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Research on AI and Human Translation of Longshan Black Pottery Culture-loaded Terms: A Case Study of DeepL

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Abstract

As digital technologies advance, artificial intelligence (AI) translation has increasingly been applied to the cross-linguistic dissemination of intangible cultural heritage (ICH). However, when handling culture-loaded terms with profound cultural connotations, AI translation remains prone to semantic deviations and loss of cultural nuance. This study focuses on the culture-loaded terms of Longshan Black Pottery, drawing on a comparative corpus of DeepL and human translations. Drawing on contrastive analysis and case study methods, this study operates within the theoretical framework of ecological translation studies' three-dimensional transformation, examining translations from three perspectives: semantic accuracy, cultural conveyance, and communicative acceptability. The findings indicate that human translation outperforms AI in conveying cultural connotations and adapting to contextual nuances, while AI translation, although efficient, remains limited in cultural reproduction and contextual understanding. Based on these findings, the study proposes translation optimization strategies-including transliteration compensation, imagery transformation, and explicitation-and puts forward a human-AI collaborative translation model. The results offer empirical insights for improving the English translation of ICH culture-loaded terms and for the optimization of AI translation tools.

Keywords

Longshan Black Pottery culture, culture-loaded terms, DeepL, AI translation, human translation

1. Introduction

1.1 Research Background

Digital technologies are reshaping cross-linguistic communication, creating new opportunities and challenges for the international dissemination of intangible cultural heritage (ICH). These technologies are transforming the patterns of cross-linguistic transmission, opening new pathways for the preservation and global dissemination of ICH, while simultaneously raising the bar for the cross-cultural communication of ICH content.

In the process of international dissemination of non-heritage, the cross-language transmission of culturally loaded words plays an important role, and its translation quality will affect the overseas audience's

understanding of relevant cultural connotations. The development of artificial intelligence translation has improved the efficiency of non-heritage text translation, but because non-heritage culturally loaded words have both professional characteristics and cultural connotations, AI translation still has limitations in semantic understanding and cultural connotation transmission. Take Longshan black pottery culture as an example. This excellent Chinese intangible cultural heritage carries the wisdom of early civilization. The quality of English translation of its culturally loaded words is uneven, and there are differences in the performance of human-computer translation. However, because non-heritage culturally loaded words have both professional characteristics and cultural connotations, this situation restricts the international dissemination of Longshan black pottery culture to a certain extent. Therefore, it is of great academic value and practical significance to carry out a comparative study on the human-computer translation differences of non-heritage culturally loaded words.

1.2 Research Objectives

This study takes Longshan black pottery culture as the object, focuses on the comparative analysis of DeepL translation and manual translation, and examines the English translation performance of its culturally loaded words under the multi-dimensional evaluation framework, in order to provide useful supplements to research in related fields.

1.3 Research Significance

1.3.1 Theoretical Significance

Taking Longshan black pottery culture as a case, this research carries out a comparative analysis of human-computer translation of non-heritage cultural load words. It aims to deepen the comparative research of human-computer translation, systematically evaluate the applicability and limitations of artificial intelligence translation in the field of non-heritage, and further enrich the non-heritage translation theory system to provide cross-cultural communication and AI technology integration. A new research perspective

1.3.2 Practical Significance

Provide guidance for the international dissemination of Longshan black pottery culture and improve the quality of English translation of its culturally loaded words; provide reference for the optimization of non-heritage translation practice and AI translation tools, and promote the deep integration of AI and non-heritage translation; respond to national policies, help the international dissemination of China's excellent traditional culture, enhance cultural influence, and provide non-heritage numbers Chemical protection and dissemination provide a path.

2. Literature Review

2.1 Current Research on the Translation of Culture-loaded Terms in Intangible Cultural Heritage (ICH)

The existing research mainly explores the translation of non-heritage culturally loaded words from the perspective of terminology standardization, cultural adaptation and ecological translation.

From the perspective of terminological standardization, Feng Xuehong and colleagues, based on the English translation practice of core terms of Nanjing Yunjin weaving skills, they have built a translator-standardized practice model for the external translation and introduction of Chinese non-heritage terms [1]. Similarly, Chatzitheodorou, K. et al., through the EuropeanaTranslate project, trained machine translation engines using cleaned bilingual and synthetic data to accommodate the translation needs of European cultural heritage metadata, thereby enhancing multilingual accessibility [2]. However, these studies primarily focus on the terminological level and overlook translation adaptation within specific cultural contexts.

From the perspective of cultural adaptation, Zhang Xiaodong et al., using the framework of cultural adaptation theory, conducted an in-depth analysis of strategies such as cultural assimilation, attenuation, transformation, and beautification in ICH translation, providing concrete pathways for applying cultural adaptation strategies [3]. Han, B. et al. explored the challenges of translating Chinese ICH vocabulary into

Swahili from the perspective of bridging cultural gaps, and proposed corresponding translation strategies [4]. These studies reveal the challenges of ICH translation in cross-cultural communication butfall short of providing in-depth analysis of. From the ecological translation perspective, Li Yanwen et al. examined the transformation and adaptation of translators across different dimensions in the context of Shandong Longshan Black Pottery culture [5]. In addition, based on the framework of Venuti's theory, LI Q explores the visibility of translators in the Chinese Heritage Museum and the Chinese-centered explanatory translation path [6]. However, existing research has failed to deeply explore specific translation strategies and their practical effects, especially in the face of specific cultural elements, how to achieve accurate cultural transmission still lacks specific case analysis.

Overall, the current research on non-heritage translation has formed a pluralistic theoretical perspective, but there is still a lack of in-depth case studies for specific non-heritage categories [7].

2.2 Current Research on AI Translation and Human Translation

The differences between AI translation and manual translation in the processing of culturally loaded words mainly focus on the three aspects of translation quality, cultural transmission ability and ethical risks.

In terms of translation quality, scholars mainly compare AI and human translations from the perspectives of lexical performance and textual readability. Zhou Wenjie et al., in their human-machine evaluation of Xin Qiji's poetry, found that AI demonstrates significant limitations in understanding deep cultural nuances [8]. Kratochvil et al. examined the application of DeepL in the English translation of academic texts [9]. Nevertheless, when it comes to handling culture-loaded terms and overall readability, human translation proves more consistent and appropriate.

Regarding cultural conveyance, there is no consensus in the literature. Some studies suggest that AI translation performs comparably to human translation at the linguistic level, yet more research highlights its significant deficiencies in understanding deep cultural contexts. Feng Yang highlights machine translation's difficulty in grasping cultural contexts [10], while Yao, Y. et al. identify the loss of cultural information as the primary issue of AI translation [11]. Therefore, the "cultural reproduction capability" of AI translation in handling culture-loaded terms still requires improvement.

Concerning ethical risks, as large language models (LLMs) advance, the ethical implications of AI translation have garnered increasing attention. Wang Huashu and colleagues point out that LLMs can readily produce cultural distortion and bias [12], while Hua Yijun finds implicit cultural omissions in AI translations [13]. Pisoni, G. et al. explored the application of AI in accessible cultural heritage design [14]. However, most of the relevant research focuses on issues such as cultural bias, cultural distortion and the weakening of translator's subjectivity, but how to effectively solve these problems through technical improvement and ethical standardization has not been fully explored. Therefore, future research should pay more attention to how to reduce cultural distortion in AI translation through technical means and strengthen the guarantee of translator's subjectivity.

2.3 Research Gap and Study Focus

In summary, the existing research has made some progress in the field of non-heritage culturally loaded word translation and human-computer translation comparison. Domestic research has been discussed from the perspective of terminology standardization [15], corpus analysis [17], and human-machine collaboration [16, 18], and has initially built a relevant research framework; although the number of foreign studies is relatively limited, machine translation in the context of cultural heritage should It provides useful references in terms of use.

Nevertheless, there are still certain limitations in existing research. For example, there are still few micro-case studies on non-heritage of specific objects, especially the lack of empirical analysis with object culture as the core; the quality evaluation of human-computer translation is mostly in a single dimension, and lacks a systematic evaluation framework that integrates language, culture and communication; AI translation There is still a lack of in-depth discussion on the ability and its limitations of cultural reproduction in a specific cultural context.

Based on this, this article takes Longshan black pottery culture as the entry point, selects DeepL translation and manual translation to build a comparative corpus, and systematically analyzes the English translation of culturally loaded words from the three dimensions of semantic accuracy, cultural transmission and communication acceptability with the help of three-dimensional transformation theory of ecological translation.

By focusing on specific non-heritage categories and typical corpus, it aims to provide useful supplements for existing research in case depth and evaluation systems, and provide new empirical support for non-heritage culturally loaded word translation and human-computer collaborative translation research.

3. Theoretical Framework and Research Methodology

3.1 Theoretical Framework

3.1.1 Classification Theory of Culture-loaded Terms

This study combines the cultural characteristics of Longshan black pottery, and at the same time refers to the classification views of Xing Fuyi and Eugene Naida, and applies the classification theory of culturally loaded words in the corpus classification link. Accordingly, Longshan black pottery cultural load words are divided into three categories: artifact load words, craft load words and cultural concept load words, which lays the foundation for the targeted comparison of subsequent AI translation and manual translation, and ensures the relevance, systematic and scientific nature of corpus analysis.

3.1.2 Three-dimensional Transformation in Ecological Translation Studies

This study combines the cultural characteristics of Longshan black pottery, and at the same time refers to the classification views of Xing Fuyi and Eugene Naida, and applies the classification theory of culturally loaded words in the corpus classification link. Accordingly, Longshan black pottery cultural load words are divided into three categories: artifact load words, craft load words and cultural concept load words, which lays the foundation for the targeted comparison of subsequent AI translation and manual translation, and ensures the relevance, systematic and scientific nature of corpus analysis.

3.2 Research Methodology

This study adopts a combination of comparative analysis and case analysis. The two methods complement each other to enhance the systematicity and reliability of research analysis.

3.2.1 Contrastive Analysis

This article compares the AI (using DeepL as a case study) translation and manual translation of Longshan black pottery culture from the three core dimensions of accuracy, cultural transmission and readability, analyzes the similarities and differences between translations, summarizes the advantages and disadvantages in the translation process, and provides a basis for translation quality optimization.

3.2.2 Case Study Analysis

As a supplement to the comparative analysis method, this article selects typical texts related to Longshan black pottery and corresponding translations and DeepL translations as cases to verify the conclusions drawn by the comparative analysis method, further enhance the practicality and credibility of the research, and provide reference for the translation of similar cultural texts.

3.3 Corpus Sources

The corpus of the manual translation of this article is derived from authoritative sources including the British Museum official website, the Palace Museum Chinese official website, the Shandong Museum English website, and the CCTV Science & Education channel website, alongside AI translations produced by DeepL. These sources provide a reliable fsupport for the research conclusion4. Comparative Analysis of the Translation of Longshan Black Pottery Culture-loaded Terms

4. Comparative Analysis of the Translation of Longshan Black Pottery Culture-loaded Terms

4.1 Extraction and Classification of Culture-loaded Terms in Longshan Black Pottery

In Longshan black pottery culture, cultural load words mainly cover three categories: articles, crafts and cultural concepts. Each type of loaded words carries profound cultural connotation and historical background, so how to accurately convey these cultural information is particularly important in the translation process. The following is a specific analysis of various loaded words.

4.1.1 Artifact-related Terms

(1) Black Pottery Lidded Gu

Human Translation: *black pottery lidded gu vessel*

DeepL Translation: *Black pottery jug with a lid*

In this group of translations, the DeepL translation emphasizes the function of the black pottery with a lid "pot" and the characteristics of the lid, but does not use archaeological or archiological terms, which is easy for readers to understand it as ordinary daily utensils and ignore its specific attributes as ancient ceremonial utensils. The artificial translation retains the original name of the artifact gu through lidded gu vessel, and at the same time supplements the characteristics of the lid through lidded, accurately conveying the categories and functional characteristics of the artifacts, so that readers can understand its historical and cultural value. At the same time, the translation structure is refined and logical, which meets the normative requirements of archaeological papers and museum documents for the terminology of objects..

(2) Black Pottery Stem Cup

Human Translation: *black pottery stem cup*

DeepL Translation: *Black pottery cup with a tall handle*

In this group of translations, the DeepL translation emphasizes the function of the black pottery with a lid "pot" and the characteristics of the lid, but does not use archaeological or archiological terms, which is easy for readers to understand it as ordinary daily utensils and ignore its specific attributes as ancient ceremonial utensils. The artificial translation retains the original name of the artifact gu through lidded gu vessel, and at the same time supplements the characteristics of the lid through lidded, accurately conveying the categories and functional characteristics of the artifacts, so that readers can understand its historical and cultural value. At the same time, the translation structure is refined and logical, which meets the normative requirements of archaeological papers and museum documents for the terminology of objects.

(3) Black Pottery Jar with Two Loop Handles

Human Translation: *black pottery jar with two loop handles*

DeepL Translation: *Black pottery jar with two spouts*

In this group of translations, there is a serious deviation in the AI translation. In the "黑陶双系罐", "双系" refers to the ring handle, and DeepL mistakenly translates "系" as "spouts", that is, the mouth of the pot, resulting in a deviation in the shape information of the utensils, which may lead to readers' misunderstanding of the form of the utensils. Accordingly, it reflects the limitations of AI's understanding of the details of the form of objects.

(4) Black Pottery Zhi Vessel

Human Translation: *black pottery zhi vessel*

DeepL Translation: *Black pottery wine cup*

As a representative of sacrificial culture, "黑陶觶" carries the special function of ceremonial utensils. The DeepL translation only describes the use of artifacts, but does not use the special term for the ceremonial vessel "gag" in archaeology, ignoring its ceremonial and cultural attributes in ancient sacrifices, reflecting the widespread problem of lack of cultural connotation in AI dealing with cultural load words; the manual translation retains the name of the original artifact. It not only conveys the category of utensils, but also meets the professional standards of the academic community for the naming of ancient ceremonial utensils.

At the same time, although the DeepL translation is straightforward and easy to understand, it does not follow the naming norms of using standard terms instead of direct translation, and the manual translation is both refined and meets the requirements of academic writing.

4.1.2 Craft-related Terms

(1) Clay Kneading and Throwing

Human Translation: *clay kneading and throwing*

DeepL Translation: *Throwing*

In this group of translations, the "Throwing" of the AI translation is easily understood as "throwing" or only refers to a single action in pulling the blank, ignoring the "mud" link in the early stage, which cannot convey the whole process to the readers, nor can it reflect the complexity and skill accumulation of the pottery process; while manual translation expands the translation At the same time, it covers the two key steps of "kneading mud" and "pulling blanks", which describes the whole process of drawing blanks in a more terminology and standardized manner. Although manual translation is slightly longer than AI translation, its structure is compact and logical, which meets the standard requirements of process description in academic papers.

(2) Plain and Polished Surface

Human Translation: *plain and polished surface*

DeepL Translation: *Smooth Polishing*

"素面磨光" is not only the polishing surface, but also the simple and rustic aesthetic connotation it contains. Although the DeepL translation briefly conveys the physical effect of the smooth surface of the process, it ignores the rustic aesthetics contained in the "plain surface" and lacks cultural orientation; the artificial translation conveys the technical effect and aesthetic characteristics of surface treatment through the combination of "plain" and "polished", and at the same time. The structure is compact, the concept is complete, and it is more in line with the terminology.

(3) Carbonization Firing / Reduction Atmosphere Firing

Human Translation: *carbonization firing / reduction atmosphere firing*

DeepL Translation: *Carbon Infusion Process*

In this group of translations, although the AI translation accurately conveys the literal meaning, it does not consider its cultural meaning, and does not use technical terms commonly used in pottery or archaeology. It is easy for readers to understand it as a general chemical treatment process, not the unique pottery technology of Longshan black pottery; manual translation uses direct translation to add meaning The double translation method of translation accurately presents the operation of the pottery carbonization technology through heating during the firing process through direct translation. At the same time, it conveys the cultural and historical value of the process in pottery manufacturing through interpretation, so that the translation is both accurate and rich in cultural connotation. At the same time, it conforms to the terminology specifications, and can lead out the cultural connotation through annotations to avoid ambiguity.

(4) Openwork / Perforated Decoration

Human Translation: *openwork / perforated decoration*

DeepL Translation: *Hollow-Carving Techniques*

"镂空工艺" refers to a decorative process that carves gaps or patterns on the surface of pottery to form a unique aesthetic effect. Although the DeepL translation accurately describes the visual effect of "holet", the use of the word carving to emphasize the carving action is easy for readers to mistake it for a simple carving process and ignore it as a decorative feature; the artificial translation is through openwork and perforated Decoration also presents the structural characteristics and decorative purpose of the hollow, so that readers can understand the unique aesthetic effect formed by the hollow process on the surface of the pottery.

4.1.3 Cultural-concept Terms

(1) Ancient Traditional Pottery Making Craft

Human Translation: *ancient traditional pottery making craft*

DeepL Translation: *Traditional Pottery Techniques*

In this group of translations, DeepL's translation is more concise, but it is biased towards the technical level, ignoring the historical context brought by "ancient", and cannot reflect the long tradition of pottery skills, which may make readers mistakenly think that it is a modern traditional craft. The manual translation emphasizes its long history through ancient, clearly expresses the historical and traditional attributes of the skill, and avoids ambiguity; pottery making craft accurately describes the pottery operation and craft attributes, so that readers can understand the cultural value and historical extension of pottery making skills.

(2) Neolithic Period

Human Translation: *Neolithic period*

DeepL Translation: *Neolithic Age*

In this group, DeepL translations are similar in meaning to artificial translations, but in archaeological and historical literature, period is usually used to express a clearly divided specific historical stage or cultural period, emphasizing the continuity and definition of the time period, which can correspond to the cultural characteristics, technological development or strata evidence of the Neolithic period, and can more accurately define the scope of the era; Age is more literary or colloquial, and the scope of expression is also broader, which may be understood as a vague "era" and lacks academic formality.

4.2 Comparative Analysis of Human and AI Translation

4.2.1 Semantic Accuracy

The manual translation accurately conveys to readers the core meaning of Longshan black pottery culture loaded word artifact names and craft terms, especially when dealing with artifact proper nouns such as "double system", which not only retains the proper nouns of artifacts, but also conveys its ceremonial attributes. When dealing with craft terms such as "pulling blanks" and "carburization", can flexibly use translation methods such as amortative translation to ensure that readers can understand the technical connotation and cultural function of the original word. It ensures the semantic accuracy of the translation.

In contrast, DeepL's translation is usually more intuitive in semantic transmission, but it is prone to partial omission of information or deviation of conceptual generalization, such as translating "double line" as two spouts, which cannot fully convey the complete technical semantics of the original word. Through comparison, it can be found that manual translation pays more attention to the complete presentation of technical terms and process details in terms of semantic accuracy, while DeepL quickly conveys the basic meaning, and some cultural and technical information tend to be simplified.

4.2.2 Cultural Transmission

Thanks to the translator's deep understanding of the connotation of Longshan black pottery culture and the application of translation expertise. Manual translation can identify the historical functions, social context and simple aesthetic values such as ceremonial utensils carried by the loaded words of Longshan black pottery culture, and embed these implicit information into the English translation through a reasonable combination of transliteration and interpretation, so that the translation not only conveys the literal meaning, but also shows the depth of the cultural level. Especially in the translation of culturally loaded words such as "black pottery" and "carburizing technology", the translator conveys its function and cultural value through transliteration, add translation or annotation, so that the target readers can understand the role of utensils or crafts in the historical context.

In contrast, AI translation tends to directly generate conceptual or functional translations, mainly focusing on the rapid transmission of literal meaning, and the sense of hierarchy of cultural connotation and the integrity of historical context are often difficult to fully reflect. Through comparison, it can be seen that manual

translation is more systematic and pays more attention to information integrity in cultural context interpretation, while AI translation emphasizes the intuitive expression of superficial semantics.

4.2.3 Communicative Acceptability

Manual translation can flexibly adjust the translation strategy according to the culture and academic needs of the target language. The translation is natural and fluent, which is in line with the expression habits of the target language. At the same time, it takes into account the rigor of academic or professional texts, so that the reader's reading experience is smoother. For example, when processing object names or technical process terms, manual translation will avoid redundant and non-standard modifications, so as to ensure that the translation is both clear and refined.

In contrast, although AI can generate grammatically correct and understandable translations, in some cases, it is prone to long expressions or naming is not concise and standardized enough. This shows that the advantages of manual translation in communication acceptability are not only reflected in language fluency, but also in the comprehensive grasp of the target language reader habits and academic expression norms, while AI translation is more inclined to superficial semantic generation, and communication adaptability is relatively limited.

4.3 Typical Error Types in AI Translation

4.3.1 Cultural Loss

Among the above ten groups of translations, the most frequent problem of AI translation is the insufficient exploration of the implicit cultural connotation of culturally loaded words, resulting in incomplete transmission of cultural information.

When dealing with terms involving historical background, etiquette function or aesthetic characteristics, AI tends to generate a literal translation or conceptual expression of superficial semantics, ignoring its deep cultural value.

4.3.2 Literal Translation

Because AI focuses on word-by-word matching when generating translations, it lacks the ability to adapt to the grammatical habits, academic naming norms and rules of the use of technical terms of the target language. When expressing the name of the process, the term of the object or the historical period, it is prone to information overload or conceptual deviation, and it is difficult to fully convey the delicate semantics and professional attributes of the original words. In addition, for culturally loaded words, AI translation tends to translate its surface meaning and ignores its implicit cultural connotation and historical background, resulting in incomplete cultural information transmission. It can be seen that the advantages of AI translation in literal fidelity are accompanied by limitations in the naturalness of language and the integrity of cultural information.

4.3.3 Contextual Misjudgment

Due to the lack of understanding of specific cultural contexts, AI translation cannot be alienated based on implicit cultural information, and often misjudges the semantics and functions of culturally loaded words. For example, the “double series” in the “black pottery double-system jar” is mistakenly translated as “two spouts”, which misunderstands the “system” as the function of the ring handle, not the mouth of the pot, resulting in semantic deviation.

Overall, although AI translation performs well in basic grammar and vocabulary conversion, it is difficult to achieve the translation requirements of “semantic accuracy, cultural integrity and fluent communication” due to the lack of in-depth understanding of Longshan black pottery culture and its tool shape and craft characteristics. Therefore, in non-heritage translation with deep cultural connotations, manual translation still occupies an irreplaceable and important position, and AI translation can only be used as an auxiliary tool in some simple translation scenarios.

5. Translation Optimization Strategies

In response to the problems of cultural loss, literal translation and context misjudgment presented by AI translation in Chapter 4, this article puts forward corresponding optimization strategies from the three levels of cultural dimension, language dimension and communication dimension.

5.1 Transliteration Compensation Strategy for Cultural Retention

From the dual perspective of the language dimension and the cultural dimension of ecological translation, the strategy mainly targets culturally exclusive words such as the name of the object. It retains the uniqueness of culturally loaded words through transliteration, and supplements them with short annotations to effectively solve the problem of cultural loss in AI translation.

For example, "黑陶觶" can be translated as black pottery zhi vessel (an ancient ritual vessel in Longshan Culture). This preserves the specialized terminology while explicitly indicating its function as a ritual object, thereby balancing cultural retention with semantic clarity.

5.2 Targeted Adaptation through Imagery-Based Free Translation

Based on the dual needs of communication and cultural dimensions, AI translation often tends to translate word by word. When facing non-heritage cultural load words with deep cultural background, it lacks perception of specific cultural images. Therefore, in the process of non-heritage translation, the original cultural expression should be appropriately converted in combination with the target language expression norms to ensure that the connotation of the original culture is transmitted, and improve the understanding efficiency and acceptance of non-heritage cultural information by target language readers.

5.3 Supplementary Expansion Strategy for Cultural Context

From the cultural dimension of ecological translation, due to the lack of in-depth understanding of the cultural background of non-heritage, especially when it comes to traditional crafts or historical background, it often leads to contextual misjudgment and lack of cultural information. Therefore, translating cultural background information is a key strategy to help target language readers better understand the loaded words in the source language by supplementing the historical background, process details and cultural interpretations related to non-heritage culture.

Based on the above comparative analysis of manual translation and AI translation, in order to ensure translation efficiency and take into account translation quality, it is recommended to build a collaborative model of "AI initial translation - manual optimization - professional audit". Specifically, you can first use AI translation to complete the basic literal translation in batches, and then use manual translation to combine the above three strategies of transliteration, interpretation and augmentation to modify AI translation, supplement cultural information with implicit connotations, and make image adaptation and context adjustment. Finally, the accuracy and standardization of the translation are ensured through professional review. This collaborative model can give full play to the advantages of manual and AI, avoid the translation deviation caused by the single reliance on AI, and ensure that the English translation of Longshan black pottery culture not only meets the language norms, but also can effectively convey the cultural connotation.

6. Conclusion

In a word, this study takes DeepL as an example and conducts research on the English translation of Longshan black pottery cultural load words from the perspective of AI translation and manual translation. It is found that AI translation has problems such as cultural loss, literal translation and context misjudgment in some cases. The main reason is that AI has the cultural connotation of Longshan black pottery. Solve the inadequacy. Based on this, combined with the theory of ecological translation, the three major translation optimization strategies of transliteration compensation, image conversion interpretation and background information translation, as well as the human-computer collaborative translation mode, have been studied and constructed, so as to provide certain ideas for the optimization of translation of non-heritage culturally loaded words.

At the same time, the research results can be used to enrich the application scenarios of ecological translation in the translation of non-heritage cultural load words, and provide reference strategies and models

for the accurate translation and cross-cultural publicity of Longshan black pottery and similar non-heritage cultural load words. However, the corpus selected in this study is only a typical case, and the scope is relatively narrow; follow-up research can expand the coverage of the corpus, further optimize the practicality of the human-computer collaboration mode, and improve the adaptability of AI translation to the connotation of non-heritage culture.

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The authors declare no conflict of interest.

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