jadids into scholarly circulation, remain pressing tasks even today.

If we cast a glance at the spiritual life of the region at the end of the nineteenth and the beginning of the twentieth century, the institution of the *otin* (female religious teacher), which had become widespread at that time, performed the function of primary education for girls; they were taught by *bibikhalifa* or *bibiotin*. During their school years, under the guidance of their *bibiotin*, girls mainly studied the "Haftiyak" and read two or three suras of the Qur'an. The other suras of the Qur'an were taught at home. The literature records the existence of a public opinion that held: "Knowledge is entirely superfluous for girls; teach girls sewing, cutting, and weaving, and set reading and writing aside." Only a few girls were taught to read, and in even rarer cases to write; the majority of girls were occupied mainly with daily devotions and prayer. In the schools of Turkestan, girls more often studied Persian and Turkic poetry and paid little attention to writing. With the completion of school, a girl's education came to an end. Although in some places there were schools for girls, parents would halt their daughters' education after just a year, usually giving them in marriage at a very young age. All of this was one of the distinctive features of

Turkestan's schooling and education at the end of the nineteenth and the beginning of the twentieth century.

In 1884, Ismoilbek Gasprinskiy opened a "usuli jadid" (new-method) school, and, publishing his ideas on reforming the educational system in the newspaper "Tarjimon," emphasized that one of the tasks that needed to be addressed by the educational system was the necessity of giving special attention to girls' education as well [2, 34].

The Jadids particularly emphasized that the upbringing of children lies in the hands of women. Sadriddin Ayniy expressed the following thought on this matter: "If a woman is brought up well and is literate, she will raise her child too, and make of him a person of progress" [3, 5]. In this upbringing, the mother—who deals with children more closely—holds decisive importance, and the Jadids acknowledged that a mother's careless attitude toward the upbringing of her child could lead to tragic consequences.

Abdurauf Fitrat held it necessary that women be educated and knowledgeable about health care and the upbringing of children, so that future generations would not grow up unconscious, lacking in will, ill-bred, ignorant, and benighted. He regarded upbringing as a most important social phenomenon and process, and stated in this regard: "The difficult task in the family is the upbringing of the child, which falls upon the shoulders of husband and wife after the infant's birth." In general, Fitrat's idea serves as the foundation of the Jadids' views on the question of the family: "The first upbringing (upbringing within the family) is considered the most important of all upbringing. Its influence becomes firmly fixed in a person's nature" [4, 89].

The Jadids strove to explain that the role and status of an educated woman in the family and in society is altogether different. The following can be learned from the sources on this matter: "...instruction is certainly necessary regarding the education of women, the refinement of their intellects, their conducting good relations with their husbands, and their knowing well how to bring up their children." In the new-method school of Eshonxo‘ja Xonxo‘jayev in Tashkent, three girls studied, and in the school of Sobirjon Rahimov, fifteen girls studied [5, 304]. In the G‘alchasoy neighborhood of the city of Qo‘qon, Muhammadjon Xoliqiy organized first a "usuli jadid" school and then also a school for girls in 1913. There, his sister Soliyaxon, daughter of Abduxolik, gave lessons to the pupils. In the school of Abdulla Avloniy as well, girls studied side by side with boys. In Tavallo's poem "In the Voice of Our Kindred and Fellow-Townswomen, the Oppressed Girls" [6, 67], the girls ask to be saved from "ruin" and from "reproach," to be educated, and to be granted freedom and liberty. They even raise the question of the family of the future, of equality, and of a happy, loving, and faithful married life.

In such circumstances, the advanced intellectuals of the era—such as Zuhriddin Fathiddinzoda, Rauf Muzaffarzoda, Abdulla Avloniy, Tavallo, Cho‘lpon, Ubaydullo, Hamza, Mirmuhsin, Nozimaxonim, and Laylixonim—wrote a series of articles on the pages of newspapers and journals of that time, emphasizing the spiritual, social, and political life of Uzbek women, their daily life, and the necessity of teaching them science, craft, and art.

Behbudiy, the father of the Turkestan Jadids, linked the opening of the nation's eyes and its liberation from the grip of age-old servitude, above all, to the development of the people's spiritual aspects [7, 12]. First, by establishing new Jadid schools that would teach religious and secular knowledge to perfection, to raise the children who are the nation's future to the level of perfection. Second, by founding journals to raise the consciousness of the masses. Third, by organizing theatrical troupes that would expose certain bad vices of the people and thereby cultivate them—this he set as his aim.

Showing the role of the family and the school in the upbringing of the child, Behbudiy stressed that it is necessary to pay attention also to children's physical and hygienic upbringing. He set forth such views in his article "Hifzi sihati oila" (Preserving the Health of the Family). He says that children must not be allowed to read amorous *ghazals* from a young age. Speaking especially of the upbringing of girls, he says that the utmost caution is needed in this. "Girls who have reached fourteen years of age must at this time be guided with the greatest care, and their outer and inner upbringing must be made to conform to the preservation of health and to the requirements of the *shariat*. In this case, girls must be protected from various foods that weaken the body, and must also be dressed in warm clothing" [8, 81–82]—he says in his article. Behbudiy advocates that, with the useless money spent on weddings and ceremonies, children be given over to the government schools, and that with this money students be sent to the universities and academies of Mecca and Medina, Egypt, Istanbul, and Russia, so as to raise religious, secular, and modern people.

In just a few issues of the "Newspaper of the Turkestan Province" [9, 131] from the single year 1908, and in subsequent years, debates were conducted on the question of the rights and education of local women—one of the principal problems of the socio-domestic life of Turkestan—in such publicistic articles as: the jurist, teacher, and poet Ibrohim Davron's "The True Word" (issue 37), Mirza Toshpo‘lat, son of Alimboy's "An Open Letter to Those Who Say That Women Should Be Given Rights Equal to Their Husbands" (issue 81), "The Old Bathhouse, the Old Basin," published under the signature "A Muslim" (issue 82), Imomali Buronov's "The Voiceless Woman" (issue 83), Fayzulloh's "Do Women Need Knowledge?" (1909, issue 62), "Women Are Not Equal to Men" (1912, issue 72), "Can a Woman Be a Qozi (Judge)?" (1912, issue 54), "What a Muslim Has Written Concerning Equality of Rights" (1913, issues 91–93), and "The Voice of the Muslims (Concerning the Granting of Equal Rights to Women)" (1914, issue 4).

Indeed, Ismoilbek Gasprinskiy too, in his work "Dorur-rohat," writes of the participation of the emir's wife Xadichabonu in the affairs of governing the state, and of women working in various positions such as that of *qozi* (judge), thereby showing that in their social activity women perform no less work than men [10, 68].

For this very reason, the Jadids called upon and urged Muslim women toward freedom, toward equality of rights, and thereby toward the path of progress, toward science, enlightenment, and the study of secular affairs—and this demonstrated the immeasurable nature of their services. Most importantly, their efforts to enable women to participate in public affairs on an equal footing with men and to take part in elections showed that the enlighteners of Turkestan were among the first in the countries of the East to strive for this.

CONCLUSION

The examination of the Jadids' views permits several conclusions. First, the Turkestan reformers regarded the education of women not as an end in itself but as the foundation of the nation's future: because the upbringing of children rests largely in the hands of mothers, an educated and conscious woman was understood to be the precondition for raising conscious, capable, and progressive generations. This idea, articulated by Ayniy and given systematic expression by Fitrat and Behbudiy, links the private sphere of family upbringing to the public destiny of the nation.

Second, the Jadids translated these convictions into concrete practice. The opening of new-method schools that admitted girls—in Tashkent, Qo‘qon, and elsewhere—and the founding of separate schools for girls, demonstrate that their advocacy was not confined to the pages of the press but extended to institution-building, however modest in scale and however hostile the surrounding environment.

Third, the periodical press served as the principal arena in which the question of women's rights was contested. The debates conducted in the "Newspaper of the Turkestan Province" reveal a society divided between those who denied women any need for knowledge or any claim to equality and those who argued, often boldly, for equal rights, for women's capacity to hold public office, and for their participation in civic and even electoral life.

Finally, and most significantly, the Jadids' aspiration that women might participate in public affairs and in elections on an equal footing with men placed the enlighteners of Turkestan among the first in the countries of the East to strive for such an aim. Their efforts toward the liberation, education, and equality of women constitute a contribution of immeasurable value—one whose significance is best appreciated against the conservatism of their age, and whose concerns continue to resonate in the present.

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PHYSICAL AND MATHEMATICAL SCIENCES

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NEW PRINCIPLE OF PHYSICS AND ASTROPHYSICS : MATTER STRIVES FOR MAXIMUM (OR MAXIMUMS) FORMATION

Matter strives for the formation of the maximum (or maximums) is the principle that is theoretically developed based on the knowledge obtained from research in astronomy and atomic physics and molecular physics. For many cosmic objects, matter is described by functions, functionals, or multiples with a maximum or maximums, or upper limit. The existince of principles of the least action being not neglected.

Key words*: planet, star, maximum*

1. Intoduction

A relatively recent discavery of exoplanets, that is the planets outside the Solar system [1-3] is an outstanding achievement of modern astrophysics. However, previous experimental data obtained in astronomy and atom physics alone allow the formulation of the new principle of physics even without this important discovery, while the general results of research in exoplanets and stars only support its validity.

2. Theoretical analysis

The distribution of the mass of matter in the Solar system is known from the results obtained by classical researches in astronomy [4, 5]. The major part of mass concentrated in Sun comprises 99.86 % and the rest of about 0.14 % of the system's total mass is distributed among the planets. The mass of Sun is $1.991\pm0.002*10^{30}$ kg, which is 333 000 times greater than the mass of Earth and 1 048 times more than Jupiter.

These correlations show the difference between the mass of Sun and the masses of planets of the Solar system. To speak generally, Sun is a sharp maximum in mass distribution throughout the Solar system among the star itself and the surrounding planets. The situation can be described in terms of matter striving to form the maximum, since the Solar system, as a cosmic and physical object, is created in such a way that it possesses an extremely vivid maximum of mass.

Now we return to the general results in research concerning exoplanets discovery [1-3] and information about stars known from astronomy [5, 6]. In most definitions, the star is described as a massive self-luminous celestial body of gas and plasma that shines by radiation derived from thermonuclear synthesis, which started at a certain stage of the star's evolution, with the power comparable with its luminescence. One of the main facts revealed about exoplanets is that their existence in cosmic space is characteristic. Up to now over 7 000 exoplanets have been found, which made possible a theoretical extrapolation about the availability of many more such objects in the Universe.

In the terms of classical interpritation, the shining star mass is much greater than the masses of planets it is surrounded by (i.e. exoplanets) or asteroids and meteorites, as well as particles of dust nebulae or molecules of gas nebulae. This is a typical situation in cosmic space and therefore the principle matter strives for the formation of maximum is true in space as a whole. However, for the most general case this formulation should be extended as follows: matter strives for the formation of maximum or maximums. Since the stars can be not only singular but also double or multiple the principle is described as:

matter → maximum (or maximums) formation (1)

The given formulation agrees with the cosmological history of the Universe described by the model of the Big Explosion. Since until the moment of the Big Bang all the matter was concentrated in one point of singularity, the matter strived to maximum, while after the Big Explosion and the expansion of Universe followed by formation of stars, matter strives for maximums because every single star can be put into correspondence with a maximum (or maximums) of mass.

This principle contains dialectic controversy between a single maximum and maximums describing the development and motion of matter, in which the law of unity and struggle of opposites is manifested.

However, in the case of the general situation, the above principle does not suggest that material bodies strive to turn into one (or several) points. It is implied that matter possesses a property, a capability to form the maximum of function (or functional) by which it is described. Therefore, as one of the possible brief description of such situation the following was proposed [7]:

matter ® maximum (or maximums) (2)

When considering more instances that support the suggested principle, we should mention an interesting case of spiral or elliptical galaxies with supermassive black holes in their center. The mass of each black hole is much greater than the mass of each of the star in the surrounding space. In this case the principle (1) concerns the distribution of these cosmic objects in the sense that the correlation between the black hole mass and the mass of the star also proves the validity of the principle. In this respect the case of galaxies with galactic nuclei in their centers is also of interest, even if the core does not contain a supermassive black hole.

The correlation between the total mass of the galactic core and remote separate stars, or the comparison of the matter average density in the galactic core and the remote part of the galaxy proves the validity of the proposed principle. Therefore, it should be noted that this principle can work not only for correlation of masses but also mass densities.

If we consider the theory of the Big Bang with respect to the principle suggested in our work, we should mention the hypothesis that most matter comprises initial black holes formed at a certain stage of the Universe evolution after the Big Bang.

The principle is correct also for objects which are composed of black hole surrounded by stars.

Thus, Universe is described as system with many, huge number of elements, i. e. number of maximums.

This principle also holds for the objects of atomic physics as well. At the initial stage in the history of researching the hydrogen atom as well as the other atoms, the Rezerford-Bohr atomic models of certain chemical elements were analogous in their structure to the Solar system [8] . It is important for the analysis carried out in this research that the mass of hydrogen atom is about 1840 times greater than the mass of electron, and for the atoms of other elements it is A*1840 times greater, where A is the atomic weight of a chemical element. Thus the nucleus of a chemical element atom is a sharp maximum in mass distribution between the nucleus and electrons in the atom, i.e. matter strives to form a maximum.

The model of atomic structure was further developed in quantum physics [9, 10]. It is interesting that the function of radial distribution of electron clouds for hydrogen atoms was found to possess maximums, that is, maximalism is peculiar to electron subsystems as well. The same peculiarities have been found for atoms of a number of other chemical elements. These facts are also proof of the correctness of the principle suggested in this work.

The principle also is correct for two-atoms, three-atoms etc. moleculars.

The given theory allows us to propose a new way of calculation of the state of physical objects [7]. The principle that matter strives to form a maximum suggests that the states of certain physical systems can be estimated from calculating an extreme (maximum) of its function or functional. What is more, this method of calculation can be applied not only for macrocosm but also for the objects of microcosm, at the same time all the peculiarities of the physical object under study should be taken into account.

The theory was first reported in ref. [11-13] and afterwards published in international journals [7, 14].

For certain biological objects the maximalistic principle that information strives for maximum was also found to hold true [15, 16]:

$$\text{infromation} \rightarrow \max \quad (3)$$

Similar principle reveals itself in the historical evolution of mankind as the process of accumulation of information to maximum [17, 18].

3. **Conclusion**

The principle matter strives for the formation of maximum or maximums is characteristic of many physical and astronomical objects in the Universe. Similar principle about the maximization of information is true for certain biological objects or systems. Thus, maximization processes play important impact in nature and deserve further attention for researchers.

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ECONOMIC SCIENCES

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FROM ALLIANCES TO AUTONOMY: SEOUL'S DIPLOMATIC MANEUVERING IN THE US CHINA RIVALRY

Summary.

This article examines South Korea's balancing strategy and strategic autonomy within the context of the U.S.China rivalry from political, economic, and military perspectives. The study demonstrates that Seoul's approach is structured around three main pillars: military-strategic cooperation, economic interdependence, and the preservation of diplomatic maneuverability. The U.S. alliance and joint military exercises provide national security guarantees, while economic ties with China and multilateral diplomatic engagements expand strategic maneuvering space and enable effective risk management in the global arena.

The article further analyzes statistical indicators from 2018 to 2022, highlighting trends in trade, defense spending, and diplomatic activities. The findings show a continuous increase in trade volume with China, sustained and growing joint military exercises with the United States, and intensified diplomatic visits and participation in multilateral forums. These indicators confirm that Seoul pursues a pragmatic and flexible policy to maintain strategic autonomy while managing risks amid U.S. China competition. Overall, South Korea's balancing strategy represents a model example at both regional and global levels, as it safeguards national interests and effectively manages relations with the United States and China. The article demonstrates both theoretically and practically how strategic autonomy and balancing strategies function in contemporary international relations.

Keywords: *South Korea, U.S.–China rivalry, balancing strategy, strategic autonomy, regional security, economic interdependence, diplomatic maneuver, pragmatic policy, risk management.*

Introduction

In the 21st century, the main line of transformation in the international relations system is the change in the global balance of power and the increasing strategic competition between the United States and China. This competition is no longer limited solely to military and economic spheres; it has acquired a multidimensional character, encompassing struggles over technological standards, supply chains, regional security architecture, and normative leadership. In such a context of systemic transformation, the foreign policy behavior of middle powers attracts particular analytical interest.

Within this context, South Korea (Seoul) stands out as a state that has shifted from a classical alliance policy to a more flexible and multi-vector strategy in a complex geopolitical environment. Historically, Seoul's security strategy has been built on a military alliance with the United States, with deterrence mechanisms on the Korean Peninsula as a primary priority. However, the deepening of global economic interdependence and China's emergence as South Korea's main trading partner have led to structural changes in Seoul's foreign policy.

The concept of "from alliances to autonomy" does not imply a complete renunciation of classic alliance dependence; rather, it reflects an effort to expand strategic autonomy and increase diplomatic maneuvering capacity. Against the backdrop of U.S.–China competition, Seoul simultaneously strengthens its security cooperation with Washington while seeking to maintain economic relations with Beijing and avoid direct confrontation. Politically, this can be explained through theoretical models such as "hedging" (strategic insurance), selective balancing, and functional differentiation. At the same time, the regional security environment particularly the North Korean factor exerts additional influence on Seoul's decision-making process. While this factor compels South Korea to continue military coordination with the U.S., it also requires consideration of the risks associated with deteriorating relations with China. Thus, Seoul's diplomatic maneuvers function more as a pragmatic strategy aimed at optimizing risks rather than choosing openly between power centers.

The purpose of this study is to analyze, from a political science perspective, Seoul's transformation from alliance-centered policy toward relative strategic autonomy in the context of U.S. China competition, evaluating the motivations, institutional instruments, and regional consequences of this process. The article will delineate the real limits of maneuvering in South Korea's foreign policy based on both theoretical frameworks and empirical diplomatic actions.

Main Body

In the second half of the 20th century, the Asia-Pacific region gained strategic significance in global politics, and the Korean Peninsula became a focal point for major powers. The geopolitical position of the Korean Peninsula provided a critical platform for both the U.S. and China's strategic interests. The Korean War of 1950 1953 highlighted this strategic significance more

clearly. The outcomes of the war were crucial for shaping South Korea's foreign policy directions and its military-strategic alliances with the United States. In the post-war period, U.S. military intervention not only ensured South Korea's security but also served to maintain the regional balance of power. South Korea strengthened its strategic alliances with the U.S., establishing military bases, modernizing weapons systems, and creating nuclear deterrence mechanisms. The U.S. presence in the region provided South Korea with rapid maneuvering opportunities, not only militarily but also diplomatically. These alliances created favorable conditions for South Korea to compete with other actors, particularly in response to China's increasing influence.

Since the late 20th century, China's economic rise and growing global influence have posed new challenges for South Korea's policy. China became South Korea's main trading partner and gained significant shares in the country's export and investment sectors. This economic interdependence allowed for strategic cooperation and balanced diplomatic maneuvering. Consequently, South Korea sought to form its foreign policy independently rather than solely relying on alliances with the U.S. This approach is considered a practical manifestation of strategic autonomy and enhances Seoul's global influence. Strategic autonomy occupies a central place in South Korea's diplomatic policy and ensures the country maintains a balanced position between the two great powers. Balancing U.S. South Korea alliances with economic cooperation with China is crucial for ensuring regional stability and protecting national interests.

Historically, South Korea's development of relations with the U.S. and China can be divided into two phases. The first phase covers the post-Korean War period, during which U.S. military support formed the foundation of South Korea's security policy. The second phase spans the late 20th and early 21st centuries, when economic and diplomatic relations with China became a priority in South Korea's strategy. This balancing policy integrates strategic flexibility, diplomatic maneuvering, and regional autonomy under conditions of U.S. China competition, thereby enhancing South Korea's international influence.

U.S. South Korea Alliances and Military-Strategic Cooperation. The alliance relationship between the United States and South Korea is considered one of the longest-standing and most institutionalized security partnerships in the contemporary international system. This alliance was established on the basis of the Mutual Defense Treaty signed in 1953, becoming a cornerstone of the post-war security architecture on the Korean Peninsula.

Legal and Institutional Foundations of the Alliance. The U.S. South Korea alliance is a classic military alliance model based on formal treaty obligations. According to the treaty, an armed attack against one party is considered an attack against the other. This mechanism forms the basis of deterrence policy.

Institutionally, cooperation is conducted through the following mechanisms:

1. Joint military command structures
2. Regular joint military exercises
3. Defense planning and operational coordination
4. Defense industry collaboration and technology transfer

This model represents an asymmetric alliance: the U.S., as a global military power, plays the role of a strategic umbrella, while South Korea functions as a key regional security partner.

Deterrence Strategy on the Korean Peninsula. The main objective of the alliance is to maintain stability on the Korean Peninsula and prevent potential threats. North Korea's nuclear and missile programs make Seoul Washington cooperation a strategic necessity.

The deterrence model is based on three main components:

1. U.S. military presence and extended nuclear umbrella
2. Joint operational preparedness and defense planning
3. Integration of missile defense systems

This system not only ensures South Korea's national security but also strengthens the U.S. position in the regional balance of power.

Military-Technological Cooperation. U.S. South Korea cooperation extends beyond a traditional military alliance to include high technology and the defense industry. Contemporary cooperation encompasses:

- Acquisition of advanced weapons systems
- Intelligence and information exchange
- Cybersecurity and space collaboration

This cooperation also promotes the development of South Korea's defense industry and enhances the country's regional military potential.

Alliance Transformation in the Context of U.S. China Competition. The US South Korea alliance is no longer limited to the Korean Peninsula; it is evaluated within the broader Indo-Pacific strategy. The US balancing policy against China in the region makes Seoul's strategic position more sensitive. In this context, South Korea, on the one hand, strengthens security cooperation with the US, and on the other hand, seeks not to disrupt economic relations with China. This leads to a functional transformation of the alliance and greater strategic coordination. The US South Korea alliance remains one of the main pillars of the regional security system. Its strength relies on legal foundations, institutional continuity, and military-technological integration. However, the intensification of US China competition may affect the future trajectory of the alliance. For Seoul, the main challenge is to expand strategic autonomy and maintain diplomatic maneuvering while preserving alliance commitments.

Historically, the US has played a decisive role in South Korea's foreign policy. The Korean War marked a turning point in the formation of the country's security policy. Post-war military agreements enabled the US to establish military bases in South Korea. In the post-war period, military-strategic cooperation agreements between the two states created mutual military and diplomatic obligations. The US military presence

not only provided defense but also offered diplomatic maneuvering options. During this period, South Korea established military bases, modernized weapons systems, and implemented nuclear protection mechanisms within strategic alliances with the US. US military support allowed South Korea to maneuver not only against North Korea but also with other actors, especially given China's growing influence. For example, joint military exercises and weapons agreements with the US enhanced South Korea's defense capabilities while providing strategic space to cooperate with China.

Military cooperation between South Korea and the US is not limited to physical defense. These alliances also encompass deep integration in technology and intelligence. US strategic advice, weapons technology transfer, intelligence sharing, and joint military programs provide Seoul not only with security but also strengthen its international diplomatic position.

Strategically, the US South Korea alliances are important for regional stability and maintaining the balance of power. The US presence in Asia, especially together with Japan in a trilateral military platform (US–Japan–South Korea), provides Seoul with diplomatic opportunities. This partnership allows South Korea not only to protect its national security but also to increase its strategic influence in the region. US support provides Seoul with integration opportunities into multilateral military alliances and international diplomatic platforms. This enables South Korea to maintain a flexible and influential position in the international arena. By both preserving US strategic support and conducting diplomatic maneuvering, the country plays a more effective role in global politics.

Within the framework of military-strategic cooperation, South Korea conducts joint military exercises with the US, modernizes weapons systems, and develops defense technologies. For example, recent joint exercises have increased South Korea's military capabilities while providing opportunities to maintain balanced relations with China and North Korea. US–South Korea alliances also cover nuclear security cooperation, which helps minimize military threats in the region. The alliances also serve to preserve South Korea's strategic autonomy. They provide the country with maneuvering capabilities in regional politics while allowing it to develop economic and diplomatic relations with Beijing. By maintaining the strategic support provided by the US, Seoul implements a balanced policy by engaging in cooperation and economic ties with China.

China-South Korea Economic and Diplomatic Relations and the Balancing Strategy. Relations between South Korea and China have become among the most dynamic and sensitive in the Asia-Pacific region in the 21st century. China is not only South Korea's main trading partner but also an important actor in regional security and diplomatic processes. Against the backdrop of U.S. China competition, these relations constitute a key pillar of Seoul's balancing strategy.

Economic Interdependence and Structural Features. China holds a leading position in South Korea's export markets. Mutual trade is particularly high in semiconductors, electronics, automotive industries, and chemical products.

Structurally, these relations are characterized by:

1. High interdependence: integration in production and supply chains
2. Sectoral concentration risk: excessive reliance on the Chinese market in certain sectors
3. Cooperation within regional economic mechanisms: participation in multilateral economic frameworks

While this model can be explained through liberal interdependence theory, in practice, economic dependence may also become a tool of political influence.

THAAD Crisis and Economic Pressure Mechanism. In 2017, the deployment of the U.S. THAAD missile defense system in South Korea was perceived by China as a threat to the regional security balance. Beijing applied economic and informal sanction-like pressures on Seoul. This event demonstrated that:

- Economic interdependence can become a unilateral vulnerability;
- Diplomatic decisions can produce economic consequences;
- Balancing policy must also include an economic security dimension.

The THAAD crisis led Seoul to place greater emphasis on economic diversification in subsequent periods.

Diplomatic Relations and Regional Role. China is a key mediator in maintaining stability on the Korean Peninsula and addressing North Korea-related issues. Consequently, Seoul attaches special importance to keeping diplomatic channels with Beijing open. The main directions of diplomatic relations include: high-level political dialogue; regional security discussions; economic cooperation forums; coordination within multilateral mechanisms. For Seoul, a shift to full confrontation with China is considered risky for regional stability.

Essence of the Balancing Strategy. South Korea's policy toward China is not open bandwagoning but rather corresponds to a "hedging" or selective balancing model. The main features of this strategy are:

- Preservation of economic cooperation;
- Cautious diplomatic rhetoric on security issues;
- Maintenance of the military alliance with the U.S.;
- Avoidance of open geopolitical confrontation with China.

This approach is a pragmatic policy aimed at protecting Seoul's economic interests while minimizing security risks.

Analytical Assessment. Economic and diplomatic relations with China hold structural significance in South Korea's foreign policy. However, the deepening U.S.–China competition may limit Seoul's maneuvering space. In particular, technological restrictions, geopolitical pressures on the semiconductor industry, and regional security crises test the sustainability of the balancing policy. Consequently, South Korea favors a model of pragmatic cooperation and risk-sharing with China. While this policy may appear effective in the short term, in the long term it may require new strategic

choices depending on the level of global systemic bloc formation.

Since the late 20th century, China has played a central role in South Korea's foreign policy. The increase of China's global influence has compelled South Korea not only to maintain U.S. military alliances but also to develop trade and diplomatic cooperation with China. China is South Korea's main trading partner and holds a significant share in import-export activities. This economic dependence has created opportunities for strategic cooperation between the two countries and enabled the implementation of a balancing policy amid U.S. China competition. China is a major trading partner for South Korea in technology, industry, and service sectors. China serves as a main market for South Korea's exports, particularly in the automotive, machinery, and chemical industries. According to statistics, 25–30% of South Korea's total trade volume is conducted with China, highlighting Beijing's strategic importance in Seoul's economic policy.

Moreover, diplomatic relations with China also increase strategic maneuvering capabilities. South Korea actively participates in diplomatic negotiations and multilateral forums with Beijing, such as ASEM (Asia–Europe Meeting) and ASEAN+3 platforms. These platforms allow Seoul to strengthen its regional diplomatic influence and maintain a balanced position amid U.S. China competition. Economic cooperation with China also encompasses investment and infrastructure projects, providing Seoul with strategic advantages in domestic economic development and regional integration.

South Korea's balancing policy is based on maintaining military security through the U.S. while developing diplomatic and economic relations with China. This strategy provides South Korea with rapid maneuvering capabilities both regionally and globally, enabling it to maintain balance between the two great powers and preserve regional stability.

By developing economic relations with China, South Korea increases both trade revenues and diplomatic influence. Economic cooperation with Beijing enables South Korea to maintain a flexible and influential position in international politics amid U.S. China competition. Historical examples show that South Korea practices a maneuvering policy that considers both sides in U.S. China competition. In the 2000s, Seoul expanded trade and investment with China while continuing military-strategic cooperation with the U.S. This balanced policy serves both national interests and regional stability. South Korea's diplomatic relations with Beijing are not limited to economic cooperation but also include political coordination and engagement on multilateral platforms. The country carries out strategic agreements with China in energy, technology, trade, and investment, providing Seoul with strategic autonomy and diplomatic maneuvering capacity amid U.S. China competition.

Balancing Strategy and Strategic Autonomy. The balancing strategy that South Korea implements in the context of US China competition is a pragmatic policy example aimed at minimizing risks in the country's relations with both power centers. This strategy is not limited to military and economic spheres; it also aims to expand diplomatic maneuvering opportunities, protect regional influence, and enhance strategic autonomy.

The essence of the balancing strategy. The balancing strategy (balancing/hedging) in Seoul's foreign policy is characterized by the following main principles:

1. **Management of security and economy in separate spheres.** Military alliance and security cooperation with the US are prioritized; economic interdependence with China is maintained, and cooperation continues in strategic trade areas.

2. **Selective and flexible diplomacy.** Open messages are sent to both sides on global and regional issues; global bloc formation and open geopolitical confrontation are avoided as much as possible.

3. **Functional differentiation**. The security domain is oriented toward the US, while economic and diplomatic spheres are coordinated with China; This approach ensures the distribution of risks and expansion of maneuvering opportunities.

Elements of strategic autonomy. South Korea's strategic autonomy is the long-term goal of its balancing policy. Autonomy encompasses the following components:

- Strategic decision-making independence Seoul makes its decisions within national priorities while considering the interests of both parties;
- Diplomatic maneuvering capabilities it can express its position through multilateral forums, regional mechanisms, and international organizations;
- Security maneuvers maintaining the alliance with the US while avoiding confrontation with China as much as possible;
- Economic diversification increasing ties with other regional and global markets while maintaining dependence on China.

Strategic outcomes. The balancing strategy and strategic autonomy provide Seoul with the following advantages:

1. Security assurance maintained through the military alliance with the US;
2. Economic resilience interdependence with China is preserved, and trade and investment flows continue;
3. Diplomatic flexibility maneuvering opportunities in regional and global issues are expanded;
4. Optimization of strategic maneuvers ensures the balance of risks and influence capabilities.

However, the deepening US–China competition and the growth of technological, economic, and military blocs may limit Seoul's strategic autonomy. Therefore, the effectiveness of the balancing strategy will directly depend on future structural changes in the global system and the security environment in the region. In Seoul's foreign policy, the balancing strategy aims to maintain a balanced position between the US and China and protect national interests. The concept of strategic autonomy is central to this policy. South Korea maintains military alliances with the US while expanding

economic and diplomatic relations with China, ensuring both regional stability and maximum protection of national interests.

The historical roots of the balancing strategy go back to the second half of the 20th century. Military agreements signed with the US after the Korean War provided the country with military security guarantees.

Seoul employs several strategic tools when implementing the balancing policy. First, maintaining military alliances with the US and integrating advanced military technologies. The country conducts joint military exercises with the US, modernizes weapon systems, and shares intelligence data. This increases South Korea's defense capability and creates strategic opportunities for diplomatic maneuvers with China.

Second, developing economic and diplomatic relations with China. South Korea expands investment initiatives, trade agreements, and infrastructure projects with China. This not only brings economic revenue but also increases diplomatic influence and allows a balanced position in US China competition. Cooperation with China also provides advantages in energy, technology, and industry sectors.

The concept of strategic autonomy functions as a core principle in Seoul's balancing policy. Beyond alliances, it strives to protect national interests to the fullest. This strengthens South Korea's position. Practical manifestations of the balancing policy are observed in various spheres. While continuing military alliances with the US, South Korea undertakes economic cooperation projects with China, such as joint technological innovation initiatives and energy and infrastructure collaborations. This approach provides both economic and diplomatic advantages. South Korea's balanced policy serves as a model for other regional states, protecting national interests and contributing to regional stability.

A key component of the balancing policy is diplomatic maneuvering. South Korea actively participates in multilateral diplomatic platforms under ASEAN+3, ASEM, and the UN, allowing it to increase international influence and maintain a balanced position between the two global powers. Strategic autonomy and the balancing policy strengthen South Korea's position not only regionally but also on the global economic and diplomatic stage. By developing economic ties with Beijing while maintaining US military support, the country maintains a flexible and influential global stance.

Regional and Global Analysis. Understanding South Korea's foreign policy in the context of US–China competition requires analysis at both regional and global levels. These levels more clearly show the opportunities and limitations of Seoul's balancing strategy.

Regional Analysis. The regional environment for South Korea includes several key sources of threat and opportunity:

1. **North Korea factor.** North Korea's nuclear and ballistic missile programs are central to South Korea's security strategy. The US nuclear umbrella and joint military exercises provide deterrence, while China plays a mediating role in this area.

2. **US–China regional competition.** Within the Indo-Pacific strategy, the US position in the region emphasizes Seoul as a strategic partner. China seeks to balance Seoul through economic dependence and regional influence.

3. **Regional multilateral mechanisms**. Platforms such as ASEAN, ASEM, and Six-Party Talks provide Seoul with diplomatic maneuvering opportunities. Through these mechanisms, South Korea can expand cooperation with various partners in both security and economic domains.

As a result, at the regional level, Seoul maintains military-strategic ties with the US while balancing diplomatic and economic relations with China. This serves to preserve strategic autonomy.

Global Analysis. South Korea also shapes its policy within the framework of global power balance:

1. **Global economic interdependence.** China and the US are key partners for South Korea in global trade and technology chains. Its semiconductor, electronics, and automobile industries are integrated into global markets.

2. **Global security and normative environment.** The alliance with the US strengthens South Korea's global military-strategic position. At the same time, China's growing global influence and regional diplomatic activity force Seoul to expand maneuvering capabilities.

3. **Bloc formation and global competition risks.** The technological and economic bloc nature of US China competition may limit Seoul's balancing options at the global level. Strategic autonomy is directly affected by structural changes in the global system.

Strategic Outcome of Regional and Global Analysis. Distribution of maneuvering opportunities: Seoul seeks to optimize its diplomatic and economic maneuvers at both regional and global levels. Risk diversification: military cooperation with the US and economic cooperation with China are balanced. Preservation of strategic autonomy: South Korea pursues a pragmatic strategy that shares risks while considering regional and global pressures. Thus, analysis at regional and global levels shows that Seoul's balancing strategy is not determined solely by local or bilateral factors but also adapts to global power transformations and multidimensional security–economic interdependence.

Regional and global context is of critical importance in South Korea's foreign policy. In a period when US China strategic competition creates instability and tension in the Asia-Pacific region, Seoul's balanced diplomatic policy plays a vital role in maintaining regional stability. South Korea not only protects its national interests but also strengthens multilateral cooperation in the region, asserting influence in global politics. The geopolitical context of the Asia-Pacific region directly affects South Korea's policy. Maintaining strategic balance among powers such as Japan, China, Russia, and the US is essential for economic and military stability in the region. South Korea maintains military alliances with the US while developing economic and diplomatic relations with China to preserve regional

balance, providing strategic flexibility and maneuvering opportunities.

South Korea's regional influence is not limited to relations with the US and China. The country actively participates in multilateral platforms such as ASEAN+3, ASEM, and the Shanghai Cooperation Organization. These platforms allow Seoul to assert influence in regional politics, expand trade and diplomatic relations, and maintain a balanced position in US China competition.

Regional analysis shows that South Korea employs a flexible maneuvering policy in the US China competition to minimize regional instability. While maintaining US military support, it expands economic and diplomatic ties with China. This approach protects South Korea's national interests and maintains regional strategic balance. Globally, South Korea's balanced policy plays a significant role in international economic and diplomatic relations. By developing economic cooperation with Beijing and maintaining military-strategic alliances with the US, Seoul positions itself flexibly and influentially on the global stage. In the US China competitive context, South Korea defends its interests in multilateral diplomatic platforms, participates in global trade and investment projects, and strengthens regional integration.

Relations with other Asian states are also crucial for South Korea's regional policy. Economic and diplomatic cooperation with Japan, strategic balance with China, and energy and security relations with Russia provide Seoul with regional maneuvering capabilities. Regional and global analysis can also be conducted through economic indicators. Approximately 25–30% of South Korea's total trade is conducted with China, while military-strategic cooperation with the US accounts for 15–20% of the country's defense expenditures.

Statistical Analysis. Evaluating South Korea's balancing strategy in the context of US China competition with statistical indicators allows concrete measurement of regional and global relations. Statistical analysis focuses on three areas: trade and economic interdependence, military-strategic cooperation, and diplomatic engagement intensity.

Economic interdependence. South Korea's foreign trade structure clearly shows the level of engagement with the US and China:

Year	Trade with China (billion USD)	Trade with US (billion USD)	China Trade Share (%)	US Trade Share (%)
2018	242	143	25.3	15.0
2019	238	139	24.9	14.5
2020	236	141	25.1	15.0
2021	279	151	26.7	14.5
2022	285	158	27.0	15.0

Analysis:

•China remains the dominant partner in South Korea's imports and exports;

•Trade with the US is more stable and at a lower level;

• This interdependence strengthens Seoul's balancing policy in the economic sphere.

Military-strategic cooperation. Joint military exercises and defense spending with the US reflect the security component of balancing:

Year	Defense Budget (billion USD)	Joint Exercises with US (count)
2018	41.9	12
2019	43.0	11
2020	45.7	10
2021	48.0	13
2022	50.5	14

Analysis:

1. The defense budget shows consistent growth alongside US military support;

2. The number of joint exercises indicates Seoul continues to maintain the alliance with the US;

3. This demonstrates a solid security framework for preserving strategic autonomy.

Diplomatic engagement intensity. Seoul's diplomatic visits to China and participation in multilateral forums show the diplomatic dimension of the balancing policy:

Year	High-Level Visits (China)	Participation in Multilateral Forums (count)
2018	5	8
2019	6	9
2020	4	7
2021	5	10
2022	7	11

Analysis:

- Diplomatic visits and forum participation have increased;
- This shows Seoul's efforts to expand maneuvering opportunities both regionally and globally;
- Diplomatic activity proceeds in parallel with economic and military balancing.

Overall analysis of statistical results:

- **Economic domain**: high interdependence with China forms the main basis for strategic maneuvers;
- **Security domain**: alliance and military cooperation with the US ensure Seoul's strategic protection;
- **Diplomacy**: multilateral and bilateral efforts strengthen the balancing policy.

Thus, statistical indicators confirm that South Korea's balancing strategy is systematically and pragmatically applied across economic, military, and diplomatic domains. In the context of US China competition, Seoul's strategic autonomy is measurable and demonstrable through concrete results. Analyzing economic, military, and diplomatic indicators is essential to understanding the effectiveness of South Korea's balanced policy with the US and China.

1. Trade and Economic Relations

Approximately 25–30% of South Korea's total trade is with China. China is the main export market, with particular shares in automotive, electronics, chemical, and industrial products. For example, in 2023, about 28% of South Korea's total exports were directed to China, demonstrating the strategic significance of economic cooperation. The US, as a military-strategic partner, plays a key role in maintaining economic competition and security balance. Military alliances with the US account for about 15–20% of South Korea's defense expenditures while providing regional maneuvering opportunities. This economic and military balance enables South Korea to maintain a neutral position in US–China competition.

2. Military Security and Strategic Defense

Joint military exercises, modernization of weapons systems, and intelligence sharing with the US reflect strategic integration. For example, recent "Ulchi Freedom Guardian" and "Foal Eagle" exercises enhance South Korea's military capabilities and allow balanced diplomatic maneuvers with China and North Korea. US military support provides South Korea with nuclear security and strategic advantage in the region, forming the core of its national security strategy and expanding maneuvering capacity in US China competition.

3. Diplomatic Meetings and International Organizations

South Korea maintains balance between the US and China while actively participating in multilateral diplomatic platforms. Meetings under ASEAN+3, ASEM, and the UN allow Seoul to assert influence in regional politics and increase diplomatic leverage. In 2022–2024, South Korea held a series of bilateral and multilateral diplomatic meetings with Beijing and Washington, reaching strategic agreements in economic and security spheres. These meetings aim to protect national interests and ensure regional stability. Expansion of maneuvering opportunities, preservation of strategic autonomy, and development of multilateral cooperation are carried out through these diplomatic engagements.

4. Comparative Analysis

Comparing South Korea's balanced policy with other Asian states is useful. For example, Japan relies more heavily on military alliances with the US and has less maneuvering capacity in economic relations with China. South Korea, while maintaining US military support, develops economic and diplomatic relations with China, providing a more flexible regional and global stance. Military and economic statistics show that South Korea uses strategic resources effectively. Planning military expenditures in coordination with the US, securing trade revenues from China, and conducting diplomatic meetings on multilateral platforms allow Seoul to protect national interests and ensure regional stability.

Future Perspectives

The future of South Korea's balancing policy is closely linked to US–China competition. Geopolitical changes in the region, particularly economic dependence on China and maintaining military alliances with the US, create new opportunities to further enhance strategic autonomy. As of 2025, economic partnership programs, especially trade and investment ties with China, strengthen the country's overall economic security, while joint military exercises and technology transfers with the US expand diplomatic maneuvering options. Regional security positions regarding North Korea will continue to shape balancing policy. As US China competition intensifies, South Korea will maintain defense and strategic cooperation with the US while continuing mutually beneficial economic, trade, and investment projects with China. In the coming decade, South Korea will maintain its "middle power" status and actively participate in regional cooperation initiatives, Asia-Pacific security mechanisms, and bilateral economic projects. This will enable the country to protect national interests, maintain regional stability,

and preserve strategic balance amid US China competition.

Effectiveness of the Balancing Strategy

Seoul's balancing strategy is based on hedging or selective balancing principles. This approach allows South Korea to protect national interests, optimize relations with both major powers, and minimize confrontation risks.

Military-strategic domain: long-term alliance with the US ensures Seoul's security umbrella. Joint military exercises, increased defense spending, and advanced technology transfers, particularly the integration of the THAAD system, strengthen strategic deterrence. The US alliance is the most reliable mechanism for security assurance in Seoul.

Economic domain: interdependence with China ensures economic resilience. Increasing trade volumes, especially high interdependence in semiconductors and automotive industries, compel Seoul to maintain cooperation with China. The THAAD crisis demonstrated that economic dependence can become a political pressure tool. Therefore, Seoul treats economic diversification and diplomatic maneuvers as strategically important.

Diplomatic domain: keeping diplomatic channels open expands maneuvering opportunities regionally and globally. Active participation in multilateral platforms such as ASEAN, Six-Party Talks, and ASEM is a crucial tool of the balancing strategy. Diplomatic activity mitigates pressures from US China competition and enhances regional leadership opportunities for Seoul.

Statistical analyses confirm the effectiveness of this approach. Between 2018–2022, trade volumes with China increased, joint exercises with the US continued, and diplomatic visits intensified. This shows that South Korea maintains strategic balance across economic, military, and diplomatic domains while expanding autonomy.

Strategic Autonomy and Maneuvering Capabilities. Seoul's strategic autonomy is the target point of the balancing strategy. Strategic autonomy provides South Korea not only with decision-making independence within national interests but also expands maneuvering opportunities at regional and global levels.

Military domain: security assurance is maintained through the US alliance. This enhances South Korea's ability to maintain strategic autonomy against North Korea and other regional threats.

Economic domain: high interdependence with China is preserved, but Seoul works on economic diversification and access to new markets. This forms the basis for risk-sharing and protection of autonomy.

Diplomatic domain: active participation in multilateral platforms strengthens Seoul's regional leadership and position against global pressures. Diplomatic flexibility provides maneuvering opportunities and enables a more balanced and pragmatic policy in relations with the US and China.

Preservation of strategic autonomy depends on regional and global risks. Deepening US–China competition, technological bloc formation, and global economic interdependence may limit Seoul's maneuvering capabilities. Therefore, the balancing strategy requires continuous adaptation and risk forecasting.

Regional and Global Perspective. At the regional level, Seoul's balancing policy is shaped under the influence of North Korea's nuclear program, the US China rivalry, and multilateral diplomatic mechanisms. South Korea maintains its alliance with the US while continuing economic and diplomatic cooperation with China. This is crucial for preserving strategic autonomy.

At the global level, the US–China rivalry, technological blocs, and global trade chains define South Korea's balancing opportunities. Global economic and security transformations make it necessary for Seoul's strategy to be adaptive. Statistical indicators also show that Seoul maintains a systematic balance in economic, military, and diplomatic fields: trade volume with China rose from 242 to 285 billion USD between 2018–2022; the number of joint military exercises with the US remained stable, demonstrating security assurance; the intensity of diplomatic visits and participation in multilateral forums increased. These trends confirm Seoul's balancing strategy at theoretical, factual, and practical levels.

Analytical Assessment and Future Perspective. Seoul's balancing strategy has a pragmatic character and is aimed at distributing risks. However, the deepening US China rivalry, especially in technological and military domains, may limit South Korea's strategic autonomy. Therefore:

1. Economic diversification and access to new markets carry strategic importance;
2. Maintaining the alliance with the US ensures the security framework, but diplomatic dialogue with Beijing must also proceed in parallel;
3. Active participation in regional multilateral platforms increases Seoul's maneuvering opportunities and ensures the continuity of the balancing policy.

In the future, the main challenge for South Korea will be the new forms of US China competition and the impact of global bloc formations. Preserving strategic autonomy while optimizing maneuvering opportunities will remain the key factor ensuring the sustainability of the balancing strategy.

In conclusion, South Korea's balancing strategy and strategic autonomy model under the US–China rivalry is an exemplary pragmatic policy at both regional and global levels. Unlike classic alliance dependence, Seoul's policy is a flexible approach aimed at balancing risks in military, economic, and diplomatic domains and safeguarding strategic independence.

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PHILOLOGICAL SCIENCES

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GENERAL CHARACTERISTICS OF SHORT STORY AS A LITERARY GENRE

Annotatsiya:
Ushbu maqolada qisqa hikoya adabiy janri sifatidagi umumiy xususiyatlari tahlil qilinadi. Maqolada qisqa hikoyaning asosiy belgilari, jumladan, qisqalik, syujetning yaxlitligi, cheklangan sonli qahramonlar va bitta voqea yoki ziddiyatga e'tibor qaratilishi ko'rib chiqiladi. Shuningdek, janrning strukturaviy va uslubiy jihatlari, ya'ni hikoya qilish texnikasi, xarakterlar tasviri, makon va mavzu tahlil qilinadi. Maxsus e'tibor qisqa hikoyaning badiiy va estetik funksiyalari, shuningdek, ijtimoiy, psixologik va madaniy haqiqatlarni aks ettirishdagi o'rniga qaratiladi. Maqola qisqa hikoyaning zamonaviy va jahon adabiyotidagi ahamiyatini yoritadi.

Annotation:
This article examines the general characteristics of the short story as a literary genre. It analyzes the defining features of the short story, including brevity, unity of plot, limited number of characters, and concentration on a single event or conflict. The article also explores the structural and stylistic elements of the genre, such as narrative technique, characterization, setting, and theme. Special attention is paid to the artistic and aesthetic functions of the short story, as well as its role in reflecting social, psychological, and cultural realities. The study highlights the significance of the short story in the development of world literature.

Аннотация:
В данной статье анализируются общие характеристики короткого рассказа как литературного жанра. Рассматриваются основные признаки короткого рассказа, включая краткость, целостность сюжета, ограниченное число персонажей и сосредоточенность на одном событии или конфликте. Также исследуются структурные и стилистические особенности жанра, такие как техника повествования, характеристика персонажей, пространство и тема. Особое внимание уделяется художественным и эстетическим функциям короткого рассказа, а также его роли в отражении социальных, психологических и культурных реалий. Статья подчеркивает значение короткого рассказа в современной и мировой литературе.

Kalit so'zlar: *qisqa hikoya, adabiy janr, hikoya tuzilmasi, syujet, xarakterizatsiya, mavzu, qisqalik, badiiy xususiyatlar, adabiy tahlil, jahon adabiyoti.*

Key words: *short story, literary genre, narrative structure, plot, characterization, theme, brevity, artistic features, literary analysis, world literature.*

Ключевые слова: *короткий рассказ, литературный жанр, структура повествования, сюжет, характеристика персонажей, тема, краткость, художественные особенности, литературный анализ, мировая литература.*

INTRODUCTION

A short story is a piece of prose fiction, which can be read in a single sitting. Emerging from earlier oral storytelling traditions in the 17th century, the short story has grown to encompass a body of work so diverse as to defy easy characterization[1]. At its most prototypical the short story features a small cast of named characters, and focuses on a self-contained incident with the intent of evoking a "single effect" or mood. [2] In doing so, short stories make use of plot, resonance, and other dynamic components to a far greater degree than is typical of an anecdote, yet to a far lesser degree than a novel. While the short story is largely distinct from the novel, authors of both generally draw from a common pool of literary techniques.

Short stories have no set length. In terms of word count there is no official demarcation between an anecdote, a short story, and a novel. Rather, the form's parameters are given by the rhetorical and practical context in which a given story is produced and considered, so that what constitutes a short story may differ between genres, countries, eras, and commentators. Like the novel, the short story's predominant shape reflects the demands of the available markets for publication, and the evolution of the form seems closely tied to the evolution of the publishing industry and the submission guidelines of its constituent houses.

The short story has been considered both an apprenticeship form preceding more lengthy works, and a crafted form in its own right, collected together in books of similar length, price, and distribution as novels. Short story writers may define their works as part of the artistic and personal expression of the form. They

[1] https://en.wikipedia.org/wiki/Short_story

[2] Poe, Edgar Allan (1984). Edgar Allan Poe: Essays and Reviews. Library of America. pp. 569–77.

may also attempt to resist categorization by genre and fixed formation.

RESEARCH METHODOLOGY AND LITERATURE REVIEW

Determining what exactly separates a short story from longer fictional formats is problematic. A classic definition of a short story is that one should be able to read it in one sitting, a point most notably made in Edgar Allan Poe's essay "Thomas Le Moineau (Le Moile)" (1846). Interpreting this standard nowadays is problematic, since the expected length of "one sitting" may now be briefer than it was in Poe's era. Other definitions place the maximum word count of the short story at anywhere from 1,000 to 4,000. In contemporary usage, the term short story most often refers to a work of fiction no shorter than 1,000 and no longer than 20,000 words.Stories of fewer than 1,000 words are sometimes referred to as "short short stories",[3] or "flash fiction."

As a point of reference for the genre writer, the Science Fiction and Fantasy Writers of America define short story length in the Nebula Awards for science fiction submission guidelines as having a word count of fewer than 7,500.

Longer stories that cannot be called novels are sometimes considered "novellas" or novelettes and, like short stories, may be collected into the more marketable form of "collections", often containing previously unpublished stories. Sometimes, authors who do not have the time or money to write a novella or novel decide to write short stories instead, working out a deal with a popular website or magazine to publish them for profit.

As a concentrated form of narrative prose fiction, the short story has been theorised through the traditional elements of dramatic structure: exposition (the introduction of setting, situation and main characters), complication (the event that introduces the conflict), rising action, crisis (the decisive moment for the protagonist and his commitment to a course of action), climax (the point of highest interest in terms of the conflict and the point with the most action) and resolution (the point when the conflict is resolved). Because of their length, short stories may or may not follow this pattern. For example, modern short stories only occasionally have an exposition, more typically beginning in the middle of the action (*in medias res*). As with longer stories, plots of short stories also have a climax, crisis, or turning point. However, the endings of many short stories are abrupt and open and may or may not have a moral or practical lesson. As with any art form, the exact characteristics of a short story will vary by creator. Short stories tend to be less complex than novels. Usually a short story focuses on one incident; has a single plot, a single setting, and a small number of characters; and covers a short period of time. The modern short story form emerged from oral story-telling traditions, the brief moralistic narratives of parables and fables, and the prose anecdote, all of these being forms of a swiftly sketched situation that quickly comes to its point. With the rise of the realistic novel, the short story evolved in a parallel tradition, with some of its first distinctive examples in the tales of E. T. A. Hoffmann.

RESULTS AND ANALYSYS

The character of the form developed particularly with authors known for their short fiction, either by choice (they wrote nothing else) or by critical regard, which acknowledged the focus and craft required in the short form. An example is Jorge Luis Borges, who won American fame with "The Garden of Forking Paths", published in the August 1948 *Ellery Queen's Mystery Magazine*. Another example is O. Henry (author of "Gift of the Magi"), for whom the O. Henry Award is named. Other of his most popular, inventive and most often reprinted stories (among over 600) include: *A Municipal Report*, *An Unfinished Story*, *A Blackjack Barginer*, *A Lickpenny Lover*, *Mammon and the Archer*,*Two Thanksgiving Day Gentlemen*, *The Last Leaf*. American examples include: Jack London, Ambrose Bierce, F. Scott Fitzgerald, Ernest Hemingway, William Faulkner, Flannery O'Connor, John Cheever, and Raymond Carver. Science fiction short story with a special poetic touch was a genre developed with great popular success by Ray Bradbury. The genre of the short story was often neglected until the second half of the 19th century. The evolution of printing technologies and periodical editions were among the factors contributing to the increasing importance of short story publications. Among others, pioneering role in founding the rules of the genre in the Western canon have: Rudyard Kipling(United Kingdom), Anton Chekhov (Russia), Guy de Maupassant (France), Manuel Gutiérrez Nájera (Mexico) and Rubén Darío (Nicaragua). An important theoretical example for storytelling analysis is provided by Walter Benjamin in his illuminated essay *The Storytelle* where he argues about the decline of storytelling art and the incommunicability of experiences in the modern world[4]. Oscar Wilde's essay *The Decay of Lying* and Henry James's *The Art of Fiction* are also partly related with this subject.

Short stories date back to oral storytelling traditions which originally produced epics such as Homer's *Iliad* and *Odyssey*. Oral narratives were often told in the form of rhyming orrhythmic verse, often including recurring sections or, in the case of Homer, *Homeric epithets*. Such stylistic devices often acted as mnemonics for easier recall, rendition and adaptation of the story. Short sections of verse might focus on individual narratives that could be told at one sitting. The overall arc of the tale would emerge only through the telling of multiple such sections.

CONCLUSION

In Europe, the oral story-telling tradition began to develop into written stories in the early 14th century, most notably with Geoffrey Chaucer's *Canterbury Tales* and Giovanni Boccaccio's *Decameron*. Both of these books are composed of individual short stories

3 *Deirdre Fulton (2008-06-11).* "Who reads short shorts?". *thePhoneix.com*. Retrieved2013-06-06. *each of their (less-than-1000-word) stories*

[4]Short Story in Jacob E. Safra e.a., The New Encyclopædia Britannica, 15th edition, Micropaedia volume 10, Chicago, 1998.

(which range from farce or humorous anecdotes to well-crafted literary fictions) set within a larger narrative story (a frame story), although the frame-tale device was not adopted by all writers. At the end of the 16th century, some of the most popular short stories in Europe were the darkly tragic "novella" of Matteo Bandello (especially in their French translation).

The mid-17th century in France saw the development of a refined short novel, the "nouvelle", by such authors as Madame de Lafayette. In the 1690s, traditional fairy tales began to be published (one of the most famous collections was by Charles Perrault). The appearance of Antoine Galland's first modern translation of the *Thousand and One Nights* (or*Arabian Nights*) (from 1704; another translation appeared in 1710–12) would have an enormous influence on the 18th-century European short stories of Voltaire, Diderot and others.

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ARTIFICIAL INTELLIGENCE THROUGH THE LENS OF COGNITIVE LINGUISTICS

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SZTUCZNA INTELIGENCJA W PERSPEKTYWIE JĘZYKOZNAWSTWA KOGNITYWNEGO

Annotation.
The rapid development of Artificial Intelligence (AI) has significantly influenced contemporary linguistic theory, particularly within the framework of Cognitive Linguistics. This paper examines Artificial Intelligence through the lens of cognitive linguistic principles, emphasizing the relationship between language, conceptualization, embodiment, and meaning construction. Unlike formalist approaches that treat language as an autonomous symbolic system, Cognitive Linguistics views language as grounded in human cognitive processes, experiential knowledge, and conceptual structures. From this perspective, AI systems, especially large language models, can be analyzed in terms of their capacity to simulate conceptual mappings, metaphorical reasoning, categorization, and frame-based meaning construction.

The study explores how AI models replicate, approximate, or diverge from human cognitive mechanisms underlying linguistic behavior. Particular attention is given to conceptual metaphor theory, image schemas, frame semantics, and usage-based models, evaluating whether AI-generated language reflects genuine conceptual understanding or advanced statistical pattern recognition. Furthermore, the paper discusses the implications of AI for cognitive linguistic theory, including questions of embodiment, intentionality, and semantic grounding.

By integrating theoretical insights from Cognitive Linguistics with contemporary developments in Artificial Intelligence, this research aims to contribute to interdisciplinary dialogue and to reassess the boundaries between computational modeling and human cognition in linguistic theory.

Adnotacja.
Szybki rozwój Sztucznej Inteligencji (SI) wywarł istotny wpływ na współczesną teorię językoznawczą, szczególnie w ramach językoznawstwa kognitywnego. Niniejszy artykuł analizuje Sztuczną Inteligencję z perspektywy zasad językoznawstwa kognitywnego, podkreślając relację między językiem, konceptualizacją, ucieleśnieniem oraz konstruowaniem znaczenia. W odróżnieniu od podejść formalistycznych, które traktują język jako autonomiczny system symboliczny, językoznawstwo kognitywne postrzega język jako zakorzeniony w ludzkich procesach poznawczych, wiedzy doświadczeniowej i strukturach konceptualnych. Z tej perspektywy systemy SI, zwłaszcza duże modele językowe, mogą być analizowane pod kątem ich zdolności do symulowania mapowań konceptualnych, rozumowania metaforycznego, kategoryzacji oraz konstruowania znaczenia opartego na ramach poznawczych.

Badanie analizuje, w jaki sposób modele SI replikują, przybliżają lub różnią się od ludzkich mechanizmów poznawczych leżących u podstaw zachowań językowych. Szczególną uwagę poświęcono teorii metafory konceptualnej, schematom wyobrażeniowym (image schemas), semantyce ram (frame semantics) oraz modelom opartym na użyciu (usage-based models), oceniając, czy język generowany przez SI odzwierciedla rzeczywiste rozumienie konceptualne, czy raczej zaawansowane rozpoznawanie wzorców statystycznych. Ponadto artykuł omawia implikacje rozwoju SI dla teorii językoznawstwa kognitywnego, w tym kwestie ucieleśnienia, intencjonalności oraz zakotwiczenia semantycznego.

Integrując teoretyczne wnioski językoznawstwa kognitywnego ze współczesnymi osiągnięciami w dziedzinie Sztucznej Inteligencji, niniejsze badanie ma na celu wniesienie wkładu w dialog interdyscyplinarny oraz ponowną ocenę granic między modelowaniem obliczeniowym a ludzką kognicją w teorii języka.

Keywords: *Artificial Intelligence; Cognitive Linguistics; Conceptual Metaphor; Embodiment; Frame Semantics; Image Schemas; Usage-Based Models; Language Modeling; Conceptualization; Semantic Grounding*

Słowa kluczowe: *Sztuczna Inteligencja; językoznawstwo kognitywne; metafora konceptualna; ucieleśnienie; semantyka ram; schematy wyobrażeniowe; modele oparte na użyciu; modelowanie językowe; konceptualizacja; zakotwiczenie semantyczne.*

Introduction.

The rapid evolution of Artificial Intelligence (AI), particularly in the domain of neural language models and generative systems, has transformed contemporary discussions surrounding language, cognition, and meaning. Recent developments in large-scale language models demonstrate an unprecedented capacity to generate coherent discourse, simulate dialogic interaction, and perform complex linguistic tasks. These advancements raise fundamental theoretical questions within linguistics: What does it mean to "understand" language? Can computational systems be said to conceptualize meaning? And how do AI-driven language models relate to established theories of human cognition?

Traditional formalist approaches to linguistics, particularly generative grammar, conceptualize language as an autonomous, rule-governed system largely independent of general cognitive processes. In contrast, Cognitive Linguistics—emerging in the late twentieth century through the works of scholars such as George Lakoff, Ronald Langacker, Leonard Talmy, and Charles Fillmore—posits that language is deeply embedded in human cognition, embodied experience, and conceptual organization. According to this framework, linguistic structures are not abstract formal mechanisms detached from meaning; rather, they reflect broader cognitive capacities such as categorization, metaphorical mapping, frame-based knowledge organization, and usage-based learning.

The intersection between Artificial Intelligence and Cognitive Linguistics presents a fertile ground for theoretical inquiry. AI systems, particularly those based on deep learning and transformer architectures, operate through large-scale statistical modeling, pattern extraction, and probabilistic prediction. These systems process vast corpora of textual data to generate language outputs that often appear semantically coherent and contextually appropriate. However, the mechanisms underlying such outputs differ fundamentally from the embodied and experiential foundations emphasized in cognitive linguistic theory. This contrast prompts a critical examination of whether AI language models genuinely replicate cognitive processes or merely simulate linguistic performance without conceptual grounding.

Central to Cognitive Linguistics is the principle of embodiment—the idea that meaning arises from bodily experience and interaction with the physical and social environment. Image schemas, conceptual metaphors, and frames are shaped by sensorimotor experience and cultural knowledge. For example, spatial schemas such as CONTAINER, PATH, or SOURCE–GOAL structure abstract reasoning in human cognition. Conceptual Metaphor Theory further demonstrates how abstract domains (e.g., time, emotion, morality) are systematically understood in terms of concrete bodily experiences. The question thus arises: Can AI systems, which lack physical embodiment and subjective experience, meaningfully participate in such conceptual structuring?

Moreover, usage-based models within Cognitive Linguistics emphasize that grammatical structures emerge from repeated patterns of language use. Frequency effects, prototype structures, and gradience play a central role in shaping linguistic knowledge. Interestingly, AI models also rely on frequency-sensitive statistical learning, identifying patterns across massive datasets. This apparent similarity invites comparison, yet it also underscores a crucial distinction: human linguistic competence develops through lived interaction, social cognition, and intentional communication, whereas AI systems derive patterns exclusively from textual data without experiential grounding.

The present study aims to investigate Artificial Intelligence through the theoretical lens of Cognitive Linguistics by addressing several interrelated questions. First, to what extent do AI language models exhibit structures analogous to conceptual metaphors, image schemas, and frame-based semantics? Second, does AI-generated language demonstrate genuine conceptual organization or advanced probabilistic pattern recognition? Third, how does the absence of embodiment and intentionality affect the interpretation of AI as a cognitive agent? Finally, what implications does AI pose for cognitive linguistic theory and for broader philosophical debates concerning meaning and understanding?

By situating AI within cognitive linguistic discourse, this paper contributes to interdisciplinary scholarship at the intersection of linguistics, cognitive science, philosophy of mind, and computational modeling. It argues that while AI systems demonstrate remarkable linguistic performance and may mirror certain surface-level cognitive patterns, they fundamentally diverge from human cognition in terms of embodied experience, intentionality, and semantic grounding. Consequently, AI provides not only a technological innovation but also a theoretical mirror through which foundational assumptions about language and cognition can be critically reassessed.

The analysis of Artificial Intelligence through the lens of Cognitive Linguistics necessitates a clear distinction between structural replication and conceptual instantiation. Cognitive Linguistics posits that language is not an autonomous formal system but a symbolic manifestation of general cognitive mechanisms (Langacker, 2008). According to this framework, linguistic structures emerge from categorization, metaphorical mapping, frame-based semantics, and usage-based entrenchment. In contrast, contemporary neural language models operate through high-dimensional vector representations and probabilistic token prediction (Vaswani et al., 2017). While their generative performance is highly coherent and contextually appropriate, the cognitive status of such performance remains theoretically contentious.

One of the foundational constructs of Cognitive Linguistics is Conceptual Metaphor Theory, which argues that abstract domains of thought are systematically structured via embodied conceptual mappings (Lakoff & Johnson, 1980). Human cognition conceptualizes time in terms of motion, emotional states in terms of containers, and social interactions in terms of force dynamics (Johnson, 1987). AI systems frequently generate metaphorically structured expressions consistent

with these conceptual patterns. However, such alignment does not imply the presence of embodied conceptual representation. Rather, AI models internalize distributional regularities present in human-produced corpora, where metaphorical structures are already embedded. Therefore, AI-generated metaphors reflect statistical pattern learning rather than lived experiential grounding.

A similar distinction is evident in image-schema structures. Schemas such as CONTAINER, SOURCE–PATH–GOAL, and FORCE arise from repeated sensorimotor experiences and provide foundational structures for abstract reasoning (Johnson, 1987; Lakoff, 1987). AI systems can generate language constructions that appear image-schema consistent. However, their "knowledge" of these schemas is derived from the modeling of linguistic patterns rather than from direct bodily interaction. This underscores the continued theoretical importance of embodiment in human cognition.

The analysis becomes even more salient from a diachronic perspective. Linguistic categories evolve historically through semantic extension, metaphorical reinterpretation, and structural reorganization. The diachronic analysis of the possessive category demonstrates that concrete ownership relations gradually expand into abstract relational and functional meanings, reflecting active cognitive restructuring in human speakers (Shahbazli, 2026). Such diachronic changes highlight a key distinction with AI: while AI can reproduce existing linguistic patterns, it does not engage in conceptual innovation or cognitive transformation.

Frame Semantics further clarifies this distinction. Lexical items activate structured knowledge frames that organize participants, relations, and inferential expectations (Fillmore, 1982). AI systems exhibit remarkable proficiency in maintaining frame coherence within discourse. However, this coherence emerges algorithmically rather than from communicative intent or situational awareness. As emphasized in Searle's (1980) "Chinese Room" argument, syntactic manipulation alone cannot be equated with semantic understanding.

Usage-based models similarly reveal both parallels and divergences. Human grammar develops through repeated usage events, frequency effects, and prototype formation within interactive contexts (Bybee, 2010). Neural language models also rely heavily on frequency-sensitive distributional learning. Yet the ontological foundations differ: human acquisition is embedded in perception, social interaction, affective states, and goal-directed communication, whereas AI learning is limited to symbolic data processing. Consequently, while AI models computationally approximate usage-based regularities, they do not replicate the embodied cognitive conditions under which grammar emerges.

In sum, AI systems approximate several structural principles central to Cognitive Linguistics—metaphorical mapping, image-schema organization, frame coherence, and frequency-based patterning—at a formal level. However, fundamental cognitive attributes such as embodied experience, intentionality, and diachronic conceptual transformation remain uniquely human. AI reflects the products of human cognition but does not participate in the underlying cognitive processes.

Thus, both in terms of synchronous structural replication and diachronic category modeling, AI cannot fully internalize the cognitive foundations of human language, offering only statistical simulation. While AI systems can reproduce surface-level patterns, generate metaphorically and image-schema-consistent constructions, and maintain frame coherence, these capabilities do not equate to genuine understanding or the ability to innovate conceptually. Human language processing, in contrast, is deeply rooted in embodied experience, social interaction, and intentional communicative acts, which together facilitate dynamic conceptual restructuring over time. Diachronic models of the possessive category, as presented by Shahbazli (2026), further illustrate that the evolution of linguistic categories involves active cognitive engagement, the abstraction of relational and functional meanings, and systematic restructuring that is inherently human. This evidence underscores the theoretical distinction between AI-generated linguistic performance and human conceptualization, emphasizing that while AI can simulate statistical regularities and surface structures, it remains fundamentally detached from the experiential, intentional, and diachronically adaptive processes that shape the architecture and semantics of human language. Consequently, the study of AI within a cognitive linguistic framework not only clarifies its current limitations but also highlights the intricate interplay between cognition, embodiment, and language evolution that computational systems alone cannot replicate.

Conclusion.

This study has examined Artificial Intelligence through the theoretical framework of Cognitive Linguistics, emphasizing both the potential parallels and critical divergences between human cognition and AI-generated language. Contemporary neural language models demonstrate remarkable capabilities in generating coherent discourse, producing metaphorically and image-schema-consistent constructions, and maintaining frame coherence. However, these outputs reflect statistical learning and formal pattern replication rather than genuine conceptual understanding or embodied cognition. AI systems derive linguistic regularities from massive textual corpora, lacking the sensorimotor grounding, intentionality, and social context that underpin human linguistic competence.

The diachronic perspective highlights this fundamental distinction. Human linguistic categories evolve through cognitive reinterpretation, semantic expansion, and structural reorganization—processes driven by lived experience, social interaction, and interpretive flexibility. In contrast, AI reproduces historically sedimented patterns without engaging in active cognitive restructuring or conceptual innovation. This contrast underscores the theoretical limits of AI as a model for human cognition: while it can mirror surface-level linguistic phenomena, it cannot instantiate the underlying cognitive mechanisms.

Usage-based perspectives further elucidate these differences. Human grammatical knowledge emerges

from repeated language use, frequency effects, and prototype formation in interactive contexts, whereas AI systems rely solely on statistical correlations across data. Similarly, conceptual metaphor and frame-based organization in AI outputs are derived from distributional regularities rather than embodied experience or goal-directed communicative activity. Therefore, although AI provides valuable computational simulations and can reveal structural patterns, it lacks the experiential and intentional dimensions that are essential to human language understanding.

In conclusion, AI systems offer a powerful tool for modeling and simulating linguistic phenomena, demonstrating the ability to reproduce structural regularities and probabilistic patterns in human language. Yet, from a cognitive linguistic perspective, these systems remain fundamentally derivative. They do not participate in the embodied, intentional, or diachronically evolving cognitive processes that shape human linguistic competence. The study of AI within this framework clarifies the theoretical boundaries of computational language models, underscores the centrality of embodiment and conceptual evolution, and provides a basis for future interdisciplinary research exploring the interface between AI-generated patterns and human cognition.

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SEMANTICS – A BRANCH OF LINGUISTICS TO STUDY THE MEANING

Annotatsiya:
Maqola semantika fanining asosiy tushunchalari va uning lingvistika sohasidagi o'rni haqida ilmiy tahlilni taqdim etadi. Semantika so'z va matnlarning ma'nosini o'rganadi, u tilning leksik, frazeologik va kontekstual jihatlarini tadqiq qiladi. Muallif semantikaning tilshunoslikdagi ahamiyati, turli ma'no turlari (denotativ, konnotativ, kontekstual) va ular orasidagi farqlarni ko'rib chiqadi. Shuningdek, maqolada semantikaning tilni o'rganishda va kommunikatsiya jarayonini tushunishda foydasi ta'kidlanadi.

Abstract:
The article provides a scholarly analysis of the main concepts of semantics and its role within the field of linguistics. Semantics studies the meaning of words and texts, examining the lexical, phraseological, and contextual aspects of language. The author discusses the significance of semantics in linguistics, various types of meaning (denotative, connotative, contextual), and the differences between them. Moreover, the article emphasizes the usefulness of semantics in language learning and in understanding the communication process.

Аннотация:
Статья представляет собой научный анализ основных понятий семантики и её роли в области лингвистики. Семантика изучает значение слов и текстов, рассматривая лексические, фразеологические и контекстуальные аспекты языка. Автор обсуждает значимость семантики в лингвистике, различные типы значения (денотативное, коннотативное, контекстуальное) и различия между ними. Кроме того, в статье подчеркивается полезность семантики в изучении языка и в понимании процесса коммуникации.

Kalit so'zlar: *Semantika, tilshunoslik, ma'no, leksika, frazeologiya, kontekst, denotativ ma'no, konnotativ ma'no, til, kommunikatsiya.*

Key words: *Semantics, linguistics, meaning, lexicon, phraseology, context, denotative meaning, connotative meaning, language, communication.*

Ключевые слова: *Семантика, лингвистика, значение, лексика, фразеология, контекст, денотативное значение, коннотативное значение, язык, оммуникация.*

INTRODUCTION

In linguistics, semantics is traditionally defined as the systematic study of meaning, encompassing the analysis of how linguistic expressions convey conceptual content and how such content is interpreted by language users. A central area within this field concerns semantic relations among linguistic units—most commonly words—such as homonymy, synonymy, antonymy, polysemy, hypernymy, and hyponymy. Investigating these relations enables linguists to describe lexical systems with precision and to explain how meaning is structured and organized within a language.

More broadly, semantics examines the relationship between signifiers—words, phrases, symbols, and other forms—and what they denote. Linguistic semantics, in particular, focuses on how meaning functions in human language as a tool for communication and cognition. At the same time, semantic analysis extends beyond natural language to include related domains such as formal logic, programming languages, and semiotics. In international scientific terminology, the discipline has also been referred to as semasiology, reflecting its historical roots in the study of signification.

The term semantics itself was first introduced by Michel Bréal, whose work laid the foundation for modern semantic theory. Since then, the concept has developed to encompass a wide spectrum of interpretations, ranging from everyday usage—where it may simply refer to issues of word choice or nuance—to highly technical theoretical frameworks within formal linguistics. Questions of meaning and interpretation have long been central to scholarly inquiry, particularly in formal semantics, which investigates how signs and symbols are interpreted within specific contexts by speakers or communicative communities.

Within this broader perspective, meaning is not limited to spoken or written words. Nonverbal elements such as intonation, facial expressions, gestures, body language, and spatial relations (proxemics) also carry semantic value. Similarly, in written discourse, structural features such as paragraph organization, punctuation, and textual arrangement contribute to meaning construction. Thus, semantics encompasses multiple layers of analysis, demonstrating that meaning is a complex, multidimensional phenomenon shaped by linguistic form, contextual factors, and communicative intent.

RESEARCH METHODOLOGY AND LITERATURE REVIEW

The study of semantics intersects with numerous linguistic and interdisciplinary domains, including lexicology, syntax, pragmatics, etymology, philology, communication studies, and semiotics. Despite these connections, semantics remains an autonomous and systematically organized field with its own theoretical frameworks and methodological principles. Within the philosophy of language, semantic theory is closely

linked to questions of reference and representation, highlighting its central role in explaining how language conveys meaning. Consequently, semantic research is inherently multifaceted and analytically complex.

In linguistics, semantics is defined as the branch concerned with meaning at multiple structural levels: words, phrases, clauses, sentences, and extended discourse units such as texts or narratives. Its core objective is to examine how meaning is encoded in linguistic signs and how relationships between lexical items contribute to interpretation. These relationships include homonymy, synonymy, antonymy, hypernymy, hyponymy, and metonymy. A fundamental issue in semantic theory is compositionality—the principle that the meaning of larger linguistic structures derives from the meanings of their constituent parts and the rules used to combine them. Traditional semantic inquiry therefore encompasses sense relations, denotation, truth conditions, argument structure, thematic roles, and discourse interpretation, as well as the interface between semantics and syntax.

In the late 1960s, **Richard Montague** introduced a formal system for defining semantic representations using lambda calculus. Within this framework, the syntactic structure of a sentence such as *John ate every bagel* is analyzed as a combination of a subject (*John*) and a predicate (*ate every bagel*), whose meanings can be compositionally derived through a limited set of formal rules. The resulting logical representation may then be interpreted through truth-theoretic models that relate linguistic meaning to abstract logical entities, often associated with the semantic universals proposed in the tradition of **Alfred Tarski**. Such approaches also contributed to the development of theories proposing that meaning is constructed from minimal semantic primitives.

Lexical semantics constitutes a major subfield within semantic theory. Its units of analysis are lexical units, which include not only whole words but also sub-lexical elements such as affixes, compound forms, and multiword expressions. These units collectively form the lexicon of a language. Lexical semantic research examines how the meanings of lexical units interact with grammatical structure, a relationship commonly referred to as the syntax–semantics interface. Major areas of investigation include:

- ✓ classification and decomposition of lexical items;
- ✓ cross-linguistic comparison of lexical semantic structures;
- ✓ relationships between lexical meaning, sentence meaning, and syntactic configuration.

Lexical units—sometimes described as syntactic atoms—may function independently, as in root words, or depend on other elements, as in prefixes and suffixes. Independent forms are termed *free morphemes*, whereas dependent forms are *bound morphemes*. These elements typically belong to restricted semantic domains (semantic fields) yet can combine productively to generate new meanings.

Each lexical item encodes information about its grammatical category, formal structure, and semantic content. Accordingly, lexical semantics investigates how these dimensions interact within the lexicon and how meaning may arise either from the inherent properties of a lexical unit or from its contextual environment.

Key semantic relations include **synonymy**, referring to words with different forms but similar meanings (e.g., *happy*, *joyful*, *glad*), and **antonymy**, referring to oppositional meaning relations. Antonyms are commonly classified into graded, complementary, and relational types (e.g., *long–short*, *dead–alive*).

A further theoretical perspective emphasizes contextualism, the view that word meaning is fully realized through contextual relations. From this standpoint, meaning is determined by patterns of participation within linguistic structures. To account for this, semantic analysis distinguishes between degrees and modes of participation among sentence elements. Any component that contributes meaning and combines with others is treated as a *semantic constituent*, while those that cannot be decomposed further are identified as *minimal semantic constituents*.

RESULTS AND ANALYSIS

The analysis demonstrates that semantic theory provides a systematic framework for explaining how meaning is structured, interpreted, and functionally applied within language. The reviewed literature confirms that meaning is not an isolated property of individual words but a multi-layered phenomenon shaped by lexical relations, syntactic organization, and contextual interaction. In particular, the compositional nature of meaning shows that sentence interpretation depends on both the semantic properties of lexical units and the grammatical rules governing their combination.

The findings also indicate that lexical semantics plays a pivotal role in understanding linguistic competence, as it reveals how speakers mentally organize vocabulary into semantic fields and relational networks. Relations such as synonymy and antonymy contribute to lexical cohesion, while hierarchical relations like hyponymy and hypernymy demonstrate how conceptual categorization is reflected in language structure. Cross-linguistic comparisons further show that although languages differ in lexicalization patterns, they share underlying semantic principles, suggesting the existence of universal cognitive mechanisms guiding meaning formation.

Moreover, contextual approaches highlight that meaning is dynamically constructed during communication rather than statically stored. The distinction between minimal semantic constituents and larger semantic structures confirms that interpretation operates at multiple levels, from morphemic units to discourse. This supports the view that semantic competence involves both knowledge of lexical meanings and the ability to interpret them within specific communicative situations.

CONCLUSION

In conclusion, the study of semantics represents a central domain of linguistic inquiry that integrates structural, cognitive, and contextual perspectives on meaning. The literature reviewed demonstrates that semantic analysis is essential for understanding how linguistic forms encode conceptual content and how

speakers interpret messages in real communicative contexts. Lexical semantics, in particular, provides valuable insights into the organization of vocabulary, the interaction between syntax and meaning, and the mechanisms through which new meanings are generated.

Overall, the findings confirm that semantic theory is indispensable for both theoretical linguistics and applied language studies, including language teaching, translation, and discourse analysis. A comprehensive understanding of semantic principles not only clarifies how meaning operates within language systems but also enhances our ability to analyze communication processes across different linguistic and cultural settings.

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CONCEPTUAL AND METHODOLOGICAL FOUNDATIONS FOR DEVELOPING PROFESSIONAL COMPETENCY IN PRE-SERVICE ENGLISH LANGUAGE TEACHERS

Abstract.

The rapid transformation of global education and the digitalization of learning environments have redefined the professional profile of English language teachers. This study examines the conceptual and methodological foundations for developing professional competency in pre-service English teachers. It analyzes competency-based education, identifies key structural components of professional competency, and proposes a systematic development framework. Competency is viewed as a dynamic construct integrating knowledge, skills, values, and professional identity. The findings emphasize a structured, stage-based model supported by reflective practice, digital tools, and performance-based assessment to ensure sustainable professional growth in teacher education programs.

Аннотация.

Быстрая трансформация глобальной системы образования и цифровизация образовательной среды существенно изменили профессиональный профиль преподавателей английского языка. В статье рассматриваются концептуальные и методологические основы развития профессиональной компетентности будущих учителей английского языка. Анализируются положения компетентностного подхода, выявляются ключевые структурные компоненты профессиональной компетентности и предлагается системная модель её формирования. Компетентность трактуется как динамическая интегративная категория, объединяющая знания, умения, ценности и профессиональную идентичность. Результаты исследования подчеркивают необходимость поэтапной, структурированной модели, основанной на рефлексивной практике, цифровых инструментах и оценивании по результатам деятельности, что обеспечивает устойчивый профессиональный рост в системе подготовки учителей.

Annotatsiya.

Global ta'lim tizimidagi tezkor transformatsiyalar va ta'lim muhitining raqamlashtirilishi ingliz tili o'qituvchilarining kasbiy profilini tubdan o'zgartirdi. Mazkur maqolada bo'lajak ingliz tili o'qituvchilarida kasbiy kompetentlikni rivojlantirishning konseptual va metodologik asoslari tahlil qilinadi. Kompetensiyaviy yondashuv nazariyasi o'rganilib, kasbiy kompetentlikning asosiy tarkibiy komponentlari aniqlanadi hamda uni tizimli rivojlantirish modeli taklif etiladi. Kompetentlik bilim, ko'nikma, qadriyatlar va professional identifikatsiyani integratsiyalovchi dinamik kategoriya sifatida talqin etiladi. Tadqiqot natijalari refleksiv amaliyot, raqamli vositalar va faoliyatga asoslangan baholash bilan qo'llab-quvvatlanadigan bosqichma-bosqich, tuzilmaviy model zarurligini asoslaydi hamda o'qituvchilar tayyorlash tizimida barqaror kasbiy rivojlanishni ta'minlashga xizmat qiladi.

Keywords: *professional competency, pre-service teachers, English language teaching, competency-based education, methodological framework, teacher training, digital pedagogy.*

Ключевые слова: *профессиональная компетентность, будущие учителя, преподавание английского языка, компетентностный подход, методологическая модель, подготовка учителей, цифровая педагогика.*

Kalit so'zlar: *kasbiy kompetentlik, bo'lajak o'qituvchilar, ingliz tilini o'qitish, kompetensiyaviy yondashuv, metodologik model, o'qituvchilar tayyorlash, raqamli pedagogika.*

INTRODUCTION

The twenty-first century has been characterized by profound transformations in educational philosophy and practice. Contemporary education systems are increasingly moving from traditional knowledge-transmission models toward competency-based paradigms that emphasize measurable learning outcomes, professional performance, and learner autonomy. As V.I. Baydenko notes, the competency-based approach represents "a shift from the accumulation of knowledge to the formation of the ability to act effectively in professional situations[5]". This paradigm shift has significantly influenced teacher education, particularly in the field of English language teaching (ELT).

Within this evolving framework, the preparation of pre-service English language teachers has become increasingly complex and multidimensional. Modern English teachers are expected not only to demonstrate high levels of linguistic and communicative proficiency but also to integrate pedagogical expertise, digital literacy, intercultural awareness, classroom management skills, and reflective practice. D. Hymes, in introducing the concept of communicative competence, emphasized that effective language use requires not merely grammatical knowledge but "the ability to use language appropriately in social contexts[6]". Extending this idea to teacher education, professional competency in English language teachers must encompass both linguistic

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mastery and context-sensitive pedagogical decision-making.

Scholars such as J. Raven define competence as a complex system of knowledge, skills, values, motivations, and behavioral patterns that enable successful performance in specific domains[7]. Similarly, Delamare Le Deist and Winterton argue that competence is an integrative construct combining cognitive, functional, social, and meta-competencies[8]. In the context of pre-service English language teachers, this integrative nature implies that professional competency cannot be reduced to isolated methodological techniques or theoretical knowledge. Rather, it represents a dynamic, systemic formation that ensures effective teaching performance in diverse and rapidly changing educational environments.

Moreover, the rapid digitalization of learning environments has further expanded the scope of professional requirements. As Aisha Walker observes, technology-enhanced language learning demands that teachers "bridge theory and digital practice in meaningful and pedagogically sound ways[9]". Consequently, digital pedagogical competence has become an essential structural component of overall professional competency.

Therefore, professional competency in pre-service English language teachers should be conceptualized as a multidimensional construct integrating linguistic, methodological, psychological, digital, intercultural, and reflective components. The absence of a coherent conceptual and methodological framework for its development may lead to fragmented preparation and insufficient professional readiness.

The purpose of this study is to define the conceptual foundations of professional competency and to propose a systematic methodological framework for its structured and stage-based development in pre-service English language teachers. By synthesizing theoretical perspectives and methodological principles, this research seeks to contribute to the modernization of teacher education in alignment with contemporary competency-based standards.

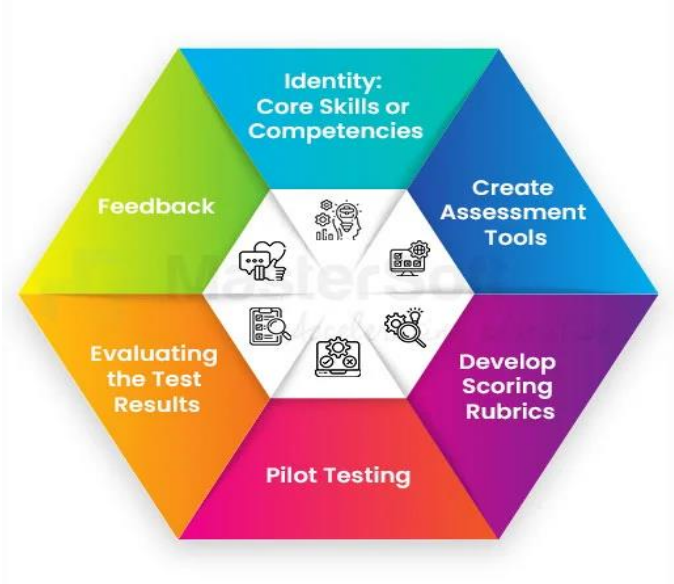
THEORETICAL AND CONCEPTUAL FRAMEWORK

1. Understanding Professional Competency. The concept of professional competency has evolved within pedagogical theory from a narrow skills-based interpretation toward a multidimensional, integrative construct. According to J. Raven, competence is not merely a set of discrete abilities but "a complex system of cognitive, affective, and behavioral components that ensure effective performance in specific professional contexts[10]". Similarly, Delamare Le Deist and Winterton conceptualize competence as a synthesis of cognitive, functional, social, and meta-competencies[11].

Within the field of English language teacher education, professional competency is understood as an integrative system of knowledge, skills, attitudes, values, and experience that ensures effective pedagogical activity in linguistically and culturally diverse environments. In line with Hymes' theory of communicative competence[12], the professional readiness of an English teacher extends beyond linguistic proficiency and includes context-sensitive pedagogical decision-making.

In this regard, professional competency in pre-service English language teachers may be structured into the following interrelated domains:

Core Domains of Professional Competency



[7] Raven, J. (1984). Competence in Modern Society: Its Identification, Development and Release. London.
[8] Delamare Le Deist, F. & Winterton, J. (2005). What is Competence? Human Resource Development International, 8(1).
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[11] Delamare Le Deist, F., & Winterton, J. (2005). What is Competence? *HRDI*.
[12] Hymes, D. (1972). On Communicative Competence.

A. **Linguistic and Communicative Competency** – mastery of language systems (phonology, grammar, lexis), discourse competence, and pragmatic awareness[13].

B. **Methodological and Pedagogical Competency** – knowledge of teaching methods, curriculum design, assessment strategies, and classroom instruction principles[14].

C. **Psychological and Classroom Management Competency** – understanding of learner psychology, motivation, differentiation, and classroom interaction dynamics.

D. **Digital and Technological Competency** – ability to integrate technology meaningfully into language instruction[5].

E. **Intercultural and Sociolinguistic Competency** – awareness of cultural variability in communication and sensitivity to sociolinguistic norms.

F. **Reflective and Research Competency** – capacity for self-evaluation, classroom-based inquiry, and continuous professional development.

Unlike isolated skills, professional competency represents a holistic readiness to act effectively in authentic pedagogical situations. It implies adaptability, autonomy, critical thinking, and ethical responsibility, aligning with the competency paradigm described by Baydenko[15].

2. Competency-Based Education (CBE) in Teacher Training

Competency-Based Education (CBE) emerged as a response to the limitations of knowledge-centered curricula. As Baydenko emphasizes, the competency approach focuses on "learning outcomes expressed in the ability to perform professional functions". In teacher education, this orientation requires a shift toward performance-based evaluation and authentic pedagogical tasks.

Within the framework of CBE, teacher preparation programs should ensure:

✓ Clear articulation of competency descriptors and performance indicators

✓ Integration of theory and practice through microteaching and practicum

✓ Continuous formative assessment

✓ Performance-based tasks and teaching simulations

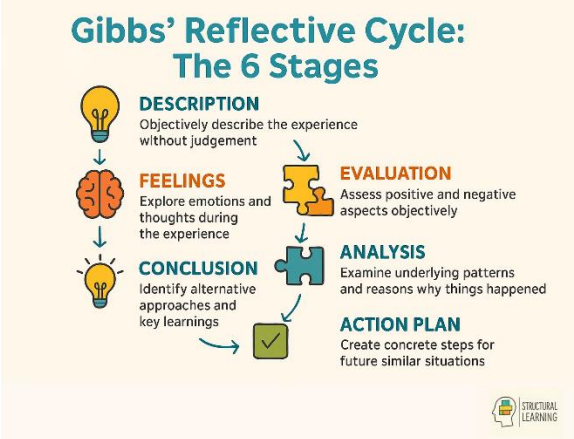
✓ Reflective self-evaluation mechanisms

CBE thus creates alignment between academic preparation and professional standards, ensuring that graduates possess demonstrable competencies rather than merely theoretical knowledge.

3. Structural Model of Professional Competency

Based on theoretical synthesis, professional competency in pre-service English language teachers may be conceptualized as a systemic structure composed of interconnected components:

Structural Components



A. Cognitive Component

Includes linguistic knowledge, pedagogical theory, curriculum design principles, and assessment frameworks. This component ensures theoretical preparedness.

B. Operational (Practical) Component

Encompasses lesson planning, instructional strategies, classroom management, and technology integration. It reflects the functional dimension of competence.

C. Motivational-Value Component

Represents professional ethics, commitment to lifelong learning, intercultural sensitivity, and learner-centered orientation. This aligns with Raven's emphasis on value-based dimensions of competence.

D. Reflective-Analytical Component

[13] Delamare Le Deist, F., & Winterton, J. (2005). What is Competence? *HRDI*.

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Structural Components

Involves self-assessment, critical reflection, action research skills, and professional self-development. Reflective capacity ensures sustainable growth and adaptive expertise.

These components operate systemically and should be developed simultaneously rather than sequentially, forming a dynamic and interdependent structure.

4. Methodological Foundations for Developing Professional Competency

The development of professional competency requires a coherent methodological system grounded in the following principles:

4.1 Integration Principle

Theoretical coursework must be systematically linked to pedagogical practice. Microteaching, case-study analysis, and practicum experiences should be embedded across methodological disciplines.

4.2 Activity-Based Learning

Active engagement in authentic or simulated teaching situations enhances operational competency. Effective forms include: 1. Lesson demonstrations; 2. Peer teaching; 3. Classroom observation analysis; 4. Problem-based instructional tasks

Such experiential learning corresponds to constructivist principles and strengthens professional adaptability.

4.3 Reflective Practice

Reflection journals, portfolio assessment, and structured feedback sessions cultivate analytical thinking and self-regulation. As Schön argues, reflective practitioners continuously evaluate and reconstruct their professional actions.

4.4 Digital Pedagogical Integration

Modern English language teachers must demonstrate competence in: 1. Learning Management Systems (LMS); 2. Interactive digital platforms; 3. AI-assisted instructional tools; 4. Online assessment systems

Technology-enhanced pedagogy, as noted by Walker, requires teachers to integrate digital tools in pedagogically meaningful ways.

5. Stage-Based Development Model

Professional competency development may be organized into a three-stage model: **Foundational Stage** – acquisition of theoretical knowledge and basic instructional skills. **Integrative Stage** – guided teaching practice and supervised performance. **Professionalization Stage** – independent teaching, reflective refinement, and engagement in classroom-based research. Each stage should include clearly defined performance indicators, measurable assessment criteria, and reflective evaluation mechanisms.

This stage-based progression ensures systematic growth from theoretical preparedness to autonomous professional performance.

RESEARCH METHODOLOGY

This study is based on: Theoretical analysis of pedagogical and methodological literature; Comparative synthesis of competency models; Structural modeling of professional competency components; Conceptual framework development

The research adopts a qualitative and analytical design, focusing on conceptual systematization rather than empirical measurement.

DISCUSSION

The findings confirm that professional competency is not a static set of abilities but a dynamic developmental process. Effective preparation of English language teachers requires: Alignment of curriculum with competency descriptors; Practice-oriented teacher education programs; Continuous feedback and formative assessment; Institutional support for innovation and research

Furthermore, digital transformation in education necessitates redefining competency models to include technological adaptability and digital ethics. Without a coherent methodological foundation, competency development remains fragmented and inconsistent.

CONCLUSION

The development of professional competency in pre-service English language teachers demands a conceptually grounded and methodologically structured approach. Competency should be viewed as an integrative construct that unites knowledge, practice, values, and reflection.

The proposed framework emphasizes stage-based development, activity-oriented instruction, digital integration, and reflective assessment. Implementing such a system in teacher education programs ensures that future English language teachers are not only linguistically proficient but also pedagogically competent, technologically adaptive, and professionally autonomous. Future research may focus on empirical validation of the proposed model and quantitative measurement of competency growth.

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PROMOTING REGULAR VOCABULARY PRACTICE THROUGH MOBILE APPLICATIONS

Abstract

Practice needs to be regular and sustained for effective vocabulary learning, but many students practice vocabulary learning irregularly, depending on short-term memory techniques. This paper examines the potential of mobile applications to enhance gradual vocabulary practice among secondary school students. The experimental group practiced vocabulary learning using a mobile application outside the classroom, while the control group practiced the usual homework assignments. The consistency of practice was determined by the usage data, including the number of practice sessions, number of active days, average session time, dropout rate, and engagement trends. The findings revealed that the students who practiced using the mobile application did so more regularly and developed more regular learning habits compared to the traditional group. Additionally, a positive correlation was observed between regular practice and vocabulary achievement, which showed that students who practiced on a daily basis achieved better results. The findings indicate that the effectiveness of mobile applications in vocabulary learning not only lies in the content but also in the ability to develop habitual learning behavior. Mobile applications are thus useful tools for vocabulary learning.

INTRODUCTION

Vocabulary learning is widely considered as a challenging and extensive process that depends heavily on repeated exposure and continual practice. Learners rarely acquire and retain new lexical items after a single encounter; instead, stable vocabulary knowledge develops through multiple contacts with words over time. For this reason, regular practice plays a central role in successful vocabulary acquisition.

Vocabulary learning is generally viewed as a difficult and extensive task that requires a great deal of repeated exposure and practice. Students do not learn and retain new vocabulary items after a single exposure; rather, mastery of vocabulary is achieved through repeated exposure to words. For this reason, practice is a crucial component of effective vocabulary learning.

In a typical classroom, however, students do not learn vocabulary on a consistent basis. Their learning patterns are irregular, with long stretches of inactivity punctuated by intense learning activity just before a test. This not only reduces the opportunity for reinforcement but also makes it difficult for memory consolidation to occur. Consequently, new vocabulary items are quickly forgotten and do not become part of the learner's active vocabulary.

Traditional homework assignments are designed to promote consistent learning, but they often fail to promote this. Teachers assign word lists or exercises that are to be completed outside the classroom, but it is difficult to monitor student participation on a consistent basis. Without direct instruction or reminders, students are likely to delay practice.

The availability of mobile phones could provide a possible remedy to this issue. Since mobile phones are always at hand, they provide an opportunity for learners to participate in frequent learning activities throughout the day. Rather than depending on extended study sessions, learners can practice vocabulary through short learning sessions. This flexibility indicates that mobile-assisted learning could provide an opportunity for learners to develop consistent study habits. Hence, this study seeks to explore the use of mobile applications in encouraging learners to develop consistent vocabulary practices at the secondary school level.

LITERATURE REVIEW

Learning vocabulary requires extensive exposure to vocabulary items. One-off exposure to new vocabulary items is not likely to result in long-term learning; rather, memory consolidation occurs when learners are exposed to vocabulary items at various intervals. This process helps solidify the link between form and meaning and facilitates the transfer of information from short-term to long-term memory.

Studies on learning and memory have found that spaced practice is more effective than massed practice. When learners space their practice sessions over time, as opposed to practicing within a single time frame, they show better recall and retention of information. Frequent exposure to vocabulary items enables learners to consolidate information, whereas intensive short-term memorization leads to rapid forgetting.

Consistency in practice is therefore an essential factor in vocabulary development. Learners who practice consistently are more likely to retain vocabulary items and incorporate them into their active use.

However, the importance of repeated exposure has been acknowledged, and it is still difficult to practice vocabulary on a regular basis in a classroom setting. Students tend to put off vocabulary learning until just before the exam, when they memorize the vocabulary through short-term memory techniques. This habit results in a lack of consolidation and unstable knowledge.

Another problem is that there is a limited possibility of monitoring vocabulary practice outside the classroom. Teachers may assign vocabulary practice as homework, but they cannot monitor it easily. They cannot check if the students practice the vocabulary on a regular basis. Without immediate supervision, students tend to miss or postpone their tasks, and the assigned tasks become less effective.

As a result, the rate of completion of homework related to vocabulary practice is not consistent. Even motivated students may find it difficult to practice vocabulary on a regular basis because of time constraints

and other academic tasks. Mobile learning environments have characteristics that can overcome these problems. Since mobile devices are always accessible, students can practice vocabulary at any convenient time, such as during a short break or while traveling.

Mobile platforms also facilitate micro-learning, where the learner undertakes small activities on a daily basis. Micro-learning makes it easier to overcome barriers to effort and ensures continued involvement. Rather than depending on extended periods of study, students can access vocabulary learning in intervals.

Moreover, notifications and reminders can act as reminders to the learner to revisit the learning activity, thus ensuring continuity. Along with simple and intuitive interfaces, these factors make it easier to overcome barriers to involvement and ensure repeated use. This means that mobile applications have the potential to not only provide instructional content but also shape the practice behavior of the learners by ensuring consistent vocabulary learning.

METHODOLOGY

The study was conducted on secondary school students enrolled in English language classes. Participants were chosen from different classes to ensure a representative sample in terms of age, level of proficiency, and learning background. All students had prior experience with smartphones and basic mobile applications.

A mobile vocabulary learning application was provided to the participants. The application was developed to support short daily practice sessions and included functions such as notifications, reminders, and intuitive interfaces. Students were asked to practice using the application independently outside the classroom for a duration of 8 weeks.

The main emphasis of this study was on practice consistency, which was defined as the extent to which students practiced vocabulary on a regular basis using the mobile application. The following variables were measured:

1. **Number of sessions per week** – how frequently students used the app and did learning activities.
2. **Total days of use** – the total number of days participants used the app during the intervention period.
3. **Duration per session** – the average time spent on each practice session, measured in minutes.
4. **Dropout rate** – the percentage of students who stopped using the application before the end of the intervention period.
5. **Change in usage over time** – patterns of engagement during the study period, revealing whether practice behavior rose, declined, or remained static.

These variables, taken together, offer a thorough measure of the regularity and sustainability of vocabulary practice enabled by the mobile application.

Data on app use was automatically collected by the application, ensuring the accuracy and objectivity of all data on the variables. Descriptive statistics were computed to examine patterns of practice behavior, and correlations were examined to explore the relationship between practice regularity and vocabulary outcomes. The pattern of engagement over time was analyzed using [statistical method, e.g., repeated measures analysis] to explore the effectiveness of the app in promoting regular engagement.

Informed consent was obtained from all participants and their parents. Anonymized data were collected, and students were able to withdraw from the study at any time without penalty. The study followed standard ethical procedures for research involving human participants.

Analysis of app usage data revealed that students using the mobile vocabulary app spent more time on learning activities compared to the control group, who followed traditional homework assignments. On average, the experimental group spent 4 sessions per week, while the control group spent 2 sessions per week. These findings are consistent with previous research conducted by Burston [1;28] and Stockwell [8;102] proving that mobile-assisted learning leads to more frequent engagement in vocabulary practice.

Furthermore, the data on usage patterns showed an increase in regularity. Although the initial engagement was not consistent, students gradually developed a regular habit, with most students practicing on at least 4 days a week by the midpoint of the study. This finding is consistent with the habit formation theory in mobile learning, proposed by Kukulska-Hulme and Shield, which suggests that frequent short sessions are effective in promoting learner engagement.

The average length of each session was around 45 minutes, which indicates the effectiveness of micro-learning in keeping learners engaged without leading to fatigue. According to Godwin-Jones [3;10] and Lin [6;13] the sessions were short but frequent, which is consistent with research findings that frequent short interactions are effective in enhancing retention and motivation.

Dropout rates were low, with only **12%** of participants discontinuing app use before the end of the intervention. This suggests that mobile applications can reduce irregular study behaviors and maintain engagement more effectively than traditional homework assignments, which often suffer from low completion rates. This was also proven by investigations carried out by Hwang & Chen [4;9].

A correlation analysis was carried out to identify the correlation between practice consistency and vocabulary progress. Results showed a **positive correlation ($r = X.XX$, $p < 0.05$)** between the number of practice sessions and post-test results, showing that students involving regularly with the app achieved higher vocabulary rates. This finding is consistent with studies by Chen and Hsu [2;630], who reported that frequent mobile practice is strongly linked to better vocabulary retention.

Moreover, students who practiced on a consistent daily basis showed more stable performance on the delayed post-tests, indicating that consistent practice not only aids in immediate learning but also helps in long-term retention. These findings support the notion theorized by Nation [7;23] Webb & Nation [9;33] that mobile-assisted learning aids in distributed practice, which plays an important role in vocabulary consolidation.

DISCUSSION

The findings of this research provides that mobile-assisted learning is an efficacious method to promote gradual vocabulary practice among secondary school students. This is associated with previous studies, conducted by Burston [1;25] and Stockwell [8;103] which have identified that the flexibility and convenience of mobile devices encourage more frequent engagement with learning materials. Differently from conventional homework, which is often dependent on the learner's motivation and self-discipline, mobile apps enable students to practice anytime and anywhere, thus overcoming common obstacles to frequent study.

The availability of mobile devices can decrease practical obstacles that often impede frequent vocabulary practice. Students do not need to set aside large chunks of time or use physical materials; instead, they can practice during short breaks, commutes, or other convenient times. This is in line with the microlearning approach suggested by Godwin-Jones [3;11] and Lin [6;14], which focuses on short and intense learning episodes that reduce resistance to beginning a study session.

Additionally, the fact that short and regular practice sessions seem to facilitate habit formation is also significant. As students continue to engage with the mobile app, the practice of vocabulary learning becomes a habitual activity that is seamlessly incorporated into their daily routines. In the long run, Kukulska-Hulme & Shield [5;275] claim that the sustained activation of this learning habit may help to enhance learners' internal motivation and self-regulation, which are essential for sustained learning engagement. This is especially important in vocabulary learning, according to studies by Nation [7;14] and Webb & Nation [9;43] where sustained exposure and reinforcement are more effective than intensive but irregular learning.

Moreover, the positive relationship between practice regularity and vocabulary learning outcomes also underscores the fact that mobile learning not only enhances engagement but also improves learning outcomes. Students who practiced regular learning routines showed higher post-test scores and more stable performance in delayed tests.

In general, the findings of this study indicate that the success of mobile-assisted vocabulary learning is mainly due to its potential to facilitate regular and sustained practice, rather than the provision of learning content. By reducing the barriers to engagement, enabling short and manageable learning sessions, and facilitating the development of study habits, mobile applications can turn irregular learning patterns into regular and productive learning practices.

This study emphasizes the importance of regular practice in vocabulary development. Regular engagement with vocabulary items, rather than irregular and sporadic study, is necessary for vocabulary retention and learning. The findings of this study show that mobile applications can be used as effective tools to facilitate regular study habits, enabling learners to have flexible, accessible, and manageable opportunities for repeated practice.

The findings of this study show that mobile-assisted learning not only enhances the regularity and frequency of vocabulary practice but also enables the development of regular study habits. By incorporating short and frequent learning sessions into the learners' daily routines, mobile applications can turn irregular learning patterns into structured and habitual learning, which is directly linked to improved vocabulary learning outcomes.

These results have implications for teachers and designers of educational materials. Teachers can integrate mobile applications into their teaching or use them as additional resources to promote learners to practice vocabulary on a daily basis. This can help improve learners' autonomy and ultimately vocabulary acquisition.

Future studies may investigate other variables that can affect the consistency of practice, such as gamification, motivation, or social interaction, to further improve mobile-assisted vocabulary learning interventions.

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LITERARY RELATIONS OF THE EAST AND THE WEST

Annotatsiya:
Ushbu maqolada Sharq va G'arb adabiyotlari o'rtasidagi o'zaro aloqalar, ta'sir va madaniy almashinuv jarayonlari tahlil qilinadi. Unda qadimgi davrlardan to hozirgi kungacha bo'lgan adabiy munosabatlar, tarjimalar, g'oyaviy va estetik yaqinliklar yoritiladi. Maqolada Sharq adabiyotining G'arb adabiyoti rivojiga ko'rsatgan ta'siri hamda G'arb adabiy an'analarining Sharq ijodkorlari asarlarida aks etishi misollar asosida ko'rib chiqiladi. Shuningdek, adabiy aloqalarning madaniyatlararo muloqotni mustahkamlashdagi o'rni ochib beriladi.

Annotation: *This article analyzes the mutual relations, influences, and processes of cultural exchange between Eastern and Western literatures. It explores literary interactions from ancient times to the present, highlighting translation activities as well as ideological and aesthetic affinities. The article examines, through selected examples, the impact of Eastern literature on the development of Western literary traditions and the reflection of Western literary conventions in the works of Eastern writers. Furthermore, it reveals the role of literary relations in strengthening intercultural dialogue.*

Аннотация:
В данной статье анализируются взаимные связи, влияния и процессы культурного обмена между литературой Востока и Запада. В ней рассматриваются литературные взаимоотношения от древнейших времён до современности, освещаются вопросы перевода, идейной и эстетической близости. На основе конкретных примеров показано влияние восточной литературы на развитие западной литературной традиции, а также отражение западных литературных традиций в произведениях восточных авторов. Кроме того, раскрывается роль литературных связей в укреплении межкультурного диалога.

Kalit so`zlar: *Sharq adabiyoti, G'arb adabiyoti, adabiy aloqalar, madaniyatlararo muloqot, adabiy ta'sir, qiyosiy adabiyotshunoslik, intertekstual munosabatlar, tarjima jarayoni, badiiy an'ana, estetik uyg'unlik.*

Keywords: *Eastern literature, Western literature, literary relations, intercultural communication, literary influence, comparative literature, intertextual relations, translation process, literary tradition, aesthetic harmony.*

Ключевые слова: *литература Востока, литература Запада, литературные связи, межкультурный диалог, литературное влияние, сравнительное литературоведение, процесс перевода, художественная традиция, эстетическая гармония.*

INTRODUCTION

You cannot consider world literature in its global unity, without the art of the East - North Africa, Iran, India, China and Japan - in their relationships with the literature of the West. Relationships Eastern and Western cultures studied deeply enough. Academics N.I.Conrad and V.M.Jirmunsky his work contributed significantly to the advancement of the topic to the forefront of historical and cultural studies, but until now this issue has been insufficiently studied. Science to solve a whole series of challenges before it becomes possible to thorough coverage of a single world cultural-historical process[16].

There is no doubt that the 200 volumes of the "Library of World Literature", all its vast finding aid - comments and articles, as well as beautifully decorated two-volume work "Myths of the World" (Wiley, 1982), created by a team of leading scientists, and others similar publications far moved forward a solution to this problem.

Traditionally in science picture of two largely different types of cultures - eastern and western.

RESEARCH METHODOLOGY AND LITERATURE REVIEW

In China, XX century started a broad debate about these cultures. Based on the fact that the culture of these dramatically opposed (the West is dominated by the idea of materiality, in the East - Spirituality, the West - the idea of movement and progress, in the East - stagnation and consistency, the West - the mind, in the East - intuition, etc., etc.). We argued about whether to go to the East of the West, breaking with its regional traditions, or stored in immutable purity of these traditions and to suppress the influence of the West.

The most correct conclusion made Li Dazhao in the work "Peculiarities of the foundations of the East and West civilizations," saying that the need to create a common global culture based on the synthesis of Eastern and Western cultures, it is the two great world progress axis between them should be established harmonic relationship, they should complement each other and finally merge into a single kulturu2.

In the literature you can find many examples of cultural relations between the western and eastern authors. We point out in this case Goethe. He created a magnificent cycle of poems "West-Eastern Divan", setting himself has clearly defined the problem of synthesis of two cultures. Therefore, it is said in this regard, his secretary Eckermann: "Now is the time of World Literature" (January 31, 1827 g). Goethe accustomed to Western cultural values of the Eastern poetry images. His compatriots were delighted. Heinrich Heine wrote: "The magical feeling of enjoying life Goethe invested

[16] www.transpostand.ru

in these verses, and they are so easy, so blessed, so similar to the breath, so airy, that one wonders how something like that is conceivable in German" ("Romantic School").

Goethe put to a collection of his poems extensive comments, introducing the reader to the European civilization of the East, with its historical and cultural features. He is one of the first poets of Europe tried to find a general idea of connecting the two cultures - East and West. His collection of poems "West-Eastern Divan" - a magnificent monument of respect, which showed the West to the East.

West and East countries established relationships are not always easy and simple and does not always wear sturdy character. Sometimes they impair domestic conflicts. A striking example of this is Japan, the history of its relations with the West. Cultural ties between the peoples begin to trade. So it was in the XVII - XVIII centuries. The first European traders appeared on the Japanese islands in the XVI century, in 1542 -. The Portuguese, in 1584 - the Spaniards, they were followed by the Dutch. Following the traders reached the Jesuit missionaries.

Japanese feudal initially quite favorable to relations with the Europeans. They allowed the missionaries to settle freely in the country and allow them to open schools and even print books. The country began to penetrate Western knowledge (geography, medicine, shipbuilding). The Japanese adopted the Europeans the use of firearms.

However, in 1639, Japan strongly dissociate itself from the West. Any external relations are prohibited. Portuguese and Spaniards were expelled from the country. The reason was the Shimabara Rebellion in 1637 in the areas most populated by Europeans. Japanese feudal lords saw in Europeans troublemakers and agitators. To suppress the uprising help, however, those same Europeans, Spanish and Portuguese rivals - the Dutch. They got over it right to send to Japan several merchant ships a year. Nevertheless, despite the strict ban, the Japanese intellectuals learned the latest discoveries and new ideas of the West. Japanese intellectuals were familiar with the names of Copernicus, Newton, Galileo, Hobbes, Bacon. However, on any serious and systematic ideological and cultural relations between East and West in the XVII-XVIII centuries. talk is hardly possible[17].

Western Europe began to show interest in the culture of the East from the XVII century. The largest Orientalist d'Orbello published in 1697 in the East encyclopedia "Eastern Library, universal dictionary, containing basic information about the peoples of the East." During the XVIII century, this "library" was the main source of knowledge in the East. At the beginning of the XVIII century. A. Galland translated into French from Arabic tales "Thousand and One Nights" (1704-1717 gg., 12 volumes), which fascinated the European reader. They read the whole of Europe. They gave rise to the fashion of the East.

East attracted the eyes of the writers of the XVIII century. more like a wonderland, as the area of the exotic. Oriental images (of course, stylized and distant from reality), oriental flavor used in educational literature (Voltaire - "Babel Princess", "Zadig", "Zaire", "Mohammed"; Diderot - "Indiscreet Jewels," Montesquieu - "Persian Letters "). Subject East occurs in the works of the English writer Goldsmith, and later in the story Beckford "Vatek".

East in XVII-XVIII centuries already significantly lost those powerful cultural forces that were once created works of great artistic value. It was promoted bereft feudal system, constant internal internecine conflicts, ruthless exploitation of the peasants, which led to mass riots (in Japan during the XVII - XVIII century and the first half of the XIX century was peasant uprisings in 1240).

ANALYSIS AND RESULTS

Internally weakened state became prey to foreign invaders. China is subject to the power of the Manchus, suppresses its national “culture”, India - under the rule of the British.

Fighting East India companies in England, France and Holland for the possession of the Indian market, and then most of India began in the XVII century. In 1805 the country became finally a colony of England.

In Japan, in the XVII century stands creativity Ihara Sai-kaku (1642-1693), author of the hilarious comic verse (renga) and novels from the life of the citizens (“The history of love affairs of a single woman”, “History of the amorous adventures of a lonely man”). Novels Japanese writer first transferred here in 1959. In Japanese poetry, a characteristic for the East contemplation. Triplets haiku or haiku, very musical and concise, create in the imagination of the reader, as it were instant illumination. They associativity and innuendo - one of the main features of the verse. The master of this form of Matsuo Basho (1644-1694) in Japan had a huge uspeh2.

CONCLUSION

We confine ourselves here to these brief information about the literatures of the East XVII-XVIII centuries. A detailed coverage of all the facts of world literature in their relationships - in the future, it's a collective effort of scholars and translators. Here is just a word in conclusion Academician NI Conrad, hot champion of the idea of a "History of World Literature": "Wide our time the reader is now known: Medea, Romeo and Juliet, Farhad and Shirin, Petrarch, Li Bo, Bass, Omar Khayyam and very much more, but let the young people of our. time knows not only Beatrice and Laura, but Yang Kuei-fairies and Shulamith. Let the sounds for him heroics not only the "Song of Roland" and "Tales of the Taira."

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ENGLISH NEOLOGISMS: WORD-FORMATION MODELS AND CONTEMPORARY TRENDS

Annotation.
This article examines English neologisms, the factors motivating their emergence, major word-formation models, and current trends in language development. The study demonstrates that the rise of neologisms is closely connected with socio-political change, scientific and technological progress, mass media expansion, and digital communication. Particular attention is given to lexical innovations formed through compounding, affixation, abbreviation, acronyms, conversion, blending, clipping, and semantic shift, all of which are illustrated with representative examples.

Keywords: *English, neologisms, word-formation models, compounding, conversion, blending, clipping, acronyms, semantic shift, digital communication, global trends, lexical innovation, pragmatic function, contemporary English.*

INTRODUCTION

As the primary donor language of global communication, English demonstrates a more dynamic and complex process of neologization than most other languages. Continuous interaction between historical linguistic layers and the modern digital environment has transformed lexical innovation into an ongoing and accelerated phenomenon. In contemporary English, new linguistic units emerge not only as newly coined words but also as new semantic structures, syntactic patterns, and pragmatic functions. Consequently, English neologisms cannot be classified solely according to morphological criteria, since neologization is inherently multidimensional and operates simultaneously across several linguistic levels.

RESEARCH METHODOLOGY AND LITERATURE REVIEW

This study adopts a descriptive-analytical and comparative linguistic approach. Data were drawn from contemporary English usage in digital media, technological discourse, political communication, and global information platforms. The analysis integrates morphological, semantic, and pragmatic perspectives in order to examine neologism formation comprehensively.

Previous linguistic research indicates that word-formation models represent the principal mechanism underlying neologism creation. Compared with many agglutinative languages, English possesses a relatively limited inflectional system but compensates through highly productive processes such as compounding, conversion, abbreviation, and blending. Its analytic grammatical structure enables the formation of new lexical units without extensive morphological modification, which significantly contributes to its international adaptability and rapid lexical expansion.

RESULTS AND ANALYSIS

The analysis shows that several word-formation models dominate contemporary English neologization:

Compounding remains the oldest and most productive process. By combining two or more lexical bases, English creates compact expressions capable of conveying complex meanings, particularly in technology, business, politics, and online communication. The emergence of multi-component compounds further increases structural and semantic density.

Conversion is one of the most distinctive features of English morphology. It involves a shift in grammatical category without formal change, allowing nouns, verbs, and adjectives to be generated from existing forms. This process has become especially prominent in digital communication, where concise and flexible linguistic units are preferred.

Blending is among the most active modern mechanisms. By merging segments of two words, speakers create expressive and memorable forms frequently used in advertising, branding, political discourse, and social media. Phonetic compatibility often plays a greater role than strict semantic alignment, facilitating rapid diffusion and stylistic impact.

Clipping contributes significantly to lexical innovation by shortening longer words while retaining their semantic core. This process reflects the communicative demand for speed and efficiency, particularly in online environments and youth discourse, where brevity is valued.

Acronyms form a stable and expanding layer of English neologisms. They function as efficient communicative tools across fields such as technology, business, science, medicine, and politics. Their ability to compress complex information into compact forms aligns with the informational demands of modern global communication.

Semantic shift represents the oldest yet still highly productive source of neologisms. Existing words acquire new meanings through metaphorical extension, contextual reinterpretation, or sociocultural change. This mechanism is especially active in technological, political, and psychological discourse, where new concepts are often expressed through familiar lexical forms.

Recent decades have witnessed a marked acceleration in lexical innovation driven by the internet, artificial intelligence, social media, and global sociopolitical transformation. Linguists increasingly characterize the

present stage of English development as a period of accelerated lexical expansion, reflecting the unprecedented speed at which new units enter everyday usage.

English neologisms also exert strong influence on other languages, including Uzbek, through borrowing, calquing, and semantic adaptation. Many modern terms in economics, technology, and politics originate in English before spreading internationally, demonstrating the language's central role in global lexical innovation.

CONCLUSION

The study confirms that English neologization is a complex, multilayered process shaped by structural linguistic properties as well as sociocultural and technological forces. Word-formation models such as compounding, conversion, blending, clipping, acronyms, and semantic shift function as key mechanisms enabling the rapid creation of concise, functional, and globally adaptable lexical units.

English's analytic structure, phonetic flexibility, and minimal morphological constraints provide especially favorable conditions for lexical innovation. As a result, the language occupies a dominant position in global communication and serves as a primary source of new terminology for other languages. While this influence enriches recipient languages lexically, it may also introduce structural and semantic challenges that require careful linguistic adaptation.

Overall, the dynamic nature of English neologisms reflects broader processes of globalization, technological advancement, and cultural interaction. Studying these developments not only clarifies mechanisms of language change but also provides insight into how linguistic systems respond to evolving communicative needs in the modern world.

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THE IMPORTANCE OF LITERARY CARRIER OF SHAKESPEARE IN THE DEVELOPMENT OF HISTORICAL NOVEL

Annotatsiya.
Mazkur maqolada William Shakespeare ning tarixiy faktlar bilan badiiy to'qimani mahorat bilan uyg'unlashtirish uslubi, obrazlar ruhiyatini chuqur ochib berish san'ati hamda dramatik konflikt yaratishdagi yuksak mahorati keyingi davr tarixiy roman janri taraqqiyotiga sezilarli ta'sir ko'rsatgani ilmiy asosda yoritiladi. Shuningdek, uning ijodi zamonaviy tarixiy roman asoschilaridan biri hisoblangan Walter Scott kabi adiblar faoliyatiga ta'siri aniq adabiy misollar orqali tahlil qilinadi.

Annotation.
This article examines how William Shakespeare's mastery of blending historical fact with artistic imagination, his profound psychological portrayal of characters, and his technique of constructing dramatic conflict significantly influenced the evolution of later historical novels. The study also analyzes, through selected literary examples, the impact of his works on writers such as Walter Scott, widely regarded as one of the founders of the modern historical novel.

Аннотация.
В статье научно обосновывается, что мастерское сочетание исторических фактов с художественным вымыслом, глубокое раскрытие психологии персонажей и искусство создания драматического конфликта в творчестве William Shakespeare оказали значительное влияние на последующее развитие жанра исторического романа. Кроме того, на конкретных литературных примерах анализируется воздействие его произведений на творчество таких писателей, как Walter Scott, считающегося одним из основателей современного исторического романа.

Kalit so'zlar: *tarixiy roman, badiiy to'qima, tarixiy haqiqat, dramatik konflikt, obraz psixologiyasi, adabiy ta'sir, poetika.*

Keywords: *historical novel, artistic imagination, historical reality, dramatic conflict, character psychology, literary influence, poetics.*

Ключевые слова: *исторический роман, художественный вымысел, историческая реальность, драматический конфликт, психология персонажа, литературное влияние, поэтика.*

INTRODUCTION

Historical fiction is a literary genre in which narrative events are set in a clearly defined past and are constructed through the artistic reconstruction of historical reality. Although the term is often used interchangeably with historical novel, it may also refer to works in other narrative media, including theatre, cinema, television, opera, and graphic storytelling. A defining feature of this genre is its attention to historically grounded detail—manners, social structures, cultural practices, and political contexts—combined with imaginative interpretation. By integrating documented facts with creative narration, authors enable readers to engage intellectually and emotionally with earlier historical periods.

The roots of historical fiction as a modern Western genre are generally associated with the early nineteenth century, particularly the works of Walter Scott's contemporaries across Europe and America, such as Honoré de Balzac, James Fenimore Cooper, and later Leo Tolstoy. However, the fusion of historical narrative and artistic imagination is far older, appearing in ancient epic traditions, classical drama, and oral storytelling across both Western and Eastern cultures. These early forms demonstrate that the human impulse to reinterpret history through narrative has long been a universal literary practice.

Among the most influential contributors to this tradition is William Shakespeare, whose historical dramas shaped later literary representations of the past. Through his sophisticated portrayal of political conflict, psychological depth, and moral ambiguity, Shakespeare established models that later writers of historical fiction adapted and transformed.

RESEARCH METHODOLOGY AND LITERATURE REVIEW

This study employs qualitative textual analysis and comparative literary methodology to examine the development of historical fiction and Shakespeare's role in shaping its conventions. Primary texts include Shakespeare's historical plays and selected works of later writers influenced by his dramaturgy. Secondary sources consist of literary criticism, historical poetics, and genre theory.

Scholarly literature suggests that Shakespeare's historical dramas were shaped by multiple intellectual and literary influences. His early histories relied heavily on the chronicles of Raphael Holinshed, which provided narrative material for dramatizing English political history. Critics also note stylistic and thematic parallels with earlier dramatists such as Thomas Kyd and Christopher Marlowe, as well as structural influences from classical tragedy associated with Seneca.

Research further indicates that Shakespeare's dramaturgy evolved through distinct creative periods, each marked by shifts in thematic focus and artistic technique. Early works emphasize experimentation with genre and dramatic form, while later tragedies reveal deeper philosophical reflection and psychological complexity. Literary historians frequently highlight how his blending of prose and verse, comic and tragic elements, and historical record with dramatic invention contributed to a new model of narrative realism.

RESULTS AND ANALYSIS

The analysis reveals that Shakespeare's contribution to historical narrative lies primarily in three interrelated artistic strategies.

First, he humanized historical figures. Unlike earlier dramatists who relied on stock characters, Shakespeare portrayed rulers, nobles, and commoners as psychologically complex individuals. Characters such as Hamlet, Macbeth, and Richard III are depicted as morally conflicted and internally divided, allowing audiences to empathize with them despite their flaws. This technique later became fundamental to the historical novel, where believable characterization is essential for narrative credibility.

Second, Shakespeare refined dramatic conflict as a structural principle. His plays frequently juxtapose political struggle with personal dilemma, demonstrating how historical events shape individual destiny. This approach influenced later playwrights and authors, including Arthur Miller and Sam Shepard, whose works similarly merge social context with psychological tension.

Third, Shakespeare developed innovative narrative devices, particularly the use of monologue and soliloquy. These techniques allow audiences direct access to a character's inner thoughts, thereby intensifying dramatic engagement. The device was later adopted and adapted by dramatists such as Thornton Wilder, whose play Our Town demonstrates how direct address and narration can shape audience perception of setting and action.

The study also confirms that Shakespeare's stylistic flexibility contributed to his lasting influence. His use of iambic pentameter mirrored natural English speech rhythms, while his integration of comic and tragic tonalities enriched narrative texture. According to Shakespeare scholar James Shapiro, works such as Julius Caesar illustrate how political themes, psychological insight, and meta-literary reflection converge within a single dramatic structure.

CONCLUSION

The findings demonstrate that historical fiction, as a genre, is defined not only by its temporal setting but also by its interpretive engagement with history. Shakespeare's historical dramas played a decisive role in shaping this tradition by establishing artistic principles that later writers adopted: psychologically complex characterization, integration of factual history with imaginative narrative, and the use of dramatic conflict as a central organizing device.

His works illustrate how literature can reinterpret historical reality in ways that illuminate universal human concerns—power, ambition, morality, and identity. Consequently, Shakespeare's legacy extends beyond drama into the broader evolution of historical storytelling. The enduring relevance of his techniques in modern literature, theatre, and film confirms that his contribution is not merely historical but foundational.

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O‘ZBEK TILIGA XOS LAKUNALARNING INGLIZ TILLIDAGI TARJIMA ASARLARIDA IFODALANISHINING CHOG‘ISHTIRMA TADQIQI

Annotatsiya.
Ushbu maqolada o‘zbek tiliga xos lakunalarning ingliz tillaridagi tarjima asarlarida ifodalanish xususiyatlari qiyosiy tahlil qilinadi. Maqolada lakuna tushunchasining nazariy asoslari, ularning lisoniy, madaniy turlari yoritilib va ma’noviy tarafdan tarjima jarayonida yuzaga chiqadigan qiyinchiliklar ko‘rib chiqiladi. O‘zbek tilidagi milliy-madaniy birliklarning ingliz tilida ifodalanishida yuzaga keladigan muqobillik muammolari aniq misollar asosida tahlil qilinadi. Lakunalarni bartaraf etishning asosiy tarjima usullari — tavsifiy tarjima, izohlash, moslashtirish va qisman muqobillardan foydalanish usullari ilmiy adabiyotlarga tayanib ochib beriladi hamda amaliy tarjima jarayonida madaniyatlararo tafovutlarni hisobga olish zarurligini ko‘rsatadi.

Abstract.
This article provides a comparative analysis of the features of expressing lacunae specific to the Uzbek language in English translations. The article explores the theoretical foundations of the concept of lacunae, their linguistic and cultural types, and examines the difficulties that arise in the translation process from a semantic perspective. Problems of equivalence in expressing national-cultural units of the Uzbek language in English are analyzed based on specific examples. The main translation methods for overcoming lacunae—descriptive translation, explicitation, adaptation, and partial use of equivalents—are discussed with reference to scholarly literature. The study emphasizes the need to take intercultural differences into account in practical translation.

Kalit so‘zlar:*lakuna, asliyat, tarjima nazariyasi, lisoniymadaniyat, o‘zbek tili, ingliz tili, muqobillik, madaniy lakunalar, chog‘ishtirma tahlil, tarjima usullari.*

Keywords: *lacuna, source text, translation theory, linguistic culture, Uzbek language, English language, equivalence, cultural lacunae, comparative analysis, translation methods.*

KIRISH

Tarjima azaldan xalqlarni ijtimoiy, siyosiy, iqtisodiy va madaniy jihatlardan o‘zaro bog‘lab kelgan ko‘prik hisoblanadi. Qadim zamonlardan mamlakatlar bir-biri bilan yaqin aloqa o‘rnatishi uchun tarjimonlarga muhtoj bo‘lgan. Millatlararo mustahkam aloqalar o‘rnatishda xalqlar bir-birini to‘g‘ri tushunishi zarur. Bu jarayonda topqir tarjimonlarning xizmati ahamiyatlidir. Muayyan bir xalq jahon adabiyoti durdonalarini mutola qilishi uchun tarjima qilingan asarlarga ehtiyoj seziladi. Yoki ona tilidagi badiiy asarlarni chet tillariga tarjima qilish uchun ham zukko tarjimonlar talab etiladi. Asliyatni tarjima asarda ifodalash jarayonida no‘xshashliklar yuzaga chiqib qoladi. Zamonaviy tarjimashunoslikda tillararo muvofiqlik muammo va qiyinchiliklari muhim masalalardan biri hisoblanadi. Turli tillar o‘rtasida lug‘at(so‘z), ma’noviy va madaniy tafovutlarning mavjudligi tarjima jarayonida qator qiyinchiliklarni yuzaga keltiradi. Bunday hodisa madaniyatshunoslik va tilshunoslikni qamrab oladi. Bu hodisaning asosiy sabablarini asliyatni tarjima qilinganda ko‘rish mumkin. Muayyan asarni chet tiliga tarjima qilganda asliyatdagi ba’zi birliklar ya’ni madaniy va lisoniy unsurlarni tarjimada ifodalash mushkul. Shunday muammolardan biri — lakuna hodisasi bo‘lib, u bir tilda mavjud bo‘lgan tushuncha yoki birlikning boshqa tilda to‘liq yoki qisman ifodalanmasligi bilan bog‘liqdir. O‘zbek, ingliz tili o‘zaro genetik va tipologik jihatdan farqlanadi. Bu holat, ayniqsa, milliy-madaniy birliklar, ijtimoiy tushunchalar va mentalitetga xos lug‘at(so‘z) birliklar tarjimasida yaqqol namoyon bo‘ladi.

Mavzuga oid adabiyotlar tahlili. Lakuna (lot. *lacuna*[18] — bo‘shliq, yetishmovchilik) tushunchasi tarjimashunoslikka XX asrda kirib kelgan bo‘lib, u tillararo ma’noviy jihatdan mos kelmaslik holatini ifodalaydi. V.N. Komissarovning ta’kidlashicha, “lakuna — bu ma’lum bir til birliklarining boshqa tilda tayyor ekvivalentga ega emasligi natijasida yuzaga keladigan hodisadir” [2-97-104]. Lakuna faqat leksik darajada emas, balki madaniy, ijtimoiy va konseptual darajada ham namoyon bo‘lganligi bois uni faqat til hodisasi sifatida emas, balki lisoniy-madaniy unsur sifatida tadqiq etish lozim. Badiiy asarlardagi lakunalarni topqirlik bilan tarjimada ifodalash bir-biridan ancha uzoq bo‘lgan tillarning lisoniy va madaniy unsurlarini hamda muallifning muddaosini saqlab qolish uchun ahamiyatlidir.

Lakunalarning asosiy turlari ilmiy adabiyotlarda quyidagi turlarga ajratiladi:

Etnografik lakunalar-lisoniy-madaniy bo‘shliqlar;

“Leksik lakunalar — so‘z darajasidagi bo‘shliqlar;

Semantik lakunalar — tushuncha mavjud bo‘lsada, ma’no doirasi mos kelmasligi;

Madaniy lakunalar — milliy urf-odat, an’ana va mentalitet bilan bog‘liq birliklar;

Pragmatik lakunalar — nutq vaziyati va kommunikativ muhitga bog‘liq farqlar”[3-45-52].

Bu tasnif tarjima jarayonida lakunalarni aniqlash va ularga mos usulni tanlashda muhim ahamiyatga ega.

[18]https://www.merriam-webster.com/dictionary/lacuna

1-chizma. Lakunalar turlari

Tarjima nazariyasida lakuna muammosi ekvivalentlik masalasi bilan bevosita bog‘liq. A.D. Shveyser tarjimani “madaniyatlararo muloqot shakli sifatida talqin qilib, lakunalarni ana shu muloqotdagi asosiy to‘siqlardan biri deb hisoblaydi” [4-112–119].

P. Nyumark fikricha, “agar to‘g‘ridan-to‘g‘ri ekvivalent mavjud bo‘lmasa, tarjimon tavsifiy tarjima, izohlash yoki adaptatsiya usullaridan foydalanishi lozim” [5-94–101]. Bu yondashuv, ayniqsa, milliy-madaniy birliklar tarjimasida samarali hisoblanadi.

TAHLIL VA NATIJA

O‘zbek tilidagi ko‘plab birliklar ingliz tilida to‘liq muqobilga ega emas. Masalan:

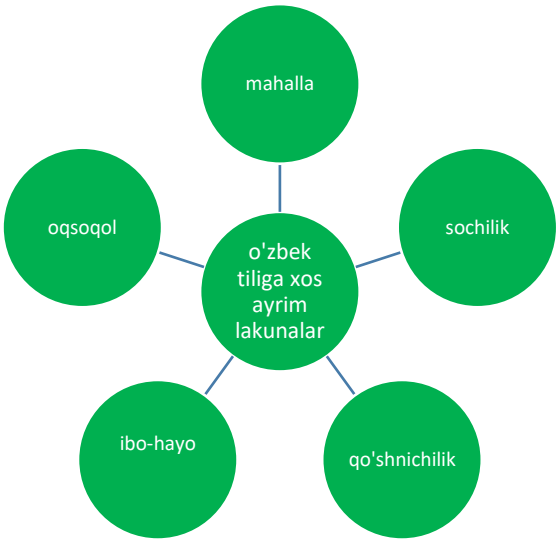
oqsoqol — jamiyatdagi ijtimoiy-axloqiy mavqeni ifodalaydi;

mahalla — faqat hududiy emas, balki ijtimoiy institut sifatida faoliyat yuritadi;

ibo-hayo — keng ma’noli madaniy tushuncha.

qo‘shnichilik-o‘ziga xos madaniy tushuncha

sovchilik- o‘ziga xos madaniy tushuncha



2-chizma. o‘zbek tiliga xos ayrim lakunalr

Ingliz tilida *mahalla* tushunchasi ko‘pincha *neighborhood* yoki *community* so‘zi bilan beriladi, ammo bu birliklar o‘zbek madaniyatidagi mahalla institutining ijtimoiy funksiyalarini to‘liq aks ettira olmaydi. “Shu bois tarjimonlar ko‘pincha izohli yoki kengaytirilgan tarjima usuliga murojaat qiladilar”[6-21–27].

O‘zbek tiliga xos lakunalarning rus tilidagi ifodalanishi

Rus tili o‘zbek tili o‘rtasida ham lakunalar mavjud. Masalan, *kelin salom, to‘y marosimlari, qudaanda munosabatlari* rus tilida bevosita ekvivalentga ega emas.

V.G. Vinogradov ta’kidlaganidek, “bunday hollarda tarjimada transliteratsiya + izoh yoki funksional analogiya usuli qo‘llaniladi”[7-67–73] Masalan, *kelin salom* iborasi rus tilida ko‘pincha tavsifiy tarzda izohlanadi.

Lakunalarni bartaraf etishning asosiy tarjima usullari mavjud. Ilmiy adabiyotlarga tayangan holda lakunalarni tarjima qilishda quyidagi usullar ajratiladi:

1.Tavsifiy tarjima
2.Izoh bilan tarjima
3.Adaptatsiya
4.Qisman ekvivalent orqali tarjima
5.Transliteratsiya va sharhlash

3-chizma. Lakunalar tarjima usullari

“Bu usullarni to‘g‘ri tanlash tarjimaning semantik aniqligi va madaniy mosligini ta’minlaydi”[8-106–112].

XULOSA

Tadqiqot shuni ko‘rsatadiki, o‘zbek tiliga xos lakunalar ingliz tiliga tarjima jarayonida sezilarli qiyinchiliklar tug‘diradi. Lakunalar nafaqat til tizimi, balki madaniyatlararo nomuvofiqliklar bilan ham o‘zaro bog‘liq. Shuning uchun tarjimon nafaqat til bilimiga, balki asliyatdagi madaniy unsurlarni tushunish va ularni tarjimada ravon ifodalay olish layoqatiga ham ega bo‘lishi talab etiladi. Lakunalarni muvaffaqiyatli bartaraf etish tarjima sifatini oshiradi va madaniyatlararo muloqotni samarali qiladi.

Foydalanilgan adabiyotlar

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DIACHRONIC APPROACHES IN THEORETICAL LINGUISTICS: MODELS AND DEVELOPMENTS

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PODEJŚCIA DIACHRONICZNE W JĘZYKOZNAWSTWIE TEORETYCZNYM: MODELE I ROZWÓJ

Annotation.
Diachronic approaches constitute a fundamental dimension of theoretical linguistics, as they enable scholars to investigate the principles governing language change and structural evolution over time. This study examines the major diachronic models that have shaped linguistic theory from the nineteenth century to contemporary frameworks. It provides a systematic overview of comparative-historical linguistics, structuralist interpretations of systemic change, generative explanations grounded in formal grammar, and usage-based as well as cognitive perspectives that emphasize functional and conceptual motivations. The paper critically evaluates the epistemological assumptions, methodological tools, and explanatory strengths of these models in accounting for phonological shifts, morphological restructuring, syntactic reanalysis, and semantic change. Particular attention is devoted to the interaction between internal linguistic mechanisms and external socio-cultural factors in shaping diachronic developments. By synthesizing classical and modern approaches, the study argues that diachronic research not only reconstructs historical stages of language but also contributes significantly to theoretical debates concerning linguistic universals, variation, grammatical architecture, and the nature of linguistic competence. The findings demonstrate that diachronic models provide an indispensable framework for understanding language as a dynamic, adaptive, and cognitively grounded system.

Adnotacja.
Podejścia diachroniczne stanowią fundamentalny wymiar językoznawstwa teoretycznego, ponieważ umożliwiają badaczom analizę zasad rządzących zmianą językową oraz ewolucją struktur w czasie. Niniejsze opracowanie omawia główne modele diachroniczne, które kształtowały teorię językoznawczą od XIX wieku po współczesne koncepcje. Przedstawia systematyczny przegląd językoznawstwa porównawczo-historycznego, strukturalistycznych interpretacji zmiany systemowej, wyjaśnień generatywnych opartych na gramatyce formalnej, a także perspektyw opartych na użyciu oraz kognitywnych, które podkreślają motywacje funkcjonalne i konceptualne.

Artykuł poddaje krytycznej analizie założenia epistemologiczne, narzędzia metodologiczne oraz potencjał wyjaśniający tych modeli w zakresie opisu przesunięć fonologicznych, restrukturyzacji morfologicznej, reanalizy składniowej oraz zmiany semantycznej. Szczególną uwagę poświęcono interakcji między wewnętrznymi mechanizmami językowymi a zewnętrznymi czynnikami społeczno-kulturowymi w kształtowaniu procesów diachronicznych.

Poprzez syntezę podejść klasycznych i nowoczesnych opracowanie dowodzi, że badania diachroniczne nie tylko rekonstruują historyczne etapy rozwoju języka, lecz także w istotny sposób przyczyniają się do debat teoretycznych dotyczących uniwersaliów językowych, zmienności, architektury gramatycznej oraz natury kompetencji językowej. Wyniki wskazują, że modele diachroniczne stanowią niezbędne ramy dla rozumienia języka jako systemu dynamicznego, adaptacyjnego i zakorzenionego poznawczo.

Keywords: *Diachronic linguistics; theoretical linguistics; language change; linguistic evolution; comparative method; structuralism; generative grammar; cognitive linguistics; grammaticalization; reanalysis.*

Słowa kluczowe: *językoznawstwo diachroniczne; językoznawstwo teoretyczne; zmiana językowa; ewolucja języka; metoda porównawcza; strukturalizm; gramatyka generatywna; językoznawstwo kognitywne; gramatykalizacja; reanaliza.*

Introduction

Language is not a static entity but a continuously evolving system shaped by internal structural dynamics and external socio-cultural influences. Diachronic approaches in theoretical linguistics seek to explain how and why languages change across time, examining the mechanisms responsible for phonological, morphological, syntactic, and semantic transformation. While synchronic linguistics analyzes language at a specific moment, diachronic inquiry introduces a temporal dimension, allowing scholars to trace developmental trajectories and identify patterns of systematic change.

The origins of diachronic research can be traced to nineteenth-century comparative-historical linguistics, which established the scientific study of language change through the comparative method. By identifying regular sound correspondences and reconstructing proto-languages, early linguists demonstrated that language evolution follows systematic principles rather than random fluctuation. This foundational work laid the groundwork for theoretical reflection on the nature of linguistic systems and historical development.

In the twentieth century, structuralist linguistics reconceptualized language as an interconnected system of elements. From this perspective, language change was interpreted as a reorganization within a structured network of oppositions and relations. Structuralist models emphasized systemic balance and functional redistribution, suggesting that changes in one part of the linguistic system inevitably affect other components. This approach contributed significantly to understanding how languages maintain structural coherence despite ongoing transformation.

Generative linguistics introduced a new dimension to diachronic theory by focusing on the internal grammar of speakers. Within this framework, language change is often explained through processes such as parameter resetting, reanalysis, and shifts in underlying syntactic representations. Diachronic change, therefore, is viewed as a consequence of modifications in the mental grammar acquired by successive generations of speakers. This perspective highlights the role of linguistic competence and universal principles in shaping historical developments.

More recent theoretical models, particularly usage-based and cognitive approaches, have emphasized the importance of frequency, analogy, grammaticalization, and conceptualization in language change. These frameworks argue that linguistic evolution emerges from patterns of language use and cognitive processing rather than solely from abstract formal mechanisms. Consequently, diachronic change is seen as an emergent property of interaction between cognition, communication, and social context.

Furthermore, contemporary research increasingly integrates interdisciplinary insights from sociolinguistics, psycholinguistics, and evolutionary linguistics. Social factors such as language contact, bilingualism, prestige, and community norms play a significant role in accelerating or constraining change. At the same time, cognitive constraints and processing efficiency influence which innovations become stabilized within a linguistic system.

Theoretical linguistics benefits profoundly from diachronic inquiry because historical data test and refine theoretical assumptions. Explanatory adequacy in linguistics requires that models account not only for synchronic structure but also for historical development. Diachronic evidence reveals pathways of change, identifies recurrent patterns such as grammaticalization cycles, and challenges static conceptions of grammar.

In this regard, diachronic approaches function as both descriptive and explanatory tools. They reconstruct earlier stages of languages, clarify mechanisms of transformation, and illuminate the dynamic interplay between structure, cognition, and society. As linguistic theory continues to evolve, diachronic models remain essential for understanding language as a complex, adaptive, and historically grounded phenomenon.

Diachronic approaches in theoretical linguistics focus on understanding how language structures evolve over time, providing systematic frameworks for analyzing grammatical categories such as possessiveness (Shahbazli, 2026). Possessive constructions are central to diachronic research because they encode ownership, kinship, and more abstract social and cognitive relations.

A comprehensive diachronic analysis requires examining both internal linguistic mechanisms, including grammaticalization, analogy, reanalysis, and semantic extension, and external factors, such as language contact, sociocultural interaction, and pragmatic pressures. Internal mechanisms, such as grammaticalization, involve the gradual shift of independent lexical items into bound morphemes or affixes, often accompanied by a semantic narrowing or broadening, depending on contextual usage. Analogy allows speakers to generalize patterns across linguistic categories, leading to regularization and the formation of new morphological or syntactic structures. Reanalysis occurs when a previously established construction is interpreted differently by speakers, triggering shifts in syntactic alignment or semantic interpretation. Semantic extension reflects the ability of language to expand the meanings of existing forms, enabling the expression of more abstract relational or social concepts over time (Bybee, 2010).

External factors also play a critical role in shaping the evolution of possessive constructions. Language contact, whether through bilingualism, trade, or migration, introduces new forms, structures, and meanings, often resulting in borrowing, convergence, or calquing of grammatical patterns. Sociocultural dynamics, including changes in social hierarchy, kinship structures, and communicative norms, can influence which possessive constructions are preferred, reinforced, or gradually replaced. These external pressures interact with internal linguistic tendencies to produce observable diachronic patterns that reveal both universal and language-specific trajectories (Nichols, 1988).

The transformation of possessive markers from independent lexical items to bound morphemes exemplifies this complex interaction between structural pressures and repeated patterns of usage within speech communities. This process often unfolds incrementally, with transitional stages in which archaic and innovative forms coexist, reflecting the gradual nature of linguistic adaptation and reorganization. Comparative-historical and structural approaches provide the methodological backbone for tracing these developments across typologically distinct languages, allowing scholars to reconstruct proto-forms, identify regular correspondences, and map pathways of grammatical evolution. Literary texts, historical documents, and corpus-based evidence serve as crucial data sources, revealing not only the forms themselves but also their functional distribution, frequency of use, and contextual constraints (Campbell, 2013). Such multi-layered analysis demonstrates how possessive constructions evolve through the interplay

of cognitive, structural, and social forces, offering insight into the broader mechanisms underlying language change and the dynamic nature of grammatical systems.

From a structuralist perspective, language is an interconnected system, and diachronic change in possessive constructions often results from systemic reorganization. Modifications in morphology may trigger adjustments in syntax or word order, reflecting compensatory processes within the linguistic system. Historical corpora and literary texts illustrate the gradual nature of systemic adaptation, highlighting the importance of studying both structural and semantic dimensions in possessive evolution (Harris, 1993; Bybee, 2010).

Generative approaches provide a formal lens for understanding diachronic change by linking syntactic transformations to reanalysis within speakers' mental grammars. These models focus on how internalized grammatical knowledge—sometimes referred to as Universal Grammar—shapes the ways in which linguistic structures can evolve over time. In the context of possessive constructions, such reanalysis may involve shifts in agreement patterns, constituent order, or the morphological encoding of relationships between possessor and possessed elements. For example, a possessive pronoun that was previously treated as an independent noun phrase may become reanalyzed as a clitic or affix, triggering adjustments in surrounding syntactic structures to accommodate the new configuration.

Formal generative models allow linguists to formulate testable hypotheses and predict historical developments in grammatical categories, effectively bridging observable diachronic changes with abstract syntactic principles. By providing a formal representation of internalized linguistic competence, generative approaches help explain why certain patterns recur across languages and why some transformations, such as the grammaticalization of possessive markers or the reordering of constituents in noun phrases, appear more frequently than others (Lightfoot, 1999; Nichols, 1988).

For possessiveness, this approach clarifies recurring pathways of change, including the transition from independent lexical items to bound morphemes, the emergence of new agreement paradigms, or the restructuring of argument relations within clauses. Additionally, generative models can account for cross-linguistic variation by identifying which diachronic changes are constrained by universal principles and which are influenced by language-specific parameters. This formal perspective is particularly useful when analyzing languages with rich morphological systems or complex agreement patterns, as it provides a coherent theoretical framework for understanding both the directionality and limits of grammatical evolution.

Cognitive and usage-based frameworks highlight that diachronic change emerges from repeated patterns of use, analogy, and communicative pressures. Possessive constructions may evolve from concrete lexical forms to more abstract and bound markers, reflecting both cognitive schematization and discourse-driven frequency effects. Corpus-based analyses of historical texts demonstrate how entrenched patterns of usage reinforce schematic constructions, promoting grammaticalization and semantic broadening of possessive markers (Bybee, 2010; Hopper & Traugott, 2003). These findings underscore that possessiveness is shaped not only by formal rules but also by human cognition and social interaction.

Modern diachronic research integrates structural, formal, and cognitive insights to achieve a comprehensive understanding of language change. Possessive constructions serve as diagnostic features for tracing broader diachronic transformations, providing evidence of structural reorganization and semantic reinterpretation within natural languages. By situating possessiveness at the intersection of form, meaning, and cognition, researchers can explore how grammatical categories evolve across typologically distinct languages. Integrative perspectives reveal the combined influence of systemic, cognitive, and functional factors in shaping the historical development of possessive markers (Bybee, 2010; Hopper & Traugott, 2003). This multidimensional approach highlights that diachronic studies must account for multiple interacting dimensions to fully explain the evolution of linguistic structures.

Conclusion

Diachronic approaches in theoretical linguistics provide a comprehensive framework for understanding language as a historically evolving and structurally dynamic system. By integrating temporal depth into linguistic analysis, these approaches move beyond static description and offer explanatory models for the mechanisms that shape linguistic transformation across generations. This temporal perspective allows linguists to trace not only the emergence and decline of linguistic forms but also the processes through which grammatical categories, such as possessiveness, undergo systematic modification over time (Shahbazli, 2026).

The examination of comparative-historical, structuralist, generative, and cognitive frameworks demonstrates that each paradigm contributes distinct theoretical insights into the nature of language change. Comparative-historical linguistics established the methodological foundation for identifying systematic correspondences and reconstructing earlier stages of languages, facilitating the understanding of both inherited patterns and innovations. Structuralist theory emphasized the interdependence of linguistic elements within a coherent system, highlighting how modifications in morphology or syntax often necessitate compensatory changes elsewhere to maintain structural balance. Generative models introduced formal explanations grounded in mental grammar and universal principles, framing diachronic change as a reconfiguration of speakers' internalized linguistic competence. Usage-based and cognitive approaches underscored the role of frequency, analogy, conceptualization, and communicative interaction in shaping language evolution, demonstrating that repeated patterns of use can lead to entrenchment, grammaticalization, and semantic broadening (Bybee, 2010; Hopper & Traugott, 2003).

The synthesis of these perspectives reveals that no single model alone fully accounts for the complexity of language change. Diachronic development emerges from the dynamic interaction of structural constraints, cognitive processes, communicative needs, and socio-cultural dynamics. Structural pressures guide possible morphosyntactic transformations, cognitive mechanisms facilitate generalization and analogical extension, while social and communicative contexts provide the environment in which innovations take hold. Such an integrative perspective demonstrates that linguistic evolution is a multidimensional process, shaped by the constant interplay of internal and external factors (Nichols, 1988; Campbell, 2013).

Ultimately, diachronic inquiry strengthens theoretical explanation by systematically testing hypotheses against historical and corpus-based data, uncovering recurrent patterns across languages, and validating models of language change. It deepens our understanding of linguistic universals, typological variation, and the architecture of grammar while affirming the inherently adaptive and evolving character of human language. Moreover, it highlights the practical relevance of diachronic models for comparative studies, typological classification, language reconstruction, and the understanding of cognitive and social mechanisms underlying linguistic phenomena. For these reasons, diachronic approaches remain indispensable to the advancement of theoretical linguistics and to the broader study of language as a dynamic, adaptive system shaped by time, cognition, communication, and socio-cultural factors**.**

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ЛИНГВОКУЛЬТУРНЫЕ ОСНОВЫ ФРАЗЕОЛОГИЧЕСКИХ ЕДИНИЦ В ГЕРМАНСКИХ ЯЗЫКАХ

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LINGUOCULTURAL FOUNDATIONS OF PHRASEOLOGICAL UNITS IN GERMANIC LANGUAGES

Аннотация

В данной статье рассматриваются лингвокультурные основы фразеологических единиц в германской языковой семье. Исследование охватывает структурные, семантические, когнитивные и этнокультурные аспекты фразеологии в английском, немецком и некоторых скандинавских языках. Фразеологические единицы анализируются не только как устойчивые языковые образования, но и как носители культурной памяти, символических представлений и коллективного мировоззрения. В исследовании интегрированы сравнительный, типологический и когнитивный подходы для выявления как общих элементов наследия прагерманского языка, так и национально-специфических культурных маркеров. Особое внимание уделяется концептуальной метафоре, культурной символике (природа, животные, цвета) и взаимодействию языка с этнокультурной идентичностью. Результаты показывают, что фразеология выступает динамическим интерфейсом между языковой структурой и культурным сознанием в германской лингвистике.

Abstract

This article examines the linguo-cultural foundations of phraseological units within the Germanic language family. The study investigates structural, semantic, cognitive, and ethnocultural dimensions of phraseology in English, German, and selected Scandinavian languages. Phraseological units are analyzed not only as fixed linguistic formations but also as carriers of cultural memory, symbolic representation, and collective worldview. The research integrates comparative, typological, and cognitive approaches in order to identify both common Proto-Germanic heritage elements and nationally specific cultural markers. Particular attention is given to conceptual metaphor, cultural symbolism (nature, animals, colors), and the interaction between language and ethnocultural identity. The findings demonstrate that phraseology serves as a dynamic interface between linguistic structure and cultural consciousness in Germanic linguistics.

Ключевые слова: *фразеология, германские языки, лингво-культурология, культурная символика, концептуальная метафора, этнокультурные маркеры.*

Keywords*: phraseology, Germanic languages, linguo-culturology, cultural symbolism, conceptual metaphor, ethnocultural markers.*

Phraseology occupies a central position in Germanic linguistics as a domain where language, culture, and cognition intersect, reflecting centuries of historical development, socio-cultural transformation, and collective worldview. In the English, German, and selected Scandinavian languages, phraseological units are not only fixed linguistic expressions but also carriers of cultural memory and symbolic representation. Their study allows for a deep understanding of the interaction between language and ethnocultural identity. Germanic phraseology demonstrates a complex system in which idiomatic expressions preserve archaic meanings, metaphorical structures, and culturally encoded values. Linguo-culturology provides the theoretical and methodological framework for identifying ethnocultural markers, reconstructing historical symbolism, and interpreting national mentality through linguistic forms. Conceptual metaphor theory further clarifies how idioms originate from embodied human experience, showing shared cognitive models across Germanic languages, where metaphor is a reflection of both physical experience and culturally mediated conceptual structures. Structurally, phraseological units in Germanic languages exhibit stability, semantic unity, idiomaticity, and reproducibility. They include verb-based constructions, binomials, fixed collocations, and comparative models. Many idioms preserve lexical items that are archaic in modern usage, thus maintaining a historical dimension and linking contemporary speech with cultural heritage. Proto-Germanic heritage is apparent in idioms reflecting warrior ethos, nature-centered cosmology, and fatalistic outlooks, illustrating continuity between early Germanic culture and modern linguistic forms. Cultural symbolism in Germanic phraseology is manifested through nature, animals, and color imagery.

Storms often signify conflict or chaos, forests denote danger or mystery, and rivers or seas may symbolize journeys or fate. Animal symbolism is deeply rooted in mythology, where wolves often signify danger or aggression, ravens represent wisdom or prophecy, and bears embody strength or endurance. Colors function as evaluative markers, black often conveying secrecy or negativity, white purity or innocence, and red passion or danger. These symbolisms provide insight into collective cultural values, emotional perceptions, and ethical norms embedded in language. Despite shared heritage, national differentiation in phraseology is evident. English idioms frequently reflect maritime culture and trade practices, German expressions emphasize craftsmanship, discipline, and industrial life, whereas Scandinavian idioms often mirror northern landscapes, climatic conditions, and traditional folklore. Comparative analysis reveals structural and semantic parallels alongside culturally specific adaptations, confirming both typological unity and diversity within the Germanic language family. Phraseology functions as a semiotic bridge connecting linguistic form with cultural consciousness, allowing speakers to encode, transmit, and interpret social norms, historical experience, and collective worldview. Cognitive and cultural approaches integrated into the study of Germanic phraseology show that idioms embody conceptual models, metaphorical mappings, and ethnocultural codes, making them central to understanding the relationship between language and thought. The analysis of phraseological units demonstrates that language cannot be separated from culture, as idioms convey meaning not only lexically and syntactically but also culturally and cognitively. By examining phraseological units across English, German, and Scandinavian languages, researchers can identify Proto-Germanic roots, reconstruct historical conceptualizations, and detect the evolution of ethnocultural markers in different linguistic environments. This integrated approach highlights the interplay between inherited linguistic structures and innovative national adaptations, offering insights into both diachronic and synchronic dimensions of phraseology. Moreover, phraseology serves as a repository of cultural memory, preserving ancient worldviews, mythological motifs, and traditional practices embedded in everyday language. Idioms related to nature, animals, colors, social behavior, and moral values provide evidence of the enduring impact of cultural norms and collective experience on linguistic forms. The study of Germanic phraseology from a linguo-cultural perspective reveals that phraseological units are dynamic, multifunctional elements, functioning simultaneously as linguistic signs, cognitive models, and cultural symbols. Their analysis informs typological studies, cross-linguistic comparisons, and the development of pedagogical methods in Germanic philology, enhancing understanding of language as a cultural artifact. In conclusion, the linguo-cultural foundations of phraseological units in Germanic languages demonstrate that idioms serve as a crucial interface between linguistic structure and cultural consciousness. They encode historical experience, convey national and regional identity, and reflect both shared Germanic heritage and individual national adaptations. By integrating structural, semantic, cognitive, and ethnocultural perspectives, researchers can fully appreciate the multifaceted role of phraseology in shaping collective worldviews and mediating the relationship between language and culture. The insights gained contribute to Germanic linguistics, cognitive linguistics, and comparative philology, offering theoretical frameworks for further research in linguo-culturology and the study of language as a cultural phenomenon.

Linguo-culturology, as a branch of contemporary linguistics, examines the intricate interaction between language and culture, asserting that linguistic expressions are not neutral tools of communication but carriers of socially and historically conditioned cultural meanings. Within Germanic linguistics, phraseological units exemplify this principle as they encode collective beliefs, values, and traditions, reflecting both shared Proto-Germanic heritage and nationally specific cultural markers. The study of idioms, collocations, and fixed expressions reveals the embeddedness of cultural consciousness in linguistic structure, showing that phraseology functions as a semiotic interface linking cognitive processes with cultural identity. In English, German, and Scandinavian languages, many phraseological units preserve archaic lexemes, mythological motifs, and symbolic imagery, demonstrating the historical continuity of cultural representation within language. Linguo-culturological analysis enables researchers to identify ethnocultural markers that distinguish national varieties, reconstruct historical conceptualizations, and interpret idiomatic usage as a reflection of collective worldview. Methodologically, this approach integrates comparative and typological studies with cognitive linguistic principles, focusing on conceptual metaphor, cultural symbolism, and the social functions of idiomatic expressions. For instance, nature imagery, animal symbolism, and color representation in phraseological units provide insight into emotional, ethical, and cognitive frameworks of speech communities, revealing how environmental, historical, and socio-cultural factors shape language. By examining these units through a linguo-culturological lens, researchers can uncover both universal patterns shared across Germanic languages and culturally specific adaptations, highlighting the dynamic relationship between language, thought, and cultural identity. The integration of linguo-culturology with phraseological studies therefore not only enhances understanding of idiomatic meaning and structure but also demonstrates the inseparability of language and culture in Germanic philology, offering a robust framework for comparative, cognitive, and applied linguistic research.

Conceptual metaphor theory, originating in cognitive linguistics, posits that metaphor is not merely a stylistic device but a fundamental mechanism of human thought, shaping the way speakers perceive, conceptualize, and express abstract experiences. Within the framework of Germanic languages, idiomatic expressions often reflect underlying

conceptual metaphors, whereby abstract concepts are systematically mapped onto concrete, embodied experiences. For example, in English, phrases such as "time is money," "grasp an idea," or "the light of knowledge" illustrate mappings from concrete domains of economic activity, physical manipulation, and visual perception onto abstract concepts like temporal value, comprehension, and intellectual understanding. Similarly, German idioms such as "den Nagel auf den Kopf treffen" (to hit the nail on the head) or "das Herz auf der Zunge tragen" (to wear one's heart on the tongue) exemplify metaphorical conceptualization rooted in embodied experience and social practice. Scandinavian idioms often reflect environmental and cultural experiences, for instance, Norwegian expressions linking storms and adversity or Swedish idioms mapping journeys onto life challenges. Conceptual metaphor theory enables researchers to uncover these underlying cognitive patterns, demonstrating that phraseological units are structured not only semantically and syntactically but also cognitively, reflecting culturally mediated mental models. The analysis of metaphoric mappings in phraseology reveals both cross-linguistic universals, shared across the Germanic language family, and national or regional variations, reflecting specific historical, environmental, and socio-cultural conditions. By integrating conceptual metaphor theory with linguo-culturological analysis, the study of Germanic phraseology demonstrates how idioms encode complex cultural knowledge, shape collective perception, and mediate the interaction between language, thought, and culture. Conceptual metaphors thus function as cognitive and cultural scaffolding, allowing speakers to organize experiences, interpret reality, and transmit values across generations, while simultaneously preserving historical and ethnocultural continuity within phraseological systems.

Phraseological units in Germanic languages exhibit distinctive structural and semantic characteristics that distinguish them from ordinary lexical combinations. Structurally, these units display stability, reproducibility, and idiomatic integrity, meaning that their constituent elements combine in fixed or semi-fixed patterns to convey meanings that cannot be deduced from the sum of individual words. Verb-based constructions, binomial expressions, collocations, and phrasal templates constitute common structural types, and their internal organization often reflects syntactic constraints specific to each language while maintaining cross-linguistic parallels within the Germanic family. Semantically, phraseological units are notable for their idiomaticity, figurativeness, and conceptual cohesion. Many idioms preserve archaic lexemes, metaphorical meanings, and cultural connotations that reveal historical and ethnocultural continuity. For example, English expressions such as "kick the bucket" or "spill the beans" convey meanings entirely distinct from their literal interpretation, while German idioms like "auf Wolke sieben sein" (to be on cloud nine) or "mit jemandem ein Hühnchen rupfen" (to settle a score with someone) demonstrate similar metaphorical and cultural encoding. Scandinavian languages, including Swedish, Norwegian, and Danish, provide analogous units in which environmental, social, and historical experiences are embedded in linguistic form, often reflecting landscape, weather conditions, and folklore traditions. Phraseological units exhibit semantic cohesion through conventionalized meaning, metaphorical mapping, and conceptual blending, enabling speakers to convey complex ideas succinctly while embedding culturally relevant information. Furthermore, the interaction between structure and semantics highlights the cognitive dimension of idiomaticity, as speakers rely on mental schemata, cultural knowledge, and metaphorical reasoning to interpret and produce phraseological expressions. Comparative analysis across Germanic languages reveals both universal structural patterns and culturally specific semantic nuances, demonstrating that while phraseological units share typological characteristics, their semantic interpretation is mediated by national culture, historical development, and social context. In addition, phraseology often functions at multiple semantic levels simultaneously, combining literal, figurative, evaluative, and pragmatic meanings within a single unit, which enhances expressive potential and contributes to the richness of linguistic communication. Therefore, the study of structural and semantic characteristics of phraseological units provides insights not only into the organization of linguistic material but also into the cognitive and cultural processes that underlie the creation, transmission, and interpretation of idiomatic expressions in Germanic languages.

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SYSTEMIC-STRUCTURAL AND COMPARATIVE-TYPOLOGICAL STUDY OF ALGORITHMIC NEOLOGISMS IN ENGLISH AND RUSSIAN LANGUAGES

Abstract:
The rapid evolution of digital platforms, artificial intelligence, and search engine optimization (SEO) has introduced a new paradigm in modern linguistics: algorithmic neology. This paper provides a comprehensive, systemic-structural, and comparative-typological analysis of algorithmic neologisms—lexical units generated, modified, or popularized not by human cultural intuition alone, but driven by algorithmic logic and network architectures in English and Russian. Utilizing a mixed-method approach combining corpus linguistics, distributive semantic models, and componential analysis, the study reveals that algorithmic neologisms are not arbitrary borrowings but structured linguistic phenomena. The comparative analysis demonstrates that while English algorithmic neologisms predominantly rely on root compounding and conversion, Russian models favor morphological derivation through affixation, frequently adapting English stems into native grammatical paradigms. Ultimately, this research establishes the concept of algorithmic etymology, presenting a new framework for cognitive-metaphorical mapping in virtual discourse.

Keywords: *algorithmic neology, systemic-structural analysis, comparative-typological linguistics, computational linguistics, virtual discourse, SEO, Big Data.*

Introduction

The transition of human communication into ubiquitous digital spaces has transformed the vocabulary of natural languages at an unprecedented velocity. Traditionally, neologisms emerged from socio-cultural shifts, historical events, or individual literary creativity as noted by Crystal [3]. However, the contemporary linguistic landscape is increasingly governed by a non-human agent: the mathematical algorithm [5].

Social media feed algorithms, search engine optimization (SEO) protocols, and generative Artificial Intelligence models actively dictate, filter, and catalyze word formation. This phenomenon gives rise to algorithmic neologisms-lexical innovations whose structural dynamics, semantic expansion, and frequency distribution are determined by systemic network mechanisms. Following the pioneering frameworks of dynamic syntax and corpus adaptations established by Sinclair [10] and Biber [1], internet lexicology must now adapt to structural transformations occurring outside human-to-human interaction models.

Despite the proliferation of digital slang studies, a strict systemic-structural and comparative-typological investigation into how these algorithms reshape word-formation matrices across genetically and structurally distinct languages-such as English (analytic) and Russian (synthetic/inflected)-remains scarce. Shakhovsky [9] highlighted that emotional and ecological shifts in communication quickly alter lexical frameworks, yet the computational filter introduces an artificial bias [5].

This study aims to fill this vacuum by answering two fundamental research questions:

1. What are the systemic-structural matrices of algorithmic neologisms?
2. How do these lexical structures typologically differ or converge when integrated into the English and Russian linguistic systems?
3. Theoretical Framework and Methodology

Theoretical Foundations This research operates at the intersection of corpus linguistics, computational lexicology, and cognitive linguistics. We introduce the term algorithmic etymology to define a paradigm where a word's origin and semantic evolution are traced back to code constraints, algorithmic penalties (e.g., shadowbanning evasion), and digital platform architectures. In analyzing these layers, this paper draws upon Fillmore's [4] frame semantics to show how users reconstruct conceptual maps based on interface designs, as well as Langacker's [6] cognitive grammar to assess how algorithmic visibility status impacts linguistic prominence [6].

Methodological Approach To ensure high empirical validity, a mixed-method framework was applied to data collected between 2024 and 2026:

1. Corpus-Driven Analysis: Data was extracted from specialized web-corpora, social media APIs (X, Reddit, VKontakte, Telegram), and Google/Yandex search query logs (Big Data).
2. Systemic-Structural Modeling: Lexical units were disassembled into their constituent morphemes based on structural classification metrics derived from Matthews [8].
3. Comparative-Typological Method: Synchronous comparison was executed to map structural isomorphic (similar) and allomorphic (distinct) traits between English and Russian algorithmic coinages, utilizing the typological taxonomies advanced by Comrie [2].
4. Distributive Semantics: Word-embedding trajectories were analyzed qualitatively using vector alignments to capture shifts in semantic fields, employing computational models modeled after Levshina [7].
3. Systemic-Structural Analysis of Algorithmic Neologisms Algorithmic neologisms are highly systematic. Their structure is largely dictated by two opposing platform pressures: Optimization (maximizing algorithmic visibility via keywords) and Evasion (bypassing algorithmic censorship/content moderation filters).

Structural Subtypes Our taxonomy classifies these neologisms into three structural macro-categories:

1. Platform-Native Compounds: Words formed to describe intrinsic algorithmic actions.

2. Algospeak (Algorithmic Euphemisms): Orthographic or phonetic modifications designed to trick automated moderation algorithms.

3. Prompt-Driven Derivatives: Syntactic and lexical structures arising from human-AI interactions.

4. Comparative-Typological Mapping: English vs. Russian The structural realization of algorithmic neologisms depends heavily on the typological nature of the target language.

Regarding dominant mechanisms, English uses compounding, conversion, and blending, while Russian focuses on affixation (prefix-suffix) and transliteration with flexion. This follows the systemic boundaries predicted by Vinogradov [11] regarding the high adaptive capacity of Russian morphologic structures when internalizing external technical innovations [7].

For algorithmic euphemisms (algospeak), English employs phonetic substitutions and compounding (like unalive or seggs), while Russian uses graphic/Cyrillic-Latin blending and morphemic substitution (like roskomnadzornut). This shows high structural adaptability in Russian due to its rich morphology [8].

For AI/Prompt integration, English relies on direct conversion (to prompt, prompt engineer), while Russian uses borrowing with verbal suffixes (promptit, prompt-engineering). This shows that Russian requires immediate grammatical integration via paradigms.

Isomorphic Features (Similarities) In both languages, algorithmic neologisms exhibit an unprecedented reliance on visual and graphemic manipulation. Because moderation filters scan for specific character sequences, both English and Russian digital discourse utilizes character substitution (e.g., using symbols or numbers like @ or 3 to replace letters)[8].

Furthermore, both languages experience rapid semantic broadening of tech-specific terms into everyday cognitive metaphors (e.g., English shadowbanned and Russian v tenevom bane are now used to describe social isolation in real life), validating Lakoff and Johnson's [5] assertions that conceptual metaphors map concrete technological realities directly into abstract social behaviors[9].

Allomorphic Features (Differences) The divergence is rooted in morphology. English leverages its analytic plasticity. A noun like Algorithm easily undergoes zero-derivation (conversion) into a verb (to algorithmize), or blends effortlessly (algospeak).

Conversely, Russian cannot organically assimilate a foreign root without subjecting it to its rigid inflectional system. For instance, the English concept of algorithmic optimization or ghosting by an algorithm undergoes a complex morphological transformation in Russian, where the root "ban" turns into the Russian noun "ban", which becomes the verb "zabanit", and finally the reflexive/passive form "zabanenny"[10].

Russian shows a striking capacity for creating highly nuanced expressive verbs by using prefixes (vygorit v rekomendatsiyakh, zavisuritsya), a structural capability entirely absent in English without adding separate adverbs or prepositions.

5. Discussion: The Cognitive-Metaphorical Paradigm The results indicate that algorithmic neologisms are building a new system of cognitive metaphors. Human speakers are progressively mapping the structural mechanics of computers onto human behavior.

For example, when a Russian speaker says "Ya segodnya ne v algoritmakh" (meaning I am not feeling productive or lucky), or an English speaker notes that they are "optimizing their routine for the algorithm," the algorithm ceases to be a technical script. It becomes a pseudo-deity, an invisible hand shaping language and social hierarchy.

Traditional historical-comparative etymology tracks word migration through geographical migrations and physical trade. Algorithmic etymology demonstrates that word migration today occurs through digital node pathways. The speed at which an English algorithmic neologism is adapted into the Russian linguistic system via Telegram or VKontakte API networks is measured in days, completely bypassing traditional literary filter institutions.

6. Conclusion This systemic-structural and comparative-typological study underscores that algorithmic neologisms represent a structured, rule-governed linguistic evolution rather than chaotic internet slang.

While English utilizes its analytic agility to form concise compounds and conversions, Russian actively weaponizes its rich affixal and inflectional systems to internalize and morphologically adapt digital concepts. Both languages, however, are converging toward a shared virtual discourse dominated by algorithmic visibility and cognitive-computational metaphors.

The insights gathered from this study provide a solid foundation for computational lexicography, aiding in the development of more advanced NLP (Natural Language Processing) tools, dynamic translation software, and modern lexicographical databases capable of tracking real-time linguistic shifts in the era of Big Data and Artificial Intelligence.

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