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RENDERING NATIONAL-CULTURAL CONCEPTS THROUGH ARTIFICIAL INTELLIGENCE: A LINGUOCOGNITIVE STUDY OF ENGLISH-UZBEK SUBTITLE TRANSLATION

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Abstract

This article examines, from a linguocognitive perspective, the peculiarities of rendering national-cultural concepts - realia, phraseological units, and vocabulary related to customs and traditions - in television subtitles produced with the help of artificial intelligence-based translation systems (Neural Machine Translation). The research is based on a comparative analysis of original English-language audiovisual texts and their AI-generated Uzbek subtitle translations against the versions produced by a professional human translator. The findings reveal that, although AI systems demonstrate a certain degree of success in ensuring lexical-semantic equivalence, they encounter a number of difficulties in conveying cultural connotations and cognitive frames. The final part of the article offers practical recommendations for overcoming these problems.

Keywords

linguocognition, national-cultural concept, artificial intelligence, neural machine translation, subtitles, realia, phraseological unit, translation transformation, cognitive frame, audiovisual translation.

INTRODUCTION

Over the past decade, the active application of artificial intelligence technologies in translation studies has brought about fundamental changes in the practice of audiovisual translation, particularly in subtitling. Automatic subtitle generation and neural machine translation tools offered by major streaming platforms and video-sharing services (such as YouTube and Netflix) have accelerated and popularized the translation process; however, they continue to face numerous challenges in accurately and adequately conveying the complex relationship between language and culture, especially

with regard to national-cultural concepts.

National-cultural concepts are lexical and phraseological units that are closely tied to a particular nation's worldview, way of life, history, and mentality, and which frequently have no direct equivalent in another language. Translating such units requires not only a linguistic but also a cognitive process, since the translator (or the translation system) must adapt the cognitive frame of the source language to the conceptual system of the target language. Because artificial intelligence systems are based on statistical and neural models, they often achieve superficial lexical-grammatical equivalence, yet possess more limited capacity than a human translator when it comes to grasping deep cognitive-cultural meaning.

The relevance of the topic is explained by the fact that the volume of audiovisual translations from English into Uzbek carried out with the help of artificial intelligence is steadily increasing, while the linguocognitive aspects of this process - in particular, the quality of rendering national-cultural concepts - remain insufficiently studied in Uzbek linguistics.

The aim of the study is to analyze, from a linguocognitive point of view, how national-cultural concepts found in English-language television content are rendered in Uzbek subtitle translation by means of artificial intelligence, and to identify the typical problems occurring in this process.

To achieve this aim, the following tasks were set: 1) to outline the theoretical foundations of the notions of national-cultural concept and the linguocognitive approach; 2) to describe the operating principles of artificial intelligence-based translation systems in subtitling; 3) to conduct a comparative analysis of original English-language texts and their AI-generated Uzbek subtitles; 4) to classify the identified translation problems and to develop recommendations for overcoming them.

The object of the study is television subtitles translated from English into Uzbek by means of artificial intelligence, while the subject is the linguocognitive peculiarities of rendering national-cultural concepts in these subtitles. The scientific novelty of the study lies in the fact that, for the first time, subtitles produced through artificial intelligence

translation within the English-Uzbek language pair are subjected to a comparative linguocognitive analysis from the standpoint of national-cultural concepts.

LITERATURE REVIEW

A review of the scholarly literature on the topic plays an important role in establishing the theoretical and methodological foundation of the study. The question of rendering national-cultural concepts in translation has a long history within translation studies. G. Salomov [1], one of the founders of Uzbek translation studies, argues in his works that translating realia is a key condition for preserving national identity, and classifies methods such as transliteration, calquing, and descriptive translation. N. Yusupov [2] enriches translation theory with modern linguistic approaches, reinterpreting the notions of equivalence and adequacy from the standpoint of cultural context. M. Yo‘ldosheva [4], for her part, pays particular attention to uncovering the cultural layers of meaning in linguistic units on the basis of a linguoculturological approach. In foreign translation studies, A. Wierzbicka [12] develops the theory of "key words," substantiating that every culture possesses its own distinctive conceptual "key," while L. Venuti [13] introduces the strategies of "foreignization" and "domestication," demonstrating that the translator's cultural choices directly influence the outcome of translation.

The rendering of phraseological units in translation has likewise formed a distinct line of research. N. Norqulov [5] carries out a comparative analysis of Uzbek and English phraseological units and identifies ways of preserving their figurative-expressive meaning, while M. Baker [9] systematically examines the problem of non-equivalence, which frequently arises in the translation of phraseological and idiomatic units, and describes the translation strategies applied in such cases (substitution with an idiom of similar meaning, paraphrase, omission).

In the field of audiovisual translation and subtitling, J.Díaz-Cintas and A. Remael [10] provide a detailed account of how the technical constraints of subtitling (time, text length, reading speed) determine translation strategy, while Y. Gambier [11] interprets audiovisual translation as a multimodal process, emphasizing the need to take into account the interaction of image, sound, and text. Within Uzbek linguistics, Sh.

Sirojiddinov and D. Yusupova [6] analyze the problems of audiovisual translation from the standpoint of the national school of translation and define the linguistic limits of condensation and simplification in subtitling.

From a cognitive-linguistic perspective, G. Lakoff and M. Johnson [14] substantiate the theory of conceptual metaphor, demonstrating that language is inseparably linked to human thought and cultural experience; this theory provides the basis for interpreting national-cultural concepts as cognitive frames. O. Mo‘minov [7] further develops this theory on the basis of Uzbek linguistic material, proposing practical methods for analyzing cognitive frames and concepts.

At the same time, the review of the source literature shows that studies devoted to the effectiveness of artificial intelligence-based translation systems in rendering national-cultural concepts have mainly been carried out on widely represented language pairs such as English-French, English-German, and English-Chinese. The linguocognitive peculiarities of rendering national-cultural concepts in AI-generated television subtitles within the English-Uzbek language pair have hardly been studied at all, which once again confirms the scientific relevance of the present study and provides grounds for testing the theoretical approaches reviewed above in practice.

Theoretical foundations of the national-cultural concept and the linguocognitive approach

The linguocognitive approach involves studying linguistic units not only in terms of form and meaning, but also in relation to the conceptual system and knowledge structures (frame, script, concept) existing in the human mind. According to this approach, language is not merely a means of communication but a cognitive mechanism reflecting a nation's way of perceiving the world.

National-cultural concepts primarily include the following types of linguistic units: a) realia - words and expressions specific to a particular nation's way of life, customs, history, and socio-political life, which have no direct equivalent in another language (for example, the Uzbek words "sumalak," "hashar," "gap"; or the English words "Thanksgiving," "prom," "Halloween"); b) phraseological units and idioms, whose meaning does not derive from the sum of their constituent parts and which often embody

features of national thought; c) vocabulary related to customs, rituals, and values; d) forms of address and units specific to speech etiquette.

In cognitive linguistics, the translation of such units is interpreted as a process of "frame adaptation": the translator identifies the cognitive frame in the source language and replaces it with the closest available frame in the target culture, or, if no such frame exists, resorts to descriptive translation, explanatory translation, or calquing. Artificial intelligence systems, however, typically rely on statistical or neural probabilities derived from large parallel text corpora, and are therefore not always able to perform this kind of deep cognitive adaptation.

Artificial intelligence-based translation systems and their role in subtitling

Modern artificial intelligence-based translation systems, including neural machine translation (NMT) models built on transformer architecture, are capable of taking contextual relationships into account when rendering the source text into the target language. However, the subtitling process is subject to specific technical and linguistic constraints: factors such as timing (synchronization), text length (the number of characters that can be displayed on screen at once), and reading speed require the translator (or the system) to condense, shorten, or simplify the text.

Under these constraints, artificial intelligence systems often opt for a "safe" strategy when rendering national-cultural concepts - that is, a variant that is as short and grammatically correct as possible, but devoid of cultural connotation. This can lead to a partial or complete loss of the cognitive-cultural meaning present in the original text.

RESEARCH METHODOLOGY

For the purposes of this study, a corpus of video excerpts was compiled from popular English-language television series and documentary-journalistic programs. For each excerpt, two subtitle versions were compared: 1) the Uzbek subtitle generated by an artificial intelligence (automatic neural translation) system; 2) a "reference" subtitle prepared by a professional translator. A total of more than 130 context units containing national-cultural concepts were selected for analysis.

The following methods were used in the study: the comparative-typological method (comparing corresponding units across the two language systems); the componential

analysis method (identifying the semantic components of word meaning); the method of classifying translation transformations (identifying techniques such as calquing, transliteration, generalization, concretization, descriptive translation, and omission); and statistical-quantitative analysis (calculating the percentage ratio of the identified cases).

ANALYSIS AND RESULTS

According to the results of the analysis, of the 130 national-cultural concepts examined, approximately 46 percent (60 units) were rendered by artificial intelligence at a satisfactory level, without significant loss of cultural connotation. In the remaining 54 percent of cases, semantic-cognitive losses of varying degrees were observed: ambiguity of meaning resulting from full calquing (approximately 22 percent), replacement of the realia with a generalized, neutral word (approximately 18 percent), and loss of imagery resulting from the literal translation of phraseological units (approximately 14 percent).

The table below presents several of the examples analyzed:

Original (English)	**AI translation (into Uzbek, back-translated)**	**Professional translation (into Uzbek, back-translated)**	**Comment**
“Break a leg!”	“Oyog‘ingni sindir!” - lit. “Break your leg!”	“Omading kelsin!” - “Good luck to you!”	The idiom was calqued word-for-word; its meaning was entirely distorted, and the underlying cognitive frame was not transferred.
“It’s Thanksgiving dinner.”	“Bu Minnatdorchilik kechki ovqati.” - “This is a	“Bu - hosil bayrami sharafiga uyushtirilgan an’anaviy oilaviy kechki ovqat.” - “This	The realia was partly calqued (transliteration + translation), but its

Original (English)	**AI translation (into Uzbek, back-translated)**	**Professional translation (into Uzbek, back-translated)**	**Comment**
	Gratitude dinner.”	is the traditional family dinner held in honor of the harvest festival.”	cultural background was left unexplained.
“Trick or treat!”	“Hiyla yoki tortiq!” - “Trick or gift!”	“Shirinlik ber, bo‘lmasa hazil qilamiz!” (with a note explaining the Halloween custom)	The literal translation is incomprehensible to the target audience; the meaning of the ritual is lost.
“He kicked the bucket.”	“U chelakni tepdi.” - “He kicked the bucket [literally].”	“U vafot etdi.” - “He passed away.”	The phraseological unit was translated as a free word combination - its figurative meaning was lost.
“Prom night”	“Bitiruv kechasi” - “Graduation night.”	“Amerika maktablarida o‘tkaziladigan an’anaviy bitiruvchilar bali” - “The traditional graduation ball held in American schools.”	A partially successful functional adaptation, though the specific cultural character of the concept was not fully conveyed.

The examples above show that artificial intelligence systems face particular difficulty in translating phraseological units and ritual-related realia, since the meaning of such units cannot be determined solely on the basis of their lexical form, independent of context. This is because neural translation models tend to select the highest-

probability literal equivalent, whereas a human translator chooses a functional-communicative equivalent based on context, genre, and the target audience's background knowledge.

At the same time, the analysis also found that artificial intelligence systems perform considerably better when translating relatively neutral, descriptive realia (such as the names of dishes or items of clothing) - in such cases, transliteration or literal translation often produces a satisfactory result, since these units rely mainly on denotative meaning rather than on a deep cognitive frame.

CONCLUSION

The results of the study show that, although artificial intelligence-based translation systems produce lexically and grammatically accurate results when translating television subtitles from English into Uzbek, these results are often insufficiently deep from a linguocognitive point of view. In particular, when translating phraseological units, ritual- and holiday-related realia, and forms of address specific to the national mentality, artificial intelligence systems tend toward literal calquing or neutralization strategies, resulting in the partial or complete loss of the cognitive-cultural meaning and imagery present in the original text.

On this basis, the following practical recommendations were developed: first, a post-editing stage carried out by a human translator should always be introduced when translating audiovisual texts rich in national-cultural concepts with the help of artificial intelligence; second, it is advisable to create specialized parallel corpora and dictionaries containing national-cultural concepts and their functional equivalents for the English-Uzbek language pair, and to use them in training translation systems; third, evaluation criteria for subtitle translation quality should be developed that take into account not only lexical-grammatical correctness but also cognitive-cultural equivalence.

In conclusion, while artificial intelligence technologies have significant potential to accelerate and simplify the audiovisual translation process, the linguocognitively adequate rendering of national-cultural concepts remains, for the time being, a task that requires the creative and intercultural competence of a human translator. Further

research in this direction should be aimed at exploring in greater depth the possibilities of improving artificial intelligence systems from a cultural-cognitive standpoint.

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