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A Report on Translation of Scientific Texts From the Perspective of Communicative Translation Theory

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Abstract

In today's society, artificial intelligence is developing rapidly, and it is widely used in some biomedical fields such as disease diagnosis, drug research and so on. Through efficient data processing and intelligent algorithms, it improves diagnostic accuracy, promotes the innovation and progress of biomedicine, and has important scientific significance. This report is excerpted from Future of AI in Biomedicine and Biotechnology. Through analyzing this translation material, the translator found that the text contains a large number of professional terms and complex sentences. Therefore, the translator chose Newmark's Communicative Translation Theory as the guiding theory, striving to accurately convey the information to the greatest extent and realize the communicative function of the text. In the translation practice, the translator analyzed feasible translation techniques from the three levels of vocabulary, syntax and text according to the Communicative Translation Theory. Through this translation practice, the translator found that the Communicative Translation Theory is of great guiding significance for the translation of scientific and technological texts, and hoped that through this practice, the translation quality of such type of texts can be continuously improved, and the cultural exchange and dissemination between different regions can be realized with more smooth, clear and understandable translations.

Keywords

Communicative Translation Theory; Artificial Intelligence; Scientific and Technological Text; Translation Skills

1. Introduction

1.1. Introduction of the Source Text

The original text of this translation practice was excerpted from Future of AI in Biomedicine and Biotechnology published by IGI Global. This material mainly describes the historical background, application, challenges and limitations and significance of artificial intelligence in genomic medicine. The original text belongs to science and technology text, with strict structure, strong language logic and a

large number of professional terms. Therefore, with the aim of conveying the accurate information of the original text, the translator read some literatures related to the translation of scientific and technological texts firstly through the China National Knowledge Infrastructure (CNKI), and learned a lot of translation methods and skills of vocabulary, syntax and text coherence. Then the translator thoroughly read the practice text, and on the basis of fully understanding the original text, thinking about how to apply the translation methods learned to this translation, so as to achieve accurate and smooth translation while being faithful to the original text.

1.2. Background of Translation Practice

With the rapid development of science and technology, artificial intelligence has become a key force driving change in the fields of biomedicine and biological science, the application of AI in the two fields has also continued to expand, from protein structure prediction to disease diagnosis, from drug development to personalized medicine, and its influence has become increasingly significant.

In the biomedical field, AI will not only be able to process and analyze large-scale genomic data, but also enable personalized health management through intelligent computational methods. For example, AI-based personalized precision medicine systems have been successfully applied in clinical settings, significantly improving treatment outcomes and patient safety. At the same time, AI also shows great potential in the early diagnosis and intervention of diseases.

However, the applications in biomedical and biological sciences is also facing many challenges. Issues such as data quality and accessibility, model interpretability, and interdisciplinary collaboration remain key challenges to be addressed. Nevertheless, the deep integration of AI and bioscience has become an inevitable trend of future development, and its potential in driving scientific innovation and improving human health cannot be underestimated.

1.3. Significance of Translation Practice

1.3.1. Theoretical Significance

Communicative translation theory was proposed by Newmark. It is one of the most important theories in the field of translation. It emphasized the target-reader-centered and try to make the effect of the target text on the target language readers the same as that of the original text on the source language readers. It may not confined to the form of the original text, but according to the cultural background of the target language and readers' reading habits, making some necessary adjustment and rewriting of the original text, so as to make the translation more natural, smooth and easy to understand. The purpose of communicative translation is to enable the target readers to easily understand the message of the original text, so as to achieve effective cross-cultural communication.

Communicative translation theory provided important principles for this translation practice. It highlighted the balance between the source language culture and the target language culture in translation, as well as the initiative and creativity of the translator in the translation process. These views have exerted an important influence on contemporary translation research and practice, and also provided translators with a broader vision and a more flexible approach.[1] Through the in-depth understanding and practical application of Newmark's communicative translation theory, we can continuously improve the quality of translation and achieve better cross-cultural communication.

1.3.2. Practical Significance

In recent years, artificial intelligence has witnessed rapid development, which has significantly transformed modern lifestyles. Meanwhile, artificial intelligence has greatly promoted the development of the pharmaceutical industry, playing a crucial role in precision medicine, intelligent diagnosis, computer-aided drug design, and clinical trial decision-making, and also has an indispensable role in the integration with the pharmaceutical industry. This translation practice selected the text on the application prospects of artificial intelligence in the field of biomedicine, which was in line with the current research on AI in this aspect in contemporary society and conformed to the trend of development.

2. Translation Process

2.1. Pre-translation

2.1.1. Theoretical Preparation

The translator chose Newmark's communicative translation theory as the guiding principle, which provided important theoretical support for this practice.

According to Newmark, the purpose of communicative translation was to make the effect of the target text on the readers of the target language the same as that of the original text on the readers of the source language, and to pay attention to the readability and acceptability of the translation.(Wang,2019)[2]Communicative translation focused on the effect of the target language and culture, and emphasized the response and understanding of the target reader. It was not confined to the form and expression of the original text, but according to the cultural background of the target language and readers' reading habits, necessary adjustments and adaptations were made to the original text, making the translation more natural, smooth and easy to understand, and realizing effective cross-cultural communication.[3]

The logic of scientific texts is often rigorous and professional, especially in the field of biomedical content. There were lots of professional terms in the material. Therefore, it was necessary to ensure that the target text accurately conveyed the information in the process of translation, and made it easy for the target readers to understand. This required the translator to be close to the expression habits of the

target language in vocabulary selection and in sentence structure, so as to avoid comprehension obstacles caused by literal translation.[4]

This translation practice aimed to achieve the equivalence between the original text and the target text in terms of function and effect. By accurately applying communicative translation theory to the target text, the target text can not only convey professional knowledge, but also meet the reading needs of the target readers.

2.1.2. Practical Preparation

In order to obtain a high-quality translation, the translator repeatedly read through the original text to master the overall intonation style and wording characteristics of the original text, and summarized some professional terms such as genomic medicine, artificial intelligence driven and so on through the Internet to fully understand the original content, so as to make accurate translation.

Moreover, it was important to choose the appropriate translation tools. Since the original text belongs to science and technology, which is beyond the professional knowledge of the translator, it was necessary to learn artificial intelligence and other related knowledge through the Internet. After having a certain understanding of professional terms in the original text, the translator can read relevant literature through CNKI to learn the application status and prospect of AI in the medical field, and had a deeper understanding of Newmark's communicative translation theory so that the translator can make an accurate translation.

2.2. While-translation

This stage was the core of the whole translation process, involving the understanding of the original text, the selection of translation strategies and the formation of the translation. In the process of translation, the translator encountered problems in terms of professional vocabulary and processing of long and difficult sentences. Some words have a deep professional degree, and the understanding to such words can not only stay on the surface. Therefore, the translator read a lot of relevant literature to ensure the full understand of the original content, and then started to process the translation.

In the process of translation, the first difficulty encountered is how to process some long and difficult sentences. Because there were always many long and complex sentences in science and technology texts, passive voice and term combinations,and these structures tend to lead to lengthy and obscure translations, which do not conform to the expression habits of Chinese.[5]Therefore, facing with long and difficult sentences, the translator gave priority to dividing them into several short sentences, and adjusted the word order appropriately according to Chinese expression habits. At the same time, the translator tried to use short sentences to avoid over-explanation or adding unnecessary information by mistake.

The second problem was that the original text involved the integration of

multidisciplinary knowledge, including professional terms in the fields of physics, chemistry, biology, etc., which required the translator to have an interdisciplinary knowledge background to ensure the accuracy of the translation and convey the correct information. Furthermore, scientific and technical texts have high requirements for logic and coherence, and the translator needed to ensure that the overall structure and paragraph of the translation maintained a clear logical relationship.

2.3. Post-translation

A comprehensive review of a translation is an indispensable condition for the formation of an excellent translation. After the completion of the translation task, the translator reread the translation to check whether there were basic grammatical and semantic errors, and whether the expression of proper nouns was uniform in the whole text, and then made some modifications. This was also very important in quality control. The translator has adjusted some words and sentence structures again according to the characteristics of scientific and technological translation in order to further meet the readers' reading needs.

After several reviews, the translator sought the help of the tutor to check the translation again, and discussed some ambiguous meanings, finally, under the guidance of the tutor, the translator modified the inappropriate parts and completed the translation practice.

3. Case Analysis

In this chapter, the translator conducted a case analysis of the translation at the lexical, syntactic and discourse levels guided by Newmark's theory of Communicative translation. The lexical level mainly discussed some techniques of omission, word formation, and annotation that appear in the article. At the syntactic level, the translator explored some skills of translating long and complicated sentences and passive sentences. At the discourse level, the translator managed to maintain the cohesion and coherence of the SL text, and at the same time considered seriously the smoothness and readability of the TL text and the transfer of the information of the SL text as accurately as possible.

3.1. Lexical Level

There were many professional terms in scientific English texts. When translating such texts, the translator should firstly infer the meaning of professional terms accurately based on a full understanding of the context and the text and then translate with certain translation methods or skills so that TL readers can get the key information of the SL.[6]

3.1.1. Annotation

A major difficulty in translating informational texts was to convey relatively professional and obscure information, knowledge and concepts. If only literal translation was adopted, it was difficult to achieve good translation effect, so that readers can understand the background and context of the text. One of the ways that can be used to solve this difficulty was to add notes to unfamiliar proper nouns and other difficult concepts,(Yu,2020)[7]so the translator has annotated some terms, and the annotated content usually includes the meaning of the terms and background information and so on.

Example 1:

ST: ...especially supervised learning techniques like decision trees and support vector machines.

TT: 特别是决策树模型（一种基于树状结构的监督学习算法，通过特征选择将数据划分为不同分支，最终形成决策规则用于分类或回归任务）和支持向量机（一种监督学习模型，通过寻找最优超平面，最大化不同类别数据点之间的间隔，同样用于分类和回归任务）等监督学习技术。

Example 2:

ST: including gene expression patterns, DNA sequences, and epigenetic markers.

TT: 包括基因表达模式、DNA 序列和表观遗传标记（指染色质中 DNA 或相关蛋白质的化学修饰，如 DNA 甲基化、组蛋白乙酰化或甲基化等。这些修饰可调控基因活性，但不改变 DNA 序列）。

Analysis: In the translation, the translator found the meanings of “decision trees”, “support vector machines” and “epigenetic markers” by searching online, and found that most of them were translated literally, but without annotations, it was difficult for readers to directly understand the meaning of such terms, so the translator added annotations, which can not only accurately convey the original information, but also enhance the readability of the translation.

3.1.2. Word Formation

Because the language of science and technology texts is often unemotional, more logical sentences are used to express objective laws, concepts, theories, etc., and a large number of proper nouns, long difficult sentences, and nominalization structures often appear in this style.(Zhang,Yang,2021:124-126)[8] Therefore, the translator selected several examples of word formation for analysis.

Example 3:

ST: Clinical practitioners’ and researchers’ belief in, acceptance of, and adoption of AI-driven genomic analysis may be hampered by their inability to comprehend the underlying mechanisms and characteristics that underlie AI predictions.

TT：临床医生和研究人员对人工智能预测背后的机制和特征理解不足，可能无法完全信任、接受和采用人工智能驱动的基因组分析。

Example 4:

ST: Since genomic data contains genetic predispositions to diseases and personal health information, it is naturally sensitive.

TT: 由于基因组数据包含疾病遗传倾向和个人健康信息，因此自然具有敏感性。
Analysis: In the third example, “brief”, “acceptance” and “adoption” are all nouns, which were translated into verb forms by the translator to make the sentences more fluent and clear, and in line with Chinese expression habits. For the fourth example, in the original sentence, “sensitive” is an adjective , and if it was directly translated as “它自然敏感”, it would be too rigid, so the translator chose to translate it as “自然具有敏感性”, the adjective was converted into a noun, which can make the sentence more smooth.

3.1.3. Omission

In translation, omission means that some parts or words in the original text were omitted by the translator. It is one of a common translation skills.(Liu,Li,Zhou,2023:143-150)[9]
Example 5:
ST: The first steps toward using AI for genetic data processing were made possible by the development of symbolic AI tools.
TT: 其用于遗传数据处理的最初尝试得益于符号人工智能工具的发展。
Analysis: In example 5, the phrase “artificial intelligence” appeared many times in this paragraph, which made the repeated translation seem redundant. Therefore, the translator here merged this sentence with the previous sentence, omitting the word “artificial intelligence” and replacing it only with “其”, which was concise and clear, and enhanced the readability of the translation.

3.2. Syntactic Level

From the level of syntax, scientific English generally adopts present tense, passive voice, nominalized structure and compound sentences, especially attributive clauses in order to show objectivity.(Ding,Sun,2016)[10]

3.2.1. Long and Complex Sentences Splitting

In translation practice, the processing of long and difficult sentences was crucial to test the translator’s ability. Through in-depth analysis and accurate translation of long and difficult sentences, we can not only improve our language ability, but also deeply understand the thinking differences between the two languages. The following were the translator’s translation analysis of several difficult sentences in the original text.
Example 6:
ST: By giving doctors up-to-date, pertinent information that is customized to each patient’s unique profile, AI-powered clinical decision support systems increase diagnostic precision, assist evidence-based decision-making, and improve patient outcomes.
TT: 通过向医生提供每位患者的实时个性化信息，人工智能驱动的临床决策支持系统诊断精确度有所提高，有助于循证决策，并改善了患者的预后。

Analysis: This is a long and difficult sentences. The translator firstly analyzed the sentence structure, divided the long sentence into short sentences, and then added or subtracted words appropriately according to Chinese expression habits to form the final translation. When translating long and difficult sentences, the translator should first understand the English sentence components and features, analyze them according to the original features of the sentences, and then translate them step by step.(Newmark,1981)[11]

3.2.2. Restructuring of Sentence Sequence

There were many obvious differences in the expression habits between English and Chinese. In English, it usually follows the pattern of fact first and then comment. Sentences generally state facts first, and then express opinions or evaluations. Chinese expressions tend to state the position or emotion first, and then further elaborate the facts. This difference makes English and Chinese have completely different characteristics in sentence construction.(Zhang,2024)[12] Therefore, in the translation of long and complex sentences, the translator should pay special attention to the appropriate exchange of word order.

Example 7:

ST: Healthcare can benefit greatly from AI-driven genomic analysis, but there are still several obstacles and restrictions that must be overcome before it can make a big difference.

TT: 尽管医疗保健行业能从人工智能驱动的基因组分析中受益良多，但在其产生重大影响之前，仍需克服一些障碍和限制。

Analysis: In example 7, if the sentence was translated as "仍然有很多障碍和限制需要克服，在其产生重大影响之前。" It was rigid and did not conform to the expression habits of Chinese. Chinese generally puts the result last, which is contrary to English. Therefore, the sentence structure of the target text was adjusted by the translator, which can enhance the readability.

3.2.3. Converting Passive Voice into Active Voice

The use of passive voice is a common phenomenon in English essays, which is closely related to the extensive use of conjunctions in sentence patterns. This kind of sentence structure makes English articles more flexible and varied in expression. Chinese, on the other hand, uses active sentence patterns and the word order is relatively fixed and stable, which makes Chinese articles more rigorous and orderly in expression.(Randolph,Greendaum,Leech,1985)[13]

Example 8:

ST: The first steps toward using AI for genetic data processing were made possible by the development of symbolic AI tools.

TT: 其用于遗传数据处理的最初尝试得益于符号人工智能工具的发展。

Analysis: It was written in the passive voice of the original text, which was corresponding to the expression habits of English, but if it was directly translated as

"被用于", the translation would not conform to the reading habits of the target language readers. Therefore, according to Newmark's communicative translation principles, the translation should be centered on the Chinese readers, and conform to the expression habits of Chinese, so as to make the sentence more fluent and clear.

3.3. Textual Level

In the process of translation, discourse coherence is an important factor to ensure the quality of translation, which focuses on the logical relationship and semantic connection among the various parts within the discourse. Discourse coherence mainly manifests in two forms: formal cohesion and semantic coherence. Formal cohesion is mainly achieved through language means such as vocabulary, grammar and logical relations, while semantic coherence refers to the fact that each sentence in a discourse is interrelated in meaning.(Xie,2024:151-153)[14]

Example 9:

ST: Proactive steps are needed to mitigate prejudice and ensure fairness in AI-driven genomic analysis.

TT: 在人工智能驱动的基因组分析中，为了减少偏差并确保公平性，研究者需要采取主动措施。

Analysis: According to Communicative Translation Theory, the logic of the translation should be rigorous and the coherence should be strong to conform to the reading habits of the target language readers. Therefore, in the above two examples, the translator used some skills such as related sentence structures like"为了...，需要...", maintaining the same form for the three parallel nouns, and adding subjects, etc., efforts were made to ensure the overall coherence and strong logic of the translation and enhanced its readability.

4. Conclusion

4.1. Experience Gained from the Translation Practice

No matter what type of text was faced with, the translator should have a solid knowledge of both the source and target language. Translators have a solid foundation to deepen their understanding of the original text.(Newmark,1988)[15]The main benefits brought to the translator by this translation practice task were as follows: Firstly, since the translation material this time belongs to scientific and technological texts and contains a large amount of knowledge unfamiliar to the translator, during the translation process, the translator consulted a lot of online resources and read many relevant literatures in order to familiarize with the related terms. Through this translation practice, the translator understood the application prospects and challenges of AI in the medical field, expanded the knowledge base, and also mastered more methods for consulting literatures and materials, laying a foundation for future translation tasks.

4.2. Limitations and Suggestions

During this translation process, although the translator adhered to the Communicative Theory of Translation and endeavored to ensure that the translation accurately conveys the original information while conforming to the reading habits of Chinese readers, upon reviewing the entire translation process, some shortcomings were still identified.

In response to these shortcomings, the translator will take the following improvement measures in future translation practices.

Firstly, for professional terms, not only should their accuracy be ensured, but also more accurate annotations should be appropriately added in the translation to help non-professional readers better understand. Secondly, when dealing with long and difficult sentences, the translator will further practice to improve the understanding ability of complex sentence structures, making the translation more natural and fluent.

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