

Svitlana Matvieieva and Ramunė Kasperė*

Intelligent translation systems: how to reproduce Ukrainian feminine forms in English

<https://doi.org/10.1515/psicl-2024-0084>

Received October 21, 2024; accepted February 5, 2026

Abstract: The paper deals with feminine units in Ukrainian and the problem of their machine translation to and from English. The purpose of the paper is to study how feminine units are translated from Ukrainian into English and vice versa by machine systems. To solve this problem, a qualitative comprehensive analysis was applied using a corpus-based approach and quantitative data verification. To study this issue, a corpus bitext was compiled consisting of an array of parallel texts in Ukrainian and English. Texts from mass media discourse have also been studied. Three intelligent translation systems were tested: Google Translate, DeepL, and GPT. The relevance of the study is also reinforced by the fact that it is based on the rules of the new Ukrainian orthography of 2019, which regulates the formation of feminine nouns in the modern Ukrainian language. The paper analyses and summarizes the types of errors (lexical-semantic and stylistic) in machine translation of gender-specific constructions. The research also contributes to improving the quality of machine translation of feminine units offering the practical recommendations for rendering Ukrainian feminines into English and English constructions that may have masculine and feminine equivalents into Ukrainian.

Keywords: feminines; machine translation; gender-specific translation; English; Ukrainian

1 Introduction

Humanity's age-old dream of delegating certain responsibilities to machines seems to have gained new momentum. More precisely, it has taken on a qualitatively new level with the emergence and rapid development of artificial intelligence systems.

***Corresponding author: Ramunė Kasperė**, Kaunas University of Technology, Kaunas, Lithuania,
E-mail: ramune.kaspere@ktu.lt

Svitlana Matvieieva, Kaunas University of Technology, Kaunas, Lithuania,
E-mail: svitlana.matvieieva@ktu.lt

One of the first areas where this new approach has been applied is natural language processing and translation.

Today, there are high hopes for intelligent information and communication systems that could effectively consider differences in grammatical and morphological structures of languages and also offer adequate solutions. Such differences have always posed a problem to the correct reproduction of texts in another language (especially when it comes to languages belonging to different language families, for example, Germanic and Slavic) and have been a significant challenge for translators. This aspect is particularly acute when it comes to reproducing specific grammatical constructions and forms used in one language but absent in another. One such form is feminitives in the Ukrainian language.

Traditionally, the Ukrainian language more often uses masculine forms of words to represent all human beings. Linguistic androcentrism, with its shift in focus towards the masculine gender, is replaced by a dichotomous approach, activating the formation of feminine units and forms. In recent years, we can observe an active and productive phase of forming feminine nouns from masculine ones, and the use of feminine gender-specific forms has significantly increased in the Ukrainian language, reflecting broader sociolinguistic and cultural shifts. Feminization is one of the most active and dynamic transformative processes in contemporary Ukrainian language, developing under the influence of both linguistic and non-linguistic factors (Starko and Synchak 2023). Despite the public's ambivalent attitude toward such words, they are increasingly appearing in spoken language and the media, which is why the issues of formation, standardization, and usage of feminitives are highly relevant today (Vakulenko 2018: 86).

Nouns that refer to a woman by her occupation, profession, or type of occupation, etc. are common in the Ukrainian language. Most of the world's languages do not have a grammatical gender category, which is a result of a general linguistic tendency toward the elimination of redundant means of expression (Vakulenko 2018: 87). Moreover, feminitives constitute one of the most numerous groups of neologisms, particularly in designations of women by profession (Karpilovska et al. 2024: 273), many of which have not yet been recorded in dictionaries or parallel text corpora. The vast majority of such Ukrainian nouns do not have direct equivalents in English, which creates a problematic issue when translating from Ukrainian into English and preserving the gender component of the text.

In contrast, English generally favours gender-neutral constructions, aligning with global trends toward inclusive and non-binary language use (Chulanova 2023). When feminine forms in Ukrainian are processed by machine translation systems, the resulting English output typically lacks any gender marking. The problem becomes even more acute when intelligent translation systems are used.

This phenomenon arises from two key factors: the significant grammatical and structural disparities between the languages, and differing sociolinguistic norms regarding gender expression. Consequently, these translations frequently obscure the source language's unique linguocultural features, thereby eroding extralinguistic nuances.

The aim of the paper is to study how the feminine units can be translated from Ukrainian into English and vice versa using machine translation systems. To address the question raised, the qualitative complex analysis with a corpus-based approach and quantitative data calculations were used.

2 Literature overview/theoretical framework

This work continues the research already carried out on the machine translation of natural gender phenomena from English to Italian, French and Spanish using the Google Translate, Bing Microsoft Translator and DeepL systems (Rescigno et al. 2020), from English to Finnish, Indonesian, Estonian, Turkish and Hungarian with DeepL (Barclay and Sami 2024), from English to Italian with Amazon Translate and DeepL (Savoldi et al. 2024), from English to Bengali, Farsi, Malay, Tagalog, Thai, and Turkish with ChatGPT (Ghosh and Caliskan 2023), and others. As for Ukrainian linguistics, previous research has focused on word-formation, lexical-semantic and stylistic features of the creation and use of femininitives (Arhanhelska 2019), and these have been given attention from the point of view of gender linguistics, linguistic-and-cultural studies (Brus 2019). The issue of translation of feminine units in languages that do not have a grammatical gender, both by a human translator and with the help of machine translation systems, is still under-reported. Given the importance that machine translation is gaining today, such research is necessary to study interlingual differences and inconsistencies from a new perspective – the processing of language material by machine tools – and to find ways to resolve them.

Femininitives are “words of the feminine gender, alternative or paired with analogous concepts of the masculine gender, which belong to all people, regardless of their sex” (Shevchenko 2016: 255). The English language is one without grammatical gender and in references to job titles and professions, feminine nouns have a long history of use (e.g., *princess*, *temptress*), as well as more recent additions (e.g., *manageress*, *hostess*) (Stevens and Pulijana 2023). However, in most cases in English, job titles and professions are not informative about the gender of the person mentioned.

Feminine nouns in Ukrainian are not a new phenomenon in this language, and they have long been characteristic of Ukrainian. In the first Ukrainian printed dictionary – *Lexis* by Lavrentiy Zyzanii (1596) – there were seven feminine units (e.g.,

ведмедиця ‘female bear’, *молодиця* ‘young woman’, *невістка* ‘daughter-in-law’, etc.). The *Dictionary of the Ukrainian Language* edited by Boris Hrynchenko, compiled in 1907–1909, also included more than 900 feminine lexical units (e.g., *арабка* ‘Arabian woman’, *багачка* ‘rich woman’, *продажука* ‘saleswoman’, *селяниця* ‘peasant woman’, etc.), and in the eleven-volume dictionary of the Ukrainian language (1970–1980), there were more than three thousand feminine nouns (Plachynda 2018: 5). Dictionaries of the Ukrainian language of the post-Soviet era responded to changes in society and the dynamics of the Ukrainian language and included entries for the feminine units: *анатоминя* ‘female anatomist’, *єпископиня* ‘bishopess’, *запитальниця* ‘woman who asks’, *кінокритикиня* ‘female cinema critic’, *міністерка* ‘female minister’ (Neliuba 2012), *експансіоністка* ‘female expansionist’, *клуберка* ‘club girl’, *миротвориця* ‘female peacemaker’, *співредакторка* ‘female co-editor’, *фемениш* ‘woman from Femen’ (Neliuba and Redko 2017) and others.

The new “Ukrainian Orthography”, developed by the Ukrainian National Commission on Orthography and approved by the Resolution of the Cabinet of Ministers of Ukraine No. 437 “Issues of Ukrainian Spelling” dated May 22, 2019, fixed the status of nouns referring to females through the regulation of rules for writing noun-forming suffixes. Such nouns are formed from masculine nouns using suffixes -к- (e.g., *автор* – *авторка* ‘male author – female author’, *дизайнер* – *дизайнерка* ‘male designer – female designer’, *директор* – *директорка* ‘male director – female director’, *редактор* – *редакторка* ‘male editor – female editor’, *співак* – *співачка* ‘male singer – female singer’, *студент* – *студентка* ‘male student – female student’, *фігурист* – *фігуристка* ‘male skater – female skater’), -иц- (e.g., *верстальник* – *верстальниця* ‘male layout designer – female layout designer’, *набірник* – *набірниця* ‘male typist – female typist’, *порадник* – *порадниця* ‘male counsellor – female counsellor’, *учень* – *учениця* ‘schoolboy – schoolgirl’), -ин- (e.g., *кравець* – *кравчиня* ‘tailor – tailoress’, *плавець* – *плавчиня* ‘male swimmer – female swimmer’, *продавець* – *продавчиня* ‘salesman – saleswoman’, *майстер* – *майстриня* ‘male master – female master’, *філолог* – *філологиня* “), -ес- (e.g., *диякон* – *дияконеса* ‘deacon – deaconess’, *патрон* – *патронеса* ‘patron – patroness’, *поет* – *поетеса* ‘poet – poetess’) (Ukrainiyskyi pravopys 2019: 27). The “Ukrainian Orthography” has official status, is mandatory for use, and remains in effect.

In 2020, an Order of the Ministry for Development of Economy, Trade and Agriculture of Ukraine officially affirmed the legality of using feminines in personnel documents: “At the user’s request, when entering a job title in the personnel documentation of a particular employee, professional job titles may be adapted to reflect the female gender of the person performing the corresponding work” (Order 2020). Among the examples listed in the Order are the following:

інженер ‘engineer’ – *інженерка*, *верстатник широкого профілю* ‘machine tool operator/broad profile’ – *вертатниця широкого профілю*, *соціолог* ‘sociologist’ – *соціологіня* (ibid).

The same year, as part of the EU-UNDP Parliamentary Reform Project the handbook “Effective Communication: Practical Recommendations for Committee Secretaries of the Verkhovna Rada of Ukraine” was published (Titarenko et al. 2020). Its aim was to support the implementation of the communication strategy of the Verkhovna Rada (Parliament) of Ukraine. The authors emphasize the mandatory use of feminine nouns in official Ukrainian-language texts, as their usage is codified in the new edition of the Ukrainian Orthography (Ukrainskyi pravopys 2019) – “The use of feminine nouns is now officially established in the new edition of the Ukrainian Orthography. This is not a joke, but a reflection of updated rules in the Ukrainian language. So let’s learn together: *авторка* ‘authoress’, *директорка* ‘female director’, *журналістка* ‘female journalist’, *консультантка* ‘female consultant’, *експертка* ‘female expert’, and so on. Moreover, one should never say about a woman anything that would not be said about a man” (Titarenko et al. 2020: 42).

In 2021, the National Commission on State Language Standards provided recommendations on the formation and use of professional titles in the diplomatic sphere to promote gender equality. To implement gender-sensitive language principles, two strategies are applied: neutralization and/or feminization (or, when necessary, masculinization) (Recommendations 2021). The document notes that the Ukrainian language is inflectional, which means the strategy of gender neutralization can only be applied partially. Currently, gender sensitivity in Ukrainian can be advanced by gradually increasing the use of feminine forms of nouns to denote professions (ibid). In the diplomatic sphere in general – and in texts issued on behalf of the President of Ukraine in particular – feminitives are used as a means of expressing respect for women, which aligns with the core values of the Ukrainian value system (Makarets 2024; Naumkina and Surova 2024). So, the primary purpose of using feminitives in contemporary Ukrainian is to reinforce the role of women in society – especially in the context of war – and to reflect the public’s growing desire to express linguistic respect toward women through the use of gender-specific lexemes when referring to them.

After the official update of the rules for writing feminine names, researchers of feminitives have been directing their efforts towards actively compiling dictionaries and vocabularies of words that refer to women. Thus, in 2022 the *Web dictionary of feminine names in the Ukrainian language* was published (Synchak 2022b). That same year, the *Alphabet of Feminitives* appeared – a resource with the dictionary of Ukrainian names for women in the military and displaced women (Synchak 2022a). It contains over 100 units, among which 73 names were taken from the *Web dictionary of feminine names in the Ukrainian language* (Synchak 2022b) and the other 27 were

processed to ensure gender parity in Ukrainian media representation (Synchak 2022a).

The current situation is characterized by both an increased use of existing feminitives and the creation of new feminine forms. The use of feminitives to refer to women is one of the principles of barrier-free language (Makarets 2024). Starko and Synchak (2023) state that the feminine personal nouns started rapidly gaining popularity after 2015. Moreover, an important role in this process is played by the desire for the fullest realization of the word-formation potential inherent in the Ukrainian language, which shapes its uniqueness (Taranenko 2015). The female equivalents of the names of professions in Ukrainian are usually formed from masculine nouns by adding feminine suffixes and endings (e.g., *журналіст* ‘journalist’; a noun naming a man by profession) + *к* (suffix to denote persons of the female gender) + *а* (ending); *секретар* (‘secretary’; a noun naming a man by profession) + *и* (suffix to denote persons of the female gender) + *а* (ending)). At the same time, the Ukrainian language has a number of nouns denoting professions that do not have masculine equivalents in any way (e.g., *ворожка* ‘female fortune teller’], *домогосподарка* ‘housewife’], *друкарка* ‘female typist’, *економка* ‘female housekeeper’, *манікюрниця* ‘female manicurist’, *нянька* ‘female nanny’, *покоївка* ‘maid’, *швачка* ‘female dressmaker’).

Both analytical and synthetic constructions are often used to express the feminine component. The existence of multiple variants of feminitives indicates intense competition among different word-formation models. Given the established nature of diplomatic protocol and the dynamic processes in feminitive formation, the use of an analytical construction combining *пані* ‘madam’ with a professional title – such as *пані міністр* ‘madam minister’, *пані консул* ‘madam consul’, or *пані посол* ‘madam ambassador’ – is a possible strategy for promoting gender equality in naming high-ranking state positions in the diplomatic sphere (Recommendations 2021). It is obvious that “feminine derivatives appear to be a subsystem in the making in Ukrainian. It is at the stage of formation and experimentation with a plethora of variant forms competing for supremacy” (Starko and Synchak 2023).

The specifics of artificial intelligence algorithms and the nature of training data – often reflecting entrenched gender stereotypes – frequently result in gender bias in machine translation, particularly when translating between languages with different grammatical systems, such as English and Ukrainian. Automated translation systems often fail to account for the grammatical and cultural features of the Ukrainian language and tend to default to masculine forms, even when context clearly indicates that the subject is female. This highlights the importance of incorporating gender-sensitive language processing and contextual awareness into AI systems, especially for languages with rich inflectional morphology like Ukrainian (Moroz 2025).

To comprehensively investigate the translation of feminine nouns by contemporary AI-driven translation technologies, three widely adopted and technologically diverse intelligent translation systems were selected for analysis: Google Translate (<https://translate.google.com>), DeepL (<https://www.deepl.com>), and GPT (specifically, ChatGPT 3.5 – <https://chat.openai.com>, and Translate GPT – <https://chatgpt.com/g-g-5bNPPaVZy-translate-gpt>).

This selection was driven by several critical factors. First, these systems represent advanced and publicly accessible examples of various prevalent paradigms in natural language processing for machine translation. Google Translate, a pioneer in both statistical and more recently neural machine translation, exemplifies a well-established paradigm of self-learning. DeepL, while also based on neural networks, distinguishes itself with an emphasis on convolutional neural network architecture and enhanced lexical precision, and is often praised for its nuanced contextual understanding. GPT, as a large language model employing reinforcement learning from human feedback, embodies a distinct and rapidly evolving approach to translation – one that differs significantly from traditional machine translation mechanisms by generating output through a generative rather than strictly translational process. This technological diversity enables a comparative analysis across the full spectrum of modern AI-based translation methodologies, offering insight into how different underlying algorithms handle gender-specific linguistic features.

Second, the focus on these freely accessible and widely used systems ensures the practical relevance of our findings. While acknowledging that paid versions of this and other translation software (such as PROMT) may provide enhanced performance or features, our study aims to reflect the translation landscape encountered by most everyday users and, those professionals who integrate these readily available tools into their workflows. The choice of these commonly used systems is directly related to their significant impact on global usage, making their effectiveness in gender-sensitive translation a highly pertinent area of investigation.

3 Methodology

Two main cases of using femininities are analysed in this work: Ukrainian-to-English translations of addresses (nouns and pronouns) to readers/listeners of male and female gender and English-to-Ukrainian translations of nouns naming women by profession/occupation/type of activity. The research is focused on feminine nouns available in Ukrainian but absent in English. We do not consider the nouns with available direct equivalents in two languages such as (Eng.) *actress* – (Ukr.) *актриса*, (Eng.) *waitress* – (Ukr.) *офіціантка*, etc.

The research is based on texts from the year 2023 to enable maximum objectivity in quantitative assessments, and it considers the dynamics of social processes, technical progress, and, accordingly, the speed of language transformations. The empirical data is selected from speeches by the President of Ukraine as a source of modern, exemplary, and official texts in Ukrainian and their translation into English (The Presidential Office of Ukraine 2023).

The President's speeches were chosen as influential and authoritative texts through which certain speech traditions emerge and become established in society. The specific nature of the Ukrainian President's addresses during wartime – namely, the fact that they are made public daily – has accentuated the importance these texts have to Ukrainian society. Moreover, the feminization of the Ukrainian language in the sphere of official and business communication is only beginning (Recommendations 2021).

To identify the specifics of the translation of Ukrainian feminine nouns into English and English nouns that have masculine and feminine equivalents in Ukrainian, random examples were also selected from media texts from 2023, provided by two official websites of news media: Ukrinform (<https://www.ukrinform.ua>) and the BBC (<https://www.bbc.com>). Our selection of examples is illustrative and does not constitute an absolutely representative and complete empirical database.

In this paper, we avoid the issues of political correctness and focus solely on the linguistic (specifically, translation and post-editing) aspects. We also do not analyse how the examined texts are perceived by individuals who identify as non-binary – people whose gender identity does not conform to the traditional binary system of “male/female” and who may identify partially or entirely outside of these two categories, or who do not identify with either. This distinction is important, as the current focus is on feminization within the binary framework, without addressing the perspectives or linguistic needs of those beyond it.

The following data collection techniques and methodological approaches were used for the research: **component analysis** – to identify the semantic components of the units' meanings; **definitional analysis** – to clarify the interpretation of words; **distributional analysis** – to identify the contextual environment, the combinational potential and properties of the studied units; **comparative analysis** – for comparative interpretation of semantic structures of words in English and Ukrainian languages; **corpus data extraction** – for collecting empirical data from corpus; **concordance analysis** – for the analysis of a set of words and connections between them; **corpus verification** – verification of the received data in the corpus; and **quantitative calculations** – for calculating research results and measuring objective indicators.

The following steps were used for the analysis:

- 1) compilation of a corpus of texts (634,354 words) from the speeches of the President of Ukraine from the official website of the President (The Presidential Office of Ukraine 2023) in Ukrainian (278,941 words) and their translations into English (355,413 words);
- 2) an exhaustive sampling of lexical units, which allowed us to select the units for analysis and compile a register of constructions (244 unique constructions used 1,573 times) with masculine and feminine nouns in the Ukrainian language. From the selected units, 60 % consist of personal addresses to specific individuals (e.g., *Пане Президенте Гітанасе!* ‘Mr. President Gitanas!’), cities (e.g., *І дякую, Вільнюсе, за емоції!* – eng.: ‘And thank you, Vilnius, for the emotions!’), etc. These units were not included in our quantitative calculations. Thus, the comprehensive sample, after further qualitative selection of units for analysis, consisted of 98 unique constructions used 1,148 times. This data forms the basis for the quantitative calculations in this research.
- 3) dictionary (definitional, component, comparative) analysis of Ukrainian feminine nouns and their English equivalents (explanatory, bilingual);
- 4) contextual (distributional, concordance) analysis of language units (words, sentences, phrases);
- 5) corpus verification and quantitative calculation of the results.

To understand the prerequisites and possibilities of intelligent translation systems in reproducing gender-specific units, we referred to the sections with guidelines for working with such units and their translation.

“Google Translate Help” (2024) provides detailed information for gender-specific translation. It says that “...in some languages, you can get both feminine and masculine translations for some gender-neutral words, phrases and sentences...” and specifies that “...some content is gender-neutral or gender-ambiguous. For example, some nouns aren’t gender-specific in the original content but are gender-specific in the translated language” (Google Translate Help 2024).

Both in the “DeepL Help Center” (2024) and “ChatGPT | OpenAI Help Center” (2024) we could not find any explanations for gender-specific translation. However, a query sent to ChatGPT-3.5 about gender-specific nouns in Ukrainian and their translation into English, received these answers, demonstrating the availability of this information in its database (February 01, 2024):

- *Do you know the difference between these two Ukrainian words: захисник and захисниця?*
- *Yes, I do. “Захисник” (zakhysnyk) is the Ukrainian word for “defender” or “protector”, and it is used to refer to a male defender or someone who protects others. On the other hand, “захисниця” (zakhysnytsia) is the female counterpart of*

“захисник” and translates to “defender” or “protector” in the context of a woman who defends or protects others. So, “захисник” is a male defender, and “захисниця” is a female defender in Ukrainian.

- *Can you translate these words correctly?*
- *Certainly! Here are the translations for the Ukrainian words:*
- *“захисник” translates to “defender” (or “protector”) in English.*
- *“захисниця” translates to “defender” (or “protector”) in English, specifically referring to a female defender.*
- *Can you translate these words literally?*
- *Certainly! Here are the literal translations of the Ukrainian words:*
- *“захисник” translates to “defender” or “protective person”.*
- *“захисниця” translates to “defender” or “protective woman”.*

As we can see, the presence of certain grammatical information in the database relating to the differences between nouns denoting men and women in Ukrainian does not allow this system to correctly and accurately translate such units into English.

Having analysed some introductory information, we posed these three key questions for our research:

- 1) Is it possible to fully apply intelligent systems for translating Ukrainian feminines into English?
- 2) Do such translations require human post-editing?
- 3) In the case of an unsatisfactory translation result, what steps should be taken to improve the quality of such translations?

4 Analysis and results

In the analysed texts, out of 98 unique address constructions, 85 units (85 %) are singular masculine nouns (e.g., *воїне* ‘warrior’, *солдате* ‘soldier’) or plural (e.g., *партнери* ‘partners’, *харків’яни* ‘Kharkiv residents’), and adjectives used as nouns (e.g., *присутні* ‘attendees’, *шановні* ‘dear friends’). The corpus of units for the study contains 13 unique constructions (13 %) used 347 times out of the total of 1,148 (30 %), in which masculine and feminine nouns or pronouns are used.

Table 1 shows the examples of the address of the President of Ukraine to male and female addressees translated from Ukrainian into English. Gender-marked units and their gender-specific and neutral equivalents – nouns and pronouns (correct and erroneous) are given in bold.

The gender-specific units in the Ukrainian texts are represented by nouns (*захисник/захисниця* (used four times; relative frequency 0.0000143/0.00143 %),

Table 1: Address of the President of Ukraine to male and female addressees (<https://www.president.gov.ua>) translated from Ukrainian into English.

Source text (Ukr)	Official (human) translation (Eng)	Machine translation (Ukr → Eng)		
		Google translate	DeepL	GPT
		ChatGPT-3.5		
		Translate GPT		
1	Бажаю здоров'я, шановні українці, українки!	1. I wish you good health, dear Ukrainian men and women! 2. I wish you good health, dear Ukrainians!	I wish you health, dear Ukrainians!	Greetings to you, esteemed Ukrainian men and women!
2	Шановні захисники й захисниці!	1. Dear defenders! 2. Dear defenders and protectors!	1. Dear defenders! 2. Dear defenders of the world!	Dear defenders, both men and women!
3	Дорогі студенти, студентки!	1. Dear students! 2. Dear students, female students!	Dear students!	Dear students, both male and female!
4	Шановні учасники й учасниці конференції!	1. Dear participants of the conference! 2. Dear conference participants and participants!	1. Dear participants of the conference! 2. Dear conference participants!	Dear participants of the conference, both men and women!
5	Шановні представники й представниці бізнесу!	1. Dear business representatives! 2. Dear representatives of the business!	1. Dear business representatives! 2. Dear representatives of business! 3. Dear businessmen and women!	Dear representatives of the business community, both men and women!

Table 1: (continued)

Source text (Ukr)	Official (human) translation (Eng)	Machine translation (Ukr → Eng)		
		Google translate	DeepL	GPT
		ChatGPT-3.5		
		Translate GPT		
6 Кожен і кожна, хто присвятив своє життя захисту нашої держави та незалежності!	Everyone who dedicated life to the defense of our state and independence!	1. Everyone who dedicated his life to the defense of our state and independence! 2. Everyone who dedicated his life to the protection of our state and independence!	Each and every one of you who dedicated your life to protecting our country and independence!	Everyone who has dedicated their life to the defense of our state and independence! Everyone, both men and women, who have dedicated their lives to defending our country and independence!
7 Шановні пані та панове!	Dear ladies and gentlemen!	1. Ladies and Gentlemen! 2. Dear ladies and gentlemen!	1. Dear ladies and gentlemen! 2. Ladies and gentlemen!	Dear ladies and gentlemen! Ladies and gentlemen!

пан/пані (used 120 times; relative frequency 0.000430/0.0430 %), *представник/представниця* (used three times; relative frequency 0.0000108/0.00108 %), *студент/студентка* (used one time; relative frequency 0.0000036/0.00036 %), *українець/українка* (used 206 times; relative frequency 0.000738/0.0738 %), *учасник/учасниця* (used three times; relative frequency 0.0000108/0.00108 %) and pronouns (*кожен/кожна* (used two times; relative frequency 0.0000072/0.00072 %)). There are several words in machine translations used to represent the feminine and masculine nouns in English: *men and women*, *male and female*, *female students*, *businessmen and women*. Only the last one (*ladies and gentlemen*) is correctly used both stylistically and grammatically.

To ensure a comprehensive understanding of the lexicographic status and translational equivalents of specific nouns and pronouns corresponding to gender, we consulted various Ukrainian explanatory and bilingual dictionaries. This analysis helped contextualize their usage in the presidential speeches and to assess potential challenges in gender-sensitive translation.

Various explanatory dictionaries of the Ukrainian language present not all, but several feminine nouns:

захисниця – “жін. до *захисник*” (‘female for *defender*’ – hereinafter the definitions are translated by the authors of the paper) (Busel 2005: 432); “1 - та, хто захищає громадян своєї країни, охороняє територіальну цілісність своєї держави; 2 - та, хто захищає, охороняє когось або щось від нападу, замаху, ворожих, небезпечних дій та ін.; 3 - та, хто здійснює захист у складі спортивної команди під час гри у футбол, хокей та ін.” ‘1 - she who defends the citizens of their country, protects the territorial integrity of their state; 2 - she who defends, protects someone or something from attack, attempt, hostile, dangerous actions, etc.; 3 - she who defends, provides protection as part of a sports team during football, hockey, etc.’ (Synchak 2022a);

представниця – “жін. до *представник*” (‘female for *representative*’) (Busel 2005: 1105);

студентка – “жін. до *студент*” (‘female for *student*’) (Busel 2005: 1406);

українка – “див. *українці*” (‘see *Ukrainians*’) (Busel 2005: 1502);

учасниця – no entries in the dictionaries used.

Explanatory dictionaries are typically descriptive in nature, aiming to document language as it is used. When a feminine form is indicated – especially with a direct definition such as “жін. до *захисник*” – this suggests a certain degree of established usage.

The bilingual Ukrainian–English dictionaries of general vocabulary give different entries. For some units there are separate entries for masculine and feminine forms, and for others, only records for the masculine forms:

захисниця – “protectress” (Krysenko 2005: 647);

захисник – “1 - defender, protector; advocate; 2 - counsel for the defence” (Zhuktenko et al. 1995: 132); “1 - defender, protector; 2 - counsel for the defence; 3 - back” (Malyshev 2000: 658); “1 - defender; 2 - protector; 3 - shield...” (Krysenko 2005: 647);

представник – “representative” (Zhuktenko et al. 1995: 287; Malyshev 2000: 800); “1 - representative; 2 - specimen” (Krysenko 2005: 860);

студент – “student” (Malyshev 2000: 857; Krysenko 2005: 920);

учасник – “participant; member; competitor” (Zhuktenko et al. 1995: 377; Malyshev 2000: 876; Krysenko 2005: 934).

Bilingual dictionaries focus on providing translation equivalents. Their entries reflect what is considered an appropriate translation. When they offer separate entries for masculine and feminine forms, this suggests distinct English equivalents (e.g., *protectress*) or at least recognition of gender differentiation. Although less common in modern English, this translation is a direct feminine equivalent. If the masculine form only is listed, it implies that the masculine form is either the standard or encompasses both genders in translation, or that a direct feminine equivalent is not standard in English.

For the nouns *студент/студентка*, *українець/українка*, the translation equivalents are indicated in the same dictionary entries. For the feminine forms of these nouns, the dictionaries indicate the word formation model: from the male noun (*студент*, *українець*) by adding a feminine suffix (-к) and an ending (-а):

студент, -ка – “student” (Zhuktenko et al. 1995: 355);

українець, -ка – “Ukrainian” (Zhuktenko et al. 1995: 374; Malyshev 2000: 873; Krysenko 2005: 932).

The explicit indication of the word-formation model (suffix -к-) for words like *студент*, *студентка* and *українець*, *українка* in bilingual dictionaries (Zhuktenko et al. 1995) confirms that these feminized forms are recognized and readily derived from their masculine counterparts, indicating a high degree of linguistic transparency in their formation.

The nouns *пан* and *пані* have a special place – their translation equivalents are given in separate dictionary entries.

In explanatory dictionaries, the following entries can be found

пан – “3 - в Україні та деяких інших країнах – ввічлива форма звертання або називання стосовно до осіб чоловічої статі; у сучасній дійсності – ввічлива форма згадування або

звертання” (‘in Ukraine and some other countries – a polite form of address or naming regarding male individuals; in modern usage – a polite form of mention or address’) (Busel 2005: 880);

пані – “в Україні та деяких інших країнах – ввічлива форма звертання або називання стосовно до осіб жіночої статі; у сучасній дійсності – ввічлива форма звертання, згадування; шаноблива форма звертання до жінки в усній народній мові” (‘in Ukraine and some other countries – a polite form of address or naming regarding female individuals; in modern usage – a polite form of address, mention; a respectful form of addressing a woman in oral folk language’) (Busel 2005: 881).

In bilingual dictionaries, the provided equivalents are the following:

пан – “1 - gentleman; Sir; 2 - Mr.” (Zhuktenko et al. 1995: 248); “gentleman; Sir; Mr.” (Malyshev 2000: 766); “1 - gentleman; 2 - Sir; 3 - Mr.” (Krysenko 2005: 814);

пані – “1 - lady; 2 - Mrs.; Miss” (Zhuktenko et al. 1995: 248; Krysenko 2005: 814); “lady; Mrs.; Miss” (Malyshev 2000: 766).

The online resource Reverso Context, which contains bilingual texts processed by artificial intelligence algorithms, offers the following translation options for this construction: out of 344 sentences containing the construction *пані та панове*, 299 (87 %) were translated with the etiquette equivalent *ladies and gentlemen* (Reverso n. d.) – a “phrase used to talk to the members of the audience when you are making a speech” (Cambridge-1 n. d.).

The distinct treatment of the words *пан* and *пані* in separate, detailed entries in both explanatory and bilingual dictionaries highlights their established role as independent, gender-specific forms of polite address in Ukrainian culture. Their direct English equivalents (*Mr./Mrs./Miss*) reflect a similar – though not identical – binary system of address, which makes their translation relatively straightforward in terms of gender.

In Ukrainian, the masculine gender is identified with the common gender, and in the majority of the studied cases (62 %), when using masculine and feminine nouns in the same construction, the masculine noun stands in first place. In all but one constructions, the masculine noun precedes the feminine noun; the one construction that differs (*Шановні пані та панове!*) being an etiquette formula of address. It is translated with a stable phrase which explains the identity of human and machine translations.

Pronouns (*кожен/кожна* ‘each’ or ‘every’) are translated in different manners: a human translator (similar to Google Translate and GPT) uses the pronoun *everyone*, and DeepL gives the construction *each and every one of you*, which is an idiomatic phrase “used as a more forceful way of saying *each*” (Merriam-Webster n. d.) and “to emphasize that you are talking about every person or thing in a group” (Longman

n.d.). All three systems add more pronouns: Google Translate uses *his*, DeepL – *your*, ChatGPT-3.5, Translate GPT – *their*. Considering that this is how the machine translation systems are intended to support translation of feminine pronouns, the strategy of adding personal pronouns is erroneous.

In some cases, machine translation systems, attempting to reproduce both forms of nouns from the original texts (masculine and feminine ones), used either the same noun twice (учасники й учасниці → *participants and participants*), or synonyms of tautological nature (захисники й захисниці → *defenders and protectors*), which is an incorrect translation of Ukrainian feminine nouns in both cases. Such translation variants were identified in the results of Google Translate.

Only one system – Translate GPT – reproduced the gender component in every translated sentence by adding the construction ‘*both ... and ...*’ (*both men and women, both male and female*) which is “used to emphasize that something is true not just of one person, thing, or situation but also of another” (Longman n.d.).

As previously stated, examples from English–Ukrainian and Ukrainian–English media texts are included for additional illustration. Table 2 shows examples taken from media texts of Ukrainian → English translation of nouns naming women by profession/occupation/type of activity. The units and/or grammar markers indicating gender are given in bold.

It was predicted – and our analysis confirmed this hypothesis – that in three examples (1, 2, 4) gender-neutral counterparts without any additional gender markers were used for the English translation. However, in example 3, both the human translation and two of the three analysed machine translations (DeepL, GPT) use the personal pronoun *her*, which, on the one hand, is inherent in such constructions of the English language, but on the other, declares to some extent the presence of a gender component in the original text.

Table 3 shows examples of English → Ukrainian translation of nouns from media texts naming women by profession/occupation/type of activity. The units and/or grammar markers indicating gender are given in bold.

The nouns *head*, *prof*, *teacher* have two forms in Ukrainian: masculine (*директор*, *професор*, *вчитель*) and feminine (*директорка*, *професорка*, *учителька*). In the explanatory dictionaries of the Ukrainian language, these nouns are presented in the following way:

учителька – “жін. до *учитель*” ‘female for *teacher*’ (Busel 2005: 1523);

директорка – “жін. до *директор*” ‘female for *director*’ (Busel 2005: 297);

завідуюча – “жін. до *завідуючий*” ‘female for *head*’ (Busel 2005: 380);

Table 2: Ukrainian–English translation of nouns naming women.

Source text (Ukr) https://www.ukrinform.ua	Official (human) translation (Eng) https://www.ukrinform.net	Machine translation (Eng → Ukr)		
		Google translate	DeepL	GPT
		ChatGPT-3.5		
		Translate GPT		
1	Як пишуть пропагандисти, таке фото їм надіслала вчителька з цієї школи, а за її словами, це – донос на батьків.	According to the propagandists, such a photo was sent to them by a teacher from this school, and, according to her , it is a denunciation of parents.	According to the propagandists, this photo was sent to them by a teacher from this school, and, according to her , it is a denunciation against the parents.	As propagandists write, such a photo was sent to them by a teacher from this school, and according to her , this is an accusation against the parents.
2	Про це під час презентації аналітичного звіту ... повідомила дослідниця, завідувачка кафедри, професорка Державного Біотехнологічного Університету Наталія Савицька .	Researcher, head of the department, professor of the State Biotechnological University Nataliya Savitska informed about this during the presentation of the analytical report.	This was announced during the presentation of the analytical report ... by Natalia Savitska, researcher, head of the department, professor at the State Biotechnological University, Nataliya Savitska , during the presentation of the analytical report.	This was reported by researcher, head of the department, and professor at the State Biotechnological University, Nataliya Savitska , during the presentation of the analytical report.
3	В Україні 15 листопада 2022 року розпочала роботу представниця ЮНЕСКО, професорка зі збереження архітектури Кяра Бардескі .	On November 15, 2022, the representative of UNESCO, professor of architectural conservation Chiara Bardeschi , started her work in Ukraine.	On 15 November 2022, a representative of UNESCO, Professor of Architectural Conservation Chiara Bardeschi , began her work in Ukraine.	In Ukraine, on November 15, 2022, UNESCO representative and professor of architectural preservation Chiara Bardeschi began her work.

Table 2: (continued)

Source text (Ukr) https://www.ukrinform.ua	Official (human) translation (Eng) https://www.ukrinform.net	Machine translation (Eng → Ukr)		
		Google translate	DeepL	GPT
				ChatGPT-3.5
				Translate GPT
4 Директорка книгозбірні Надія Коротун повідомила, що пошкоджено покрівлю бібліотеки, понад 30 вікон...	The library director, Nadia Korotun, reported that the roof of the library, more than 30 windows... were damaged.	Director of the library, Nadiya Korotun, reported that the roof of the library, more than 30 windows... were damaged.	The director of the library, Nadiya Korotun, reported that the roof of the library, more than 30 windows... were damaged.	The director of the library, Nadiya Korotun, reported that the library's roof was damaged, along with more than 30 windows...

Table 3: English–Ukrainian translation of nouns naming women.

Source text (Eng) https://www.bbc.com	Official (human) translation (Ukr) https://www.bbc.com/ukrainian	Machine translation (Eng → Ukr)			
		Google translate	DeepL	GPT	
		ChatGPT-3.5			Translate GPT
1 Epsom College head Emma Pattison found dead with husband and daughter.	Директорку приватної школи в Англії вбили разом з усією родиною.	Директор коледжу Епсом Емма Паттісон знайдена мертвою разом з чоловіком і дочкою.	Завідуюча коледжем Емма Паттісон знайдена мертвою разом з чоловіком і дочкою.	Голова коледжу Епсом Емма Паттісон знайдена мертвою разом із чоловіком і дочкою.	
2 Prof Julie Williams says research towards a treatment for Alzheimer's is accelerating.	Професорка Джулі Вільямс каже, що дослідження щодо лікування хвороби Альцгеймера прискорюються.	Професор Джулі Вільямс каже, що дослідження щодо лікування хвороби Альцгеймера прискорюються.	Професорка Джулі Вільямс заявляє, що дослідження в напрямку пошуку лікування для хвороби Альцгеймера набирає обертів.	Професорка Джулі Вільямс каже, що дослідження в напрямку лікування хвороби Альцгеймера прискорюються.	
3 The teacher who lost all 32 of her pupils.	Вчителька, яка вміє втратила всіх своїх 32 учнів.	Вчителька, яка втратила всіх 32 своїх учнів.	Вчителька, яка втратила всіх 32 своїх учнів.	Вчителька, яка втратила всіх своїх 32 учнів.	
4 She plans to continue her career in teaching...	Несрін планує продовжити свою кар'єру вчительки...	Вона планує продовжувати свою кар'єру вчителя...	Вона планує продовжити свою кар'єру викладача...	Вона планує продовжити свою кар'єру у викладанні...	

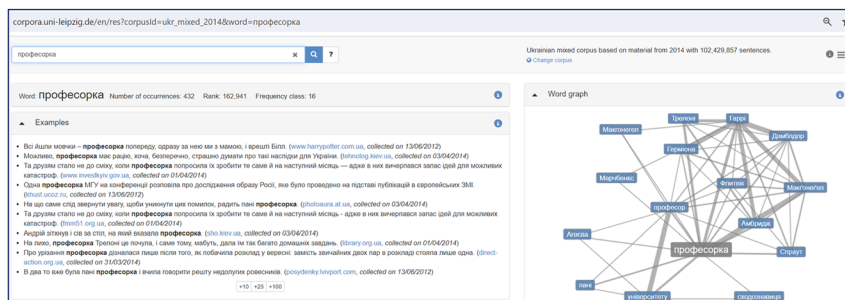


Figure 2: The feminine noun *професорка* in the Leipzig Corpora Collection.

professor – “професор” (Malyshev 2000: 332; Krysenko 2005: 396; Fedoryshyn 2009: 125); “професор, викладач” (Cambridge-2 n.d.);

teacher – “у/вчитель” (Malyshev 2000: 436; Fedoryshyn 2009: 161); “у/вчитель(ка), викладач(ка)” (Krysenko 2005: 454; Cambridge-2 n.d.).

Most traditional dictionaries published before 2019 (the year the new Ukrainian Orthography was approved) contain only one form of the nouns naming women by profession/occupation/type of activity, i.e. a masculine one. However, as mentioned above, over the past few years, feminine forms of nouns have not only appeared and spread in society, but dictionaries of feminine words in the Ukrainian language have been published. Thus, in the *Web dictionary of feminine names in the Ukrainian language* (Synchak 2022b), we find entries regarding the units from the above examples: *директорка* – “керівниця підприємства, установи або навчального закладу” ‘a female head of an enterprise, institution, or educational institution’; *професорка* – “та, хто має професорське звання, обіймає посаду викладачки закладу вищої освіти або наукової працівниці науково-дослідної установи” ‘she who holds the position of a lecturer at a higher education institution or a research scientist at a research institution’; *вчителька* – “1 - та, хто навчає учнів, викладає якийсь навчальний предмет у школі; 2 - та, хто є авторитетною в якійсь галузі, яка впливає на інших, передає свій досвід, знання, служить для них прикладом” ‘1 - she who teaches students, or instructs in a particular subject in a school; 2 - she who is authoritative in a field, influencing others, sharing their experience, knowledge, and serving as an example’.

In all translations done by humans within the texts analysed, feminine options (nouns and corresponding pronouns replacing the nouns) are used.

Examples 1 and 2 (see Table 3) have the same distributive conditions: the nouns (*head*, *prof*) are used in the original sentences along with female proper names (*Emma*, *Julie*), which ensure the correct choice of feminine gender forms for

adjectives and verbs in the past tense form in all machine translations. That said however, we still found that machine translation systems select different equivalents for these nouns in Ukrainian: Google Translate – masculine *директор, професор*; ChatGPT-3.5 – feminine *завідуюча, професорка*; and DeepL – both – feminine *директорка* and masculine *професор*. Translate GPT in example 4 (Table 3) avoids the use of a noun to denote a man or a woman, and uses the procedural noun *викладання* ‘teaching’.

The noun *завідуюча* ‘female manager’ used by ChatGPT-3.5 (example 1 in Table 3) is incorrect in terms of word formation (the use of active participles and participial nouns with the suffixes *-уч-, -юч-* is not recommended by the norms of the modern Ukrainian language). The noun *завідувачка* can be formed with the root *-від-*. Such a substitution will also require syntactic changes: the noun *завідуюча* agrees with the subject in the ablative case (*завідуюча коледже^м*), while the noun *завідувачка* agrees with the subject in the genitive case (*завідувачка коледжу*).

The noun *голова* used by Translate GPT (example 1) is the direct equivalent for the English *head* meaning here “керівник установи, об’єднання, товариства, організації та їх відділів” ‘head of an institution, association, company, organisation and their departments’ (Busel 2005: 250). The dictionary notes that this noun can be both masculine and feminine.

Examples 3 and 4 (Table 3) have the personal pronouns *she* and *her*, but the results of translation are different: in example 3, the feminine equivalent *вчителька* is used in every translation, and in example 4, in all translations, the masculine equivalent *вчитель* (and its synonym *викладач*) is used. Moreover, in example 4, the pronoun *her* is translated with the Ukrainian feminine pronoun *своя*, which, in this case, is a stylistically unmotivated use, and the pronoun *своя*, accordingly, is an unnecessary unit of text.

In the examples provided, there is no uniformity in the use of masculine or feminine forms when translating such nouns – each system uses both forms randomly: Google Translate – masculine *директор, професор, вчитель*, feminine *вчителька*; DeepL – masculine *професор вчитель*, feminine *директорка, вчителька*; ChatGPT-3.5 – masculine *викладач*, feminine *завідуюча, професорка, вчителька*; Translate GPT – female *професорка, вчителька*, masculine + feminine *голова*.

5 Discussion

The development of the Ukrainian language under the influence of both external and internal linguistic factors has called into question the legitimacy and correctness of using masculine nouns in the general nominative function. In this regard, the issue of

forming nouns to refer to women by profession, position, occupation, etc. (alternative or paired analogues to masculine forms) has received official status in the Ukrainian Orthography of 2019 (Ukrainskyi pravopys) and has already been included in some dictionaries (e.g., Synchak 2022b). The findings of our research give evidence of a dynamic expansion of the set of feminine units in the Ukrainian language and the social spheres of their use (Taranenko 2015).

As the obtained data shows, the most relevant approach to achieve the best gender-oriented translation results in the case of uncontrolled human-free machine translation cannot be determined due to the insufficient training of large language models to work with units and structures that differ across the two languages.

Although artificial intelligence systems “use a variety of components, including data, neural networks, and linguistic expertise to effectively comprehend the intricacies inherent in many languages” (Mohamed et al. 2024: 25555), the obtained results promote the necessity of a balanced strategy of combining the use of intelligent translation systems with the translator’s final post-editing for the translation of specific feminitives. At the same time, our study allowed us to outline certain recommendations about how to use the specificity of the original texts to teach the system how gender-specific words, phrases and sentences are mapped between Ukrainian and English, and to instruct computer systems to translate the gender-specific constructions.

Despite the impossibility of answering the questions ‘which method is the best?’ and ‘which approach is the most relevant?’, we can suggest certain steps in response to the question ‘what can be done to improve the gender-oriented translation results?’.

To improve the quality of machine translation of Ukrainian constructions with feminine units into English using intelligent translation systems, we suggest consideration of the following specific characteristics and components of the source text:

1) **Linguistic and cultural specificity of proper names of women or men.**

Names of unambiguous genders can be taken into account. Although the same names for men and women are not typical for the normative Ukrainian language, they sometimes occur in colloquial texts. Thus, the name *Женя* can be a short form for both male (*Євген*) and female (*Євгенія*) names.

2) **Pronouns that have gender characteristics** – the third-person singular pronouns (*він, вона*) and those that correlate with adjectives: possessive pronouns (*мій/моя, твій/твоя, свій/своя, наш/наша, ваш/ваша, його/її*), demonstrative pronouns (*той/та, цей/ця, такий/така*), interrogative and relative pronouns (*який/яка, чий/чия, котрий/котра*), pronouns (*весь/вся, всякий/всяка, кожний/кожна, жодний/жодна, інший/інша, сам/сама, самий/сама*), indefinite pronouns (*деякий/деяка, якийсь/якась, абиякий/абияка, казна-який/*

казна-яка, котрийсь/котрась), and negative pronouns (ніякий/ніяка, нічий/нічия, нікотрий/нікотра).

- 3) **Corpus concordances and frequency of word combinations.**
- 4) **Syntactic features and the correlation of nouns in a sentence with adjectives and verbs.**

To improve the quality of machine translation of English constructions, which can have masculine and feminine equivalents in Ukrainian, we suggest taking into account the following specific characteristics and components of the source text:

- 1) **Linguistic and cultural specificity of proper names of women or men.** Names of unambiguous genders can be taken into account. Thus, the name *Sam* cannot be such a marker, as it can be a short form for both male (*Samuel*) and female (*Samantha*) names. If the interpretation of the name is unambiguous, the feminine may be used in the Ukrainian translation, for example: *Professor Peter Brown* → *професор Пітер Браун* (masculine form); *Professor Barbara Brown* → *професорка Барбара Браун* (feminine form).
- 2) **Pronouns that have gender characteristics** – the third-person singular pronouns (subject pronouns – *he, she*, object pronouns – *him, her*), possessive pronouns (*his/hers*).
- 3) **Corpus concordances and frequency of word combinations.**
- 4) **The contextual environment of the noun.** For example, sentence 1 from Table 3 about the subject ‘head Emma Pattison’ states that she had a *husband*, which allows with a high degree of probability to determine the subject as being a female person and, accordingly, to translate it with such feminities as *директорка, керівниця*.

Of course, this is not an exhaustive list of recommendations and it was not the objective of this paper, but with this we demonstrate that a thorough analysis of discrete language units, context and discourse will allow us to identify certain nuances and provide recommendations for improving model learning.

6 Conclusions

Language, being a dynamic phenomenon, is the most sensitive mirror of social events and transformations. Linguistic identification of women, the development of gender-related academic fields (including gender linguistics), and other factors have fueled the surge in the problem of political correctness and, even more, have led to gender reforms of some languages (including Ukrainian), one of the results of which has been the emergence and intensification of the use of feminities.

Cultural norms and sensitivities vary across languages and regions. In particular, gender language sensitivity differs between English and Ukrainian. Unlike English, the Ukrainian language features grammatical gender for nouns, including those referring to professions. While English speakers are increasingly adopting gender-neutral language, Ukrainian is actively developing and using feminines to address issues of gender equality and representation. This means that what might be considered a gender-neutral approach in English could be perceived as erasing female representation in Ukrainian – and vice versa. This linguistic and cultural divergence presents unique challenges for translation and requires careful, context-aware choices.

English and Ukrainian have crucial differences in the availability and formal expression of the grammatical category of gender. This causes considerable problems when translating gender-specific units, especially when it comes to computer translation. Problems are especially evident when translating from English into Ukrainian, since the vast majority of such units in the modern Ukrainian language have two forms – masculine (recorded in explanatory and translation dictionaries) and feminine (some of which are recorded in experimental dictionaries, but the formation and specifics of functioning of most of them are regulated by the grammatical rules of the new Ukrainian orthography as of 2019).

While modern English tends to reduce the number of gender-marked pronouns and gender-binary nouns, Ukrainian revives distinctive nouns for men and women. This leads to certain problems in translation, especially when it comes to computer-assisted translation of gender-specific texts. However, the results show that this trend is not universal in Ukrainian. Out of 98 unique address constructions of the analysed texts, 13 contained units of both genders – masculine and feminine – while the other 85 units are masculine nouns in singular or plural, and adjectives used as nouns. The empirical data of this research constituted that those 13 constructions in Ukrainian were used 347 times in the corpus of 278,941 words.

The study of introductory information on the translation of gender-specific constructions provided instructive data in the Google Translate system, while, according to the results of our investigation, the DeepL and ChatGPT systems did not contain such information at the time of the study.

The methodology we used, which combined component, distributional, and comparative analysis, corpus data extraction, concordance analysis, corpus verification, and quantitative calculations, proved effective for the units studied and allowed us to reach the following conclusions.

When translating from Ukrainian to English, all three systems used dictionary equivalents, which, naturally, in English are gender neutral, to translate Ukrainian feminines. When translating from English to Ukrainian, all three studied systems used the feminine forms of the Ukrainian language for translation, but this use is not

systematic: Google Translate uses feminine nouns in 30 % of the cases, but masculine nouns in 70 % for naming women; DeepL uses feminine nouns in 70 % of the cases, and masculine nouns in 30 % of the cases; and ChatGPT (both ChatGPT-3.5 and Translate GPT) uses Ukrainian feminine equivalents in 100 % of the cases.

The main errors identified in the translations performed by the three systems under analysis were the following:

- a stylistically incorrect addition of nouns (e.g., *Dear businessmen and women!*), adjectives (e.g., *Dear students, female students!*);
- the same noun used twice without reference to gender (e.g., *participants and participants*),
- the synonyms of tautological nature used without reference to gender (e.g., *defenders and protectors*); etc.

The results of the study provided the following answers to the questions we raised at the beginning of our research:

- 1) The analysis supported the conclusions drawn in other studies (Lardelli and Gromann 2023; Rivera-Trigueros 2022) about the impossibility of absolute delegation of translation to machines at this stage of development of intelligent translation systems.
- 2) Any text with specific units inherent in the system of only one language of a translation pair translated by a machine requires post-editing by a human.
- 3) To improve the quality of machine translation of Ukrainian constructions with feminine units into English using intelligent translation systems, we propose to consider the linguistic and cultural specificity of proper names of women or men, pronouns that have gender characteristics, corpus concordances and frequency of word combinations, and the contextual environment of the noun.

We see the following prospects for further research of the stated problem.

As our experiment was carried-out on one language pair – Ukrainian–English–Ukrainian, we would like to apply the proven methodology to other language pairs (e.g., Lithuanian–English–Lithuanian, Lithuanian–Ukrainian–Lithuanian) and compare the results for the languages of various families (Slavic, Baltic, Germanic). For this, among other things, we are going to study the quality of the results of the intelligent translation systems in comparison with each other. Moreover, adding a greater number of languages to the empirical material will allow us to identify general trends in the mutual translation of gender-marked units and develop practical recommendations for improving the quality level of intelligent translation systems when working with such units.

References

- Arhanhelska, Alla. 2019. *Femina cognita. Ukrainska zhinka u slovi i slovnyku* [Femina cognita. Ukrainian woman in the word and dictionary]. Kyiv: Vydavnychiy dim Dmytra Buraho. [In Ukrainian].
- Barclay, Peter J. & Ashkan Sami. 2024. Investigating markers and drivers of gender bias in machine translations. *arXiv preprint arXiv:2403.11896*. <https://doi.org/10.48550/arXiv.2403.11896>.
- BBC. <https://www.bbc.com>, <https://www.bbc.com/ukrainian> (accessed 25 June 2024).
- Brus, Mariia. 2019. *Feminityvy v ukrainskii movi: heneza, evolutsia, funktsionuvannia* [Feminities in the Ukrainian language: genesis, evolution, functioning]. Ivano-Frankivsk: DVNZ “Vasyl Stefanyk Prykarpatskyi National University”. [In Ukrainian].
- Busel, Viacheslav. (comp. & ed.). 2005. *Velykyi tlumachnyi slovnyk suchasnoi ukrainskoi movy* [Great Explanatory Dictionary of Modern Ukrainian Language]. Kyiv, Irpin: Perun. [In Ukrainian].
- Cambridge-1 – *Cambridge Dictionary*. <https://dictionary.cambridge.org/dictionary> (accessed 21 October 2024).
- Cambridge-2 – *Cambridge English-Ukrainian Dictionary*. <https://dictionary.cambridge.org/dictionary/english-ukrainian> (accessed 05 March 2024).
- ChatGPT | OpenAI Help Center. <https://help.openai.com/en/collections/3742473-chatgpt> (accessed 01 February 2024).
- Chulanova, Halyna. 2023. Gender asymmetry in modern mass media English. *Philological Treatises* 15(1). 175–182.
- DeepL Help Center. <https://support.deepl.com/hc/en-us> (accessed 01 February 2024).
- Fedoryshyn, Myron. 2009. *Anhlo-ukrainskyi slovnyk z ukrainskoiu transkryptsieiu* [English-Ukrainian dictionary with Ukrainian transcription]. Lviv: BaK.
- Ghosh, Sourojit & Aylin Caliskan. 2023. ChatGPT perpetuates gender bias in machine translation and ignores non-gendered pronouns: Findings across Bengali and five other low-resource languages. In *Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society (AIES '23)*, 901–912. New York, NY, USA: Association for Computing Machinery.
- Google Translate Help. <https://support.google.com/translate/answer/9179237?hl=en-GB> (accessed 01 February 2024).
- Karpilovska, Yevheniia, Larysa Kysliuk & Nina Klymenko. 2024. *Systema ta struktura ukrainskoi movy u funktsionalno-styloviomu vymiri* [The system and structure of the Ukrainian language in the functional-stylistic dimension]. Kyiv: Instytut ukrainskoi movy NAN Ukrainy. Available at: https://iul-nasu.org.ua/wp-content/uploads/2024/02/MONOGRAFIYA_strukturalisty.pdf (In Ukrainian).
- Krysenko, Serhii (comp.). 2005. *Novitnii anhlo-ukrainskyi, ukrainsko-anhliyskyi slovnyk* [The newest English-Ukrainian, Ukrainian-English dictionary]. Kharkiv: VAT “Kharkivska knyzhkova fabryka im. M.V. Frunze”.
- Lardelli, Manuelli & Dagmar Gromann. 2023. Gender-fair post-editing: A case study beyond the binary. In *Proceedings of the 24th annual conference of the European Association for machine translation*, 251–260. Leipzig Corpora Collection. https://corpora.uni-leipzig.de/?corpusId=ukr_mixed_2014 (accessed 25 June 2024).
- Longman Dictionary of Contemporary English Online. <https://ldoceonline.com> (accessed 05 March 2024).
- Makarets, Iuliia. 2024. Language of a Barrier-Free Society: The experience of Ukraine. *Orbis Linguarum* 22(3). 74–81.
- Malyshev, Vitalii (comp.). 2000. *Novyi anhlo-ukrainskyi, ukrainsko-anhliyskyi slovnyk* [The new English-Ukrainian, Ukrainian-English dictionary]. Kharkiv: Drukarskyi tsentr “Yedynoroh”.
- Merriam-Webster. <https://www.merriam-webster.com> (accessed 05 March 2024).

- Mohamed, Yasir Abdelgadir, Akbar Khanan, Mohamed Bashir, Abdul Hakim H. M. Mohamed, Mousab A. E. Adiel & Muawia A. Elsadig. 2024. The impact of artificial intelligence on language translation: A review. *IEEE Access* 12. 25553–25579.
- Moroz, Maryna. 2025. Vidtvorennia hendernykh stereotypiv u systemah mashynnoho perekladu (na materiali ukrainskoi ta anhliiskoi mov) [Reproduction of gender stereotypes in machine translation systems (based on the material of the Ukrainian and English languages)]. *Transcarpathian Philological Studies* 39(2). 136–143. [In Ukrainian].
- Naumkina, Svitlana & Maria Surova. 2024. *Nezalezhni chynnyky formuvannia politychnoi kultury Ukrainy v konteksti derzhavotvorennia* [Independent factors of forming the political culture of Ukraine in the context of state formation], 70–74. *Political transformations of modern society: collection of materials V All-Ukrainian scientific-practical conference* (Poltava, February 22, 2024). Poltava: PDAU. Available at: <https://surl.li/nqdsshr> [In Ukrainian].
- Neliuba, Anatolii (comp.). 2012. *Slovotvorchyst nezaleznoi Ukrainy. 1991–2011* [Word-formation in independent Ukraine. 1991–2011]. Kharkiv: Kharkiv Historical and Philological Society. [In Ukrainian].
- Neliuba, Anatolii (comp.) & Yevhen Redko (comp.). 2017. *Slovotvorchyst nezaleznoi Ukrainy. 2012–2016* [Word-formation in independent Ukraine. 2012–2016]. Kharkiv: Kharkiv Historical and Philological Society. [In Ukrainian].
- Order of the Ministry for Development of Economy, Trade and Agriculture of Ukraine “On the Approval of Amendment No.9 to the National Classifier of Occupations DK 003:2010”* No. 1574 dated 18.08.2020. Available at: <https://me.gov.ua/view/cc190a8b-9cca-46ef-8ef6-45aeb861a176> [In Ukrainian].
- Plachynda, Halyna. 2018. *Slovnichok feminityviv dlia pres-ofitseriv ta pres-ofitserok terytorialnykh upravlin Derzhavnoi sluzhby Ukrainy z nadzvychainykh sytuatsii* [Glossary of femininitives for press officers of territorial units of the State Emergency Service of Ukraine]. Kyiv: Ukrainian-Bulgarian cultural center “Serdika”. [In Ukrainian].
- Recommendations of the National Commission on State Language Standards on the formation and use of professional titles in the diplomatic sphere to promote gender equality* No. 339 dated 10.12.2021. Available at: https://mo.gov.ua/storage/app/sites/19/rishennja_komisii/desember/dodatok-rekomendatsii-shchodo-tvorennia-ta-vzhivannia-nazv-profesiy-v-diplomatichny-sferi.pdf [In Ukrainian].
- Rescigno, Argentina Anna, Johanna Monti, Andy Way & Vanmassenhove Eva. 2020. A case study of natural gender phenomena in translation: A comparison of Google Translate, Bing Microsoft Translator and DeepL for English to Italian, French and Spanish. In *Workshop on the Impact of Machine Translation (IMpact 2020)*, 62–90. Virtual. Association for Machine Translation in the Americas.
- Reverso Context*. <https://context.reverso.net/translation> (accessed 25 June 2024).
- Rivera-Trigueros, Irene. 2022. Machine translation systems and quality assessment: A systematic review. *Language Resources and Evaluation* 56(2). 593–619.
- Savoldi, Beatrice, Andrea Piergentili, Dennis Fucci, Matteo Negri & Luisa Bentivogli. 2024. A prompt response to the demand for automatic gender-neutral translation. *arXiv preprint arXiv:2402.06041*. <https://doi.org/10.48550/arXiv.2402.06041>.
- Shevchenko, Zoiia. 2016. *Slovnnyk gendernykh terminiv* [Dictionary of gender terms]. Cherkasy: vydavets Chabanenko Yu. [In Ukrainian].
- Starko, Vasyli & Olena Synchak. 2023. Feminine personal nouns in Ukrainian: Dynamics in a corpus. In *CEUR workshop proceedings*. <https://ceur-ws.org/Vol-3396/paper33.pdf> (accessed 15 May 2024).
- Stevens, Graham & Juta Pulijana. 2023. What’s so bad about being a manageress? *Inquiry* 69(4). 2232–2256.
- Synchak, Olena. 2022a. *Abetka feminityviv* [ABC of femininitives]. <https://behindthenews.ua/spetsproiekti/po-toy-bik-genderu/abetka-feminityviv-358> (accessed 21 April 2024). [In Ukrainian].

- Synchak, Olena. 2022b. *Vebslovnyk zhinochyh nazv ukrainskoi movy* [Web dictionary of feminine names in the Ukrainian language]. https://r2u.org.ua/html/femin_details.html (accessed 20 January 2024). [In Ukrainian].
- Taranenko, Oleksandr. 2015. *Aktualizovani modeli v systemi slovotvorennia suchasnoi ukrainskoi movy (kinets XX – pochatok XXI st.)*. [Updated models in the word-formation system of contemporary Ukrainian language (late 20th – Early 21st century)]. Kyiv: Vydavnychiy dim Dmytra Buraho. [In Ukrainian].
- The Presidential Office of Ukraine. 2023. Available at: <https://www.president.gov.ua/news/speeches>.
- Titarenko, Iryna, Anzhela Khachaturova, Veronika Fomenko, Milena Komar, Alisa Hnydiuk & Olha Yevstihneieva. 2020. *Efektivni komunikatsii: praktychni rekomendatsii dlia sekretariv komitetiv Verkhovnoi Rady Ukrainy* [Effective Communication: Practical Recommendations for Committee Secretaries of the Verkhovna Rada of Ukraine]. Kyiv. Available at: https://www.undp.org/sites/g/files/zskgke326/files/migration/ua/Effective_communications_for_VRU_ua.pdf [In Ukrainian].
- Ukrainskyi pravopys. 2019. [Ukrainian orthography]. <https://mon.gov.ua/storage/app/media/zagalna%20serednya/Pravopys.2019/ukr.pravopys-2019.pdf> (accessed 20 January 2024). [In Ukrainian].
- Ukrinform. <https://www.ukrinform.ua>; <https://www.ukrinform.net> (accessed 25 June 2024).
- Vakulenko, Maksym. 2018. Dekilka zauvah shchodo feminityviv v ukrainskii movi [A few comments on the femininities in the Ukrainian language]. *Herald of the National Academy of Sciences of Ukraine* 1. 86–89. [In Ukrainian].
- Zhluhtenko, Yurii (comp.), Nataliia Bykhovets (comp.) & Anatolii Shvants (comp.). 1995. *Ukrainsko-anhliiskyi slovnyk* [Ukrainian-English Dictionary]. Kyiv: Osvita.