ISSN 2616-5783 Vol.8, Issue 12: 88-94, DOI: 10.25236/AJHSS.2025.081214

A Study on the Deviation between AI Translation and Human Translation from the Perspective of Pragmatic Functions

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Abstract: *AI translation has become a core tool in the language service industry by virtue of its efficiency and automation advantages, but the limitations in the realization of its pragmatic function lead to significant deviation from human translation, which restricts the accuracy and adaptability of cross-cultural communication. In this regard, the study of the deviation between AI translation and human translation under the perspective of pragmatic function is proposed. Firstly, the essence of pragmatic function is defined as the ability of language to realize communicative intentions in specific contexts, and by comparing the logic of AI translation with that of human translation, it is clarified that human translators are able to dynamically adjust their translation strategies to achieve functional equivalence through cognitive reasoning and cross-cultural awareness. It is pointed out that the difference between AI translation and human translation in context adaptation is essentially the path difference between data-driven static mapping and cognitive-driven dynamic understanding, which is also reflected in the path choice between explicit symbol matching and implicit functional reconstruction. In terms of cultural values integration, AI translation focuses more on symbol transfer while human translation can significantly improve the cross-cultural adaptability of translation through contextual weight calibration and other operations. Based on this, we propose a collaborative framework of "AI initial screening context association+ human calibration function adaptation", construct a translation paradigm oriented by functional equivalence, and realize the deep complementarity between human and machine at the level of pragmatic function through the hierarchical context model, the intention classification system, and the cultural-functional transcoding protocol, with the aim of providing theoretical support for the upgrading of AI translation technology and innovation of the collaboration model of translation industry between human and machine. It aims to provide theoretical support for the upgrading of AI translation technology and the innovation of translation industry human-machine cooperative mode.*

Keywords: *pragmatic function; AI translation; human translation; deviation study; translation strategy*

1. Introduction

As a bridge connecting different languages and cultures, the quality and efficiency of translation directly affect the accuracy of information dissemination and the depth of cultural communication. Traditional human translation has long dominated by virtue of the translator's profound linguistic skills, cultural literacy and contextual understanding, but its efficiency bottleneck has become increasingly prominent in the face of massive text and real-time translation needs[1]. Meanwhile, breakthroughs in artificial intelligence technology have given rise to the rapid development of AI translation, which has rapidly penetrated into many fields such as business, education and media by virtue of its fast processing speed and wide coverage of languages. However, while pursuing efficiency, AI translation has also led to significant deviations between translations and human translations due to insufficient perception of context and rigid handling of cultural metaphors, triggering a rethinking of translation quality assessment standards in the academic community[2]. The pragmatic function theory emphasizes the communicative purpose of language in a specific context, and requires that the translated text maintains functional equivalence with the original text in terms of information transmission, emotional expression, and cultural adaptation. However, most of the existing studies focus on the accuracy at the lexical or syntactic level, and pay insufficient attention to the systematic deviation at the pragmatic-functional level, resulting in structural deficiencies in the AI translation quality assessment system[3]. In recent years, relevant studies have carried out multidimensional exploration around AI translation quality assessment. At the linguistic level, some studies have begun to pay attention to the

ISSN 2616-5783 Vol.8, Issue 12: 88-94, DOI: 10.25236/AJHSS.2025.081214

influence of cultural presuppositions, stylistic styles and other pragmatic factors on translation, but they mostly stay in qualitative description and have not yet formed a quantifiable assessment framework.

This paper compares the logic of AI and human translation through the core elements of pragmatic function, revealing the differences between the two in terms of context, intention, and cultural adaptation. On this basis, it proposes the integration strategy of "AI initial screening+ manual calibration" to help the translation industry improve its intelligence and cross-cultural communication quality.

2. Concept Definition and Theoretical Basis

2.1 Linguistic Function

As a key cross-concept of linguistics and translation research, the essence of pragmatic function is the ability of language to realize communicative intentions in specific contexts. Unlike traditional linguistics which focuses on the form of language (e.g. vocabulary and grammar), pragmatic function emphasizes the dynamic interaction between language symbols, users and contexts, and considers that the essence of translation is "functional equivalence" rather than "formal correspondence"[4]. The realization of pragmatic function depends on the synergy of three core elements, as shown in Figure 1.

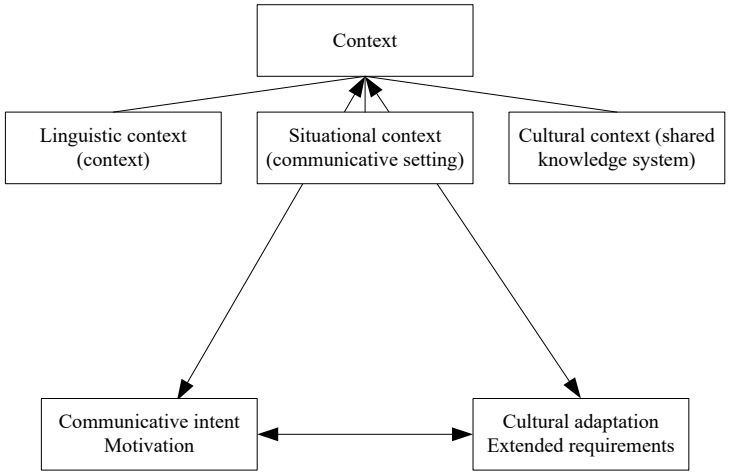

Figure1 Core elements of pragmatic function

Context is the trigger of pragmatic function, including linguistic context, situational context and cultural context. For example, the Chinese word "dragon" is often associated with "vicious monster" in Western culture, while it symbolizes "auspiciousness and power" in Chinese culture[5]. This difference in cultural context directly affects the choice of cultural imagery in translation. Communicative intent is the driving force of pragmatic function, which refers to the goal that the speaker wants to achieve through language, such as persuasion, comfort, warning, etc. Translation needs to capture the implicit meaning of the original text. Translators need to capture the implicit intention of the original text rather than just copying the surface text. In English, "Could you close the window?" is a question on the surface, but the actual intention is to request an action, which needs to be adapted to the target language according to the idiom of the target language, such as "Please close the window". Cultural adaptation is an extension of pragmatic function, which means that the translation should conform to the communication norms and value orientation of the target language culture.

2.2 AI Translation

The essence of AI translation is an automated language processing tool relying on machine learning algorithms and large-scale corpus, and its core logic can be summarized as "pattern recognition - probability calculation - symbol generation"[6]. According to the statistics of a research institute, the utilization rate of AI translation in different fields in 2023 is shown in Table 1.

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Table 1 Global AI Translation Usage Rate in Different Fields in 2023 According to a Research Organization

Field	AI translation usage rate	Growth rate compared to 2020	Main application scenarios
E-commerce	82.3% +145	+145%	Product description translation, multilingual customer service, cross-border payment interface
Technology and software	76.8%	+112%	User manual, API documentation, technical forum localization
Media and entertainment	68.5% +98	+98%	Film and television subtitles, game task text, social media content
Travel and hospitality	63.1% +85	63.1% +85	Hotel reservation system, scenic spot introduction, real-time voice translation
Finance and law	54.7% +72	+72% +85% Finance and law	Contract terms, financial reports, investment report summary translation
Healthcare and medical care	49.2% +65	+65% Medical instructions, patient questionnaires, remote medical records	Medicine instructions, patient questionnaires, remote medical records
Education and academia	41.6% +58% Education and academia	Education and academia 41.6% +58	Online course subtitles, academic paper abstracts, international exam materials

The above statistics show that e-commerce (82.3%) and technology software (76.8%) have the highest penetration rate of AI translation, which is due to its strong standardization, high real-time performance, and low fault-tolerant cost. From the perspective of technological evolution, AI translation has experienced a paradigm shift from rule-driven to statistically-driven to neural network-driven, and the current mainstream Transformer architecture realizes dynamic modeling of context through the mechanism of self-attention, which significantly improves the fluency and accuracy of translation[7]. However, no matter how the technology is iterated, AI translation always follows the closed process of "input-encoding-decoding-output", which is in essence a probabilistic simulation of human translation behavior rather than an active understanding of the communicative function of the language. The performance of AI translation is highly dependent on the size and quality of the corpus, and if there is a lack of domain-specific expertise in the training data, AI may generate words and phrases that can be translated into the language. Belonging to the pair, AI may generate literally correct but functionally distorted translations[8]. Meanwhile, AI optimizes the translation results by minimizing the loss function, which leads it to pay more attention to the surface matching of vocabulary and syntax, while ignoring the implicit intention at the pragmatic level

2.3 Human Translation

The essence of human translation is the creative activity of human translators based on linguistic ability, cultural background and cognitive experience, and its core logic can be summarized as "comprehension-reasoning-reconstruction". Translators need to capture the implicit intention of the original text through "pragmatic reasoning" and dynamically adjust their translation strategies by combining the cultural norms of the target language and the needs of the audience[9]. In the field of human translation, translators can infer the real intention of the original text through contextual clues, background knowledge and communication scenarios. Translators also need to have cross-cultural communication awareness, be able to recognize and deal with cultural preset differences, and flexibly choose translation methods according to text types and audience needs.

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3. Deviation between AI translation and human translation under the perspective of pragmatic function

3.1 The difference between dynamic understanding and static mapping

Context is the core field for the realization of pragmatic function, and its dynamism requires translation to adjust its strategy in real time according to the communication scene, audience background and cultural presets. The difference between AI translation and human translation in context adaptation is essentially the difference in the path between data-driven static mapping and cognitively-driven dynamic comprehension[10].AI establishes the correlation between linguistic symbols and the context through the statistical laws of the corpus, but the mapping relationship will be fixed after the completion of the training of the model. However, after its model training is completed, the mapping relationship is fixed, making it difficult to cope with dynamic changes in context. Artificial translation, on the other hand, relies on the translator's contextual reasoning ability, and can realize real-time adaptation of context and translation through the capture of background knowledge, contextual clues and communicative intent. This difference leads to different functional realization effects when dealing with implicit context, cultural presuppositions and multimodal contexts.

Contextual adaptation of AI translation mainly relies on local context and statistical correlation. When translating "It's cold here", the AI may infer the implied request "Close the Window", but its inference scope is limited by the size of the model window, which makes it difficult to capture the implied intention in long-distance contexts[11]. Human translators, on the other hand, are able to reason deeply in the global context, such as the topic of the dialog and the relationship of the participants. If the scene is a family dialog, the translator may translate "Can you close the window?"; if it is a business negotiation, the translator may translate "Can you close the window? If the scene is a family conversation, the translator may translate "Can you close the window?"; if the scene is a business negotiation, the translator may translate "It's a bit cold here, do you need to adjust the temperature?". In the case of a business negotiation, the translator might translate "Do you need to adjust the temperature in here?" to achieve the communication purpose by adapting the style and wording. In addition, with the popularization of multimedia text, translation needs to integrate multimodal information such as language, image, audio, etc. Although AI translation can deal with the correlation between text and simple images, its multimodal comprehension ability is limited in complex scenarios such as the interaction between subtitle and screen of advertisement video. Human translators, on the other hand, can analyze linguistic and non-linguistic information simultaneously through cognitive strategies such as "eye tracking" and "context simulation".

3.2 Differences in the paths of explicit matching and implicit reconstruction

Communicative intent is the core driving force of pragmatic function, and its transmission needs to be realized through the selection and adjustment of linguistic forms, and the difference in intent transmission between AI translation and human translation is reflected in the choice of paths between explicit symbolic matching and implicit functional reconstruction[12]. AI takes "minimum editing distance" as the optimization goal, and tends to retain the formal features of the original text to reduce the error, while human translation takes "functional equivalence" as the criterion, and realizes the precise transmission of intention through formal variations. This difference makes the two present different effects of intention realization when dealing with metaphors, antonyms and stylistic styles.

Metaphor is an important carrier of intention transfer, and its translation needs to break through the literal meaning and realize functional equivalence; AI translation recognizes metaphor through co-occurring patterns in the corpus, but its conversion strategy is limited to symbolic substitution, while human translation can activate equivalent metaphors in the target language through semantic networks. The style of a language is the carrier of intention, and its translation needs to match the type of text and the needs of the audience. AI translators can classify styles through the style markers in the corpus, but their adjustment strategy is limited to local substitution: for example, replacing "shall" with "must" in legal texts may damage the original text, but it may not be possible for them to use the same style. For example, replacing "shall" with "must" uniformly in legal texts may destroy the obligatory tone of the original text. Artificial translation, on the other hand, can realize functional adaptation through the strategy of "style migration": when translating "The party shall compensate for losses" in a business contract, the translator may, according to the legal tradition of the target language, replace "shall" with "must". When translating "The party shall compensate for losses" in a business contract, the translator may, according to the legal tradition of the target language, translate "shall" as "is obligated to" (in

ISSN 2616-5783 Vol.8, Issue 12: 88-94, DOI: 10.25236/AJHSS.2025.081214

common law) or "está obligado a" (in civil law), which retains the obligatory nature and is in line with the target language's legal text. (civil law system), which not only retains the obligatory nature, but also conforms to the stylistic norms of the target language legal text.

3.3 Differences in Symbolic Translation and Functional Regeneration

Cultural adaptation is the ultimate goal of linguistic function realization, the essence of which is to realize the functional regeneration of cultural imagery through linguistic transformation, and the difference between AI translation and human translation in cultural adaptation is reflected in the tension between the conservatism of symbolic translation and the creativity of functional regeneration. AI takes "cultural equivalence" as an assumption and tends to retain the source language's cultural symbols, while human translation takes "functional equivalence" as a criterion and realizes the regeneration of cultural imagery through cultural filtering, compensation and integration.

This difference makes them show different cultural adaptation effects when dealing with cultural items, taboo words and cultural values. The translation of festivals, customs and other culturally specific items requires a balance between cultural fidelity and functional adaptation, and AI translators achieve transcoding through cross-cultural correspondences in the corpus, but their strategies are limited to symbolic substitutions: for example, translating the Chinese term "Dragon Boat Festival" as "Dragon Boat Festival" preserves the cultural meaning, although it is not the same as "Dragon Boat Festival". For example, the direct translation of "Dragon Boat Festival" into "Dragon Boat Festival" in Chinese retains the name of the festival, but fails to explain its cultural connotation of "commemorating Qu Yuan"[13]. Artificial translators can realize dynamic transcoding through "cultural annotation" or "functional substitution": When translating tourism texts, translators may render "Dragon Boat Festival" as "Dragon Boat Festival (a traditional event honoring the poet Qu Yuan)", using parentheses to provide cultural context. In the translation of children's books, it may be simplified to "Boat Racing Day" to realize cultural accessibility by functional substitution. At the same time, the translation of cultural values needs to realize cross-cultural resonance through language selection; AI translation relies on statistical correlation, which makes it easy to translate the values of the source language directly into the heterogeneous expressions of the target language, while human translation can realize the functional integration through "value reconstruction".

4. Strategies for the Integration of AI Translation and Human Translation

4.1 Construct the synergistic framework of "AI initial screening+ manual calibration".

The dynamic nature of context requires translators to adjust their strategies in real time according to communication scenarios, audience characteristics and cultural presuppositions. Although AI translators can capture local contextual associations through corpus statistics, their static mapping model is difficult to cope with long-distance contextual reasoning and multimodal information integration. The advantage of human translation is to realize deep context adaptation through cognitive reasoning, but the efficiency is limited by individual experience and time cost[14]. The synergistic framework of "AI initial screening context association+ artificial calibration function adaptation" can improve the accuracy and efficiency of context adaptation through technological empowerment and cognitive complementation. AI needs to build a hierarchical context model to decompose the context into "explicit context" (e.g., text, context, image annotation) and "multimodal context" (e.g., context, image annotation). AI needs to build a layered context model to decompose context into "explicit context" (e.g., text, context, image annotation) and "implicit context" (e.g., cultural presuppositions, communicative intent), and assign dynamic weights to different layers. For example, when translating a business negotiation text, the AI can prioritize the matching of terms in the explicit context, while activating the pragmatic rules in the implicit context through the pre-trained model. A human adjusts the weights assigned by the AI through the Context Weight Calibration Tool. If the target language culture prefers direct expression, the weight of "Euphemism" can be reduced from 30% to 15% to ensure that the translation meets the communication habits of the target language.

4.2 Establish a translation paradigm of functional equivalence

When human translation is integrated into AI translation, a function-oriented translation paradigm needs to be constructed to combine the translator's intentional reasoning ability with the AI's form-generating efficiency, realizing the upgrade from explicit symbol matching to implicit function

ISSN 2616-5783 Vol.8, Issue 12: 88-94, DOI: 10.25236/AJHSS.2025.081214

regeneration. Human translators should take the lead in designing the "Intent Classification Framework", subdividing communicative intents into four categories of informational, instructional, expressive and social, and further dividing them into subtypes[15]. AI learns the intent classification model (e.g., intent recognition based on BERT) through corpus annotation, and manually audits the performance of the model in edge cases and complements the culture-specific intent types. In the translation process, the AI first tags the intent types of the text, and manually selects functionally equivalent translations by combining context and cultural presuppositions. Through intent classification, human-computer collaboration realizes a breakthrough from "fuzzy perception of intent" to "precise functional positioning".

4.3 Building a cross-cultural functional symbiosis framework

Translation of cultural values needs to realize cross-cultural resonance through language selection. Artificial translators need to build a "values integration model", decompose the values of the source language into translatable functional groups and match the equivalent components in the target language. For compatible values, the AI translates directly and retains the original form. For conflicting values, the AI generates multiple fusion translations and manually selects the most suitable one in the context of the communication scene.

5. Conclusion

This study systematically analyzes the deviation mechanism of AI translation and human translation from the perspective of pragmatic function, revealing the core differences between the two in the three dimensions of context adaptation, intention transfer and cultural reconstruction. The research results can provide a pragmatics-oriented improvement path for the optimization of AI translation technology. Meanwhile, the research emphasizes that guided by the human translator's pragmatic creativity and supported by the AI's data processing efficiency, the study realizes the deep complementarity between human and machine at the level of pragmatic function by constructing the context hierarchical model, the intention classification system, and the cultural function transcoding protocol.

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