

Common Types of Errors in Generative Artificial Intelligence and Countermeasures: A Case Study of E-C Translation of Chemical Text

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Abstract: With the qualitative analysis method, the paper uses three types of generative AI such as ChatGPT, Claude2, and ERNIE Bot to translate chemical text, aiming to conclude common types of errors committed by generative AI during E-C translation of chemical text and provide some countermeasures. The findings show that common types of errors include five aspects: terminological aspect, lexical aspect, syntactic aspect, discourse aspect, and format aspect. Based on these types of errors, the paper proposes the following countermeasures: (1) Translators can obtain accurate translation of chemical terminology by utilizing the “Method of Suspicion, Searching, Determination, and Expression” and multiple methods. In addition, they can also make use of the terminology database in computer-assisted translation tools like Trados to ensure consistency in the translation of terminology; (2) During the post-editing process, translators can adopt the Communicative Translation Principle to conduct their post-editing. This involves not only modifying content-related errors produced by generative AI but also addressing format issues, with the overarching aim of producing translations that are well-adapted to target readers; (3) For translations that have been modified in the post-editing process, translators can establish translation memory to promptly store corpus, thereby preventing the unnecessary re-translation or post-editing of identical or similar content.

Keywords: Generative Artificial Intelligence; E-C Translation of Chemical Text; Common Types of Errors; Post-Editing; Communicative Translation Principle; Terminology Database; Translation Memory.

1. Introduction

At the end of 2020, after the advent of artificial intelligence represented by ChatGPT gained huge attention, the number of users has surpassed 100 million as of now. Following the release of ChatGPT, major tech companies both domestically and abroad have accelerated their research and development of artificial intelligence under their banners. On March 15, 2023, Anthropic released a product similar to ChatGPT called Claude, and in July of the same year, Anthropic announced the launch of its latest large language model, Claude2. According to the company’s official website, compared to Claude 1.3, Claude2 possesses stronger comprehensive capabilities and can generate longer responses. Similarly, domestic internet companies have followed this trend; on August 31, 2023, Baidu launched its product ERNIE Bot (Wenxin Yiyán), capable of conversing and interacting with people, answering questions, assisting in creative endeavors, and efficiently and conveniently helping people acquire information. From a single generative AI to the co-development of different types of generative AI such as Bard, Claude2, and ERNIE Bot (Wenxin Yiyán) today.

After searching through databases such as CNKI, WANFANG, Web of Science, and other databases, the author found that research related to generative AI translation can largely be categorized into five types. First, some scholars compare generative AI with neural network machine translation. For example, Zhang and Zhao (2024) investigated the quality differences in translation tasks between generative AI language models and neural network machine translation engines for English-Chinese and Chinese-English translations, and on this basis, reflected on how translation education should respond to the latest developments and changes

brought about by generative AI. Second, some researchers study which prompts yield the best performance in generative AI, such as Jiao et al. (2023), who researched what kind of prompts can enable generative AI to produce optimal translations. Third, there are studies on the application of generative AI in post-editing, such as Geng and Hu (2023), who analyzed the post-editing performance of the chatbot ChatGPT in English-Chinese and Chinese-English translation tasks from the perspectives of error correction, syntactic structure, discourse coherence, and register adjustment. Fourth, some scholars explore the impact of AI on translation pedagogy, such as Zhou (2023), who discussed the transformations, challenges, and relevant coping strategies that ChatGPT brings to translation teaching. Fifth, some studies investigate the types of errors made by generative AI in specific texts, such as Gu and Leng (2024), who identified four types of translation errors frequently encountered when using ChatGPT: term recognition, term interpretation, the use of standardized terminology, and the use of idiomatic expressions.

There is a scarcity of studies comparing the applications and shortcomings of different types of generative AI in the translation of specific texts. Chemical text involves numerous principles, processes, and procedures, and contains a plethora of specialized terminology; chemical text also includes a large number of long and complex sentences, making it lengthy and difficult to comprehend. In light of this, the study uses materials from “*English for Chemistry and Chemical Engineering*” edited by Zhang, Wang, Gong, et al. (2021), and “*English for Applied Chemistry*” edited by Wan and Wang (2008). Employing the qualitative research method, the study utilizes three types of generative AI—ChatGPT, Claude2, and ERNIE Bot to translate chemical text from English to Chinese.

This paper aims to summarize common error types made by three types of generative AI in the E-C translation of chemical text and provide corresponding countermeasures. This is intended to help translators working in the chemical text become familiar with the error types made by three types of generative AI, thereby improving the quality and speed of post-editing.

2. Common Types of Errors

The paper selects “*English for Chemistry and Chemical Engineering*” and “*English for Applied Chemistry*” as source materials. It employs the qualitative research method and utilizes three types of generative AI—ChatGPT, Claude2, and

ERNIE Bot to translate chemical text from English to Chinese. The goal is to categorize common error types made by three types of generative AI models during the E-C translation of chemical text.

Based on the research by Jiao et al. (2023) regarding prompts, the author adopts three types of generative AI to generate target text. First, drawing on previous relevant studies by scholars such as Cui and Li (2015), Chen and Tian (2021), and Yang and Fan (2021), the author identifies errors made by ChatGPT, Claude2, and ERNIE Bot in chemical text. This leads to the final determination of five categories of error types at the levels of terminology, lexis, syntax, discourse, and format concerning generative artificial intelligence.

Table 1. Common types of errors

Error Types Dimension	Terminological Level	Lexical Level	Syntactical Level	Textual Level	Format Level
	Mistranslation of Chemical Terminology	Selection of Word Meanings	Segmentation of Sentences	Omission of Content	Chinese Serial Comma
	Inconsistency in Chemical Terminology	Addition or Omission of Word Meanings	Fluency of Sentences	Referential Content	Book Title Mark
		Part-of-Speech Selection	Logical Structure of Sentences		

3. Analysis of Common Types of Errors

The types of errors made by three types of generative artificial intelligence include five categories of error types at the levels of terminology, lexis, syntax, discourse, and format. The paper analyzes in detail error types of three types of generative AI from five levels.

3.1. Terminological Level

3.1.1. Mistranslation of Chemical Terminology

Example 1: These are reactions in which a chain carrier is created in an initiation step and goes on to create more carriers.

ChatGPT: 这些是在引发步骤中创建链载体，并继续创建更多载体的反应。

Claude2: 这里是一系列反应，在初始化步骤中产生了一个链式载体，之后这个载体继续产生更多的载体。

ERNIE Bot: 这些反应中，在起始步骤中形成链载体，然后该载体继续形成更多的载体。

Reference Translation: 在这些反应中，引发步骤产生链反应活性中心，接下来产生更多的活性中心。

According to Wan and Wang (2008, p.77), “chain carrier” is a technical term meaning “chain reaction active center.” In Example 1, ChatGPT and ERNIE Bot translate it as “链载体,” while Claude2 translates it as “链式载体,” all of which belongs to the category of literal translation. Tao, Cheng, Wang, et al. (2019, p. 90) state that the handling of scientific and technological terminology typically follows established conventions, meaning that the translation of terminology should adhere to widely accepted versions and should not be subjectively created by translators, especially avoiding literal translation. Furthermore, when the terms “functional group,” “bond,” and “magma” were input into three types of generative AI, none of them ensured terminological accuracy.

3.1.2. Inconsistent in Chemical Terminology

Example 2: This impact imparts a swirling motion to the magma, facilitating flash evaporation and equilibrating the

magma with the vapor through the action of an adiabatic flash.

ChatGPT: 这对岩浆产生了旋转运动，促进了瞬时蒸发，并通过绝热闪蒸的作用将岩浆与蒸汽达到平衡。

Claude2: 这种冲击给岩浆带来了涡流运动，促进了瞬间汽化，并通过绝热闪蒸作用使岩浆与蒸汽达到平衡。

ERNIE Bot: 这会对岩浆产生旋转运动，从而促进闪蒸，并通过绝热闪蒸作用使岩浆与蒸汽达到平衡。

Reference Translation: 加热的液体进入糊状物中，引起糊状物产生漩涡，而这漩涡促进闪蒸作用，并且使糊状物在绝热闪蒸作用下达到蒸汽平衡。

“Due to the characteristics of machine translation models, when the same term appears in different phrase combinations, its translation may vary (Cu & Li, 2015, p. 22).” Inconsistent terminology often involves two scenarios: one where the same term within the same sentence is translated differently, as exemplified in Example 2, and another where the same term is inconsistently translated across different occurrences. For the two instances of “flash,” all three types of generative AI—ChatGPT, Claude2, and ERNIE Bot—demonstrate inconsistent in chemical terminology. Such inconsistencies require human translators to correct and standardize the usage of terminology.

3.2. Lexical Level

3.2.1. Selection of Word Meanings

Example 3: Each enzyme has a unique three-dimensional structure that usually includes a pocket or cleft presenting an array of functional groups positioned to bond to complementary functional groups of the reactant molecule.

ChatGPT: 每个酶都具有独特的三维结构，通常包括一个口袋或裂缝，其中排列着一系列功能基团，以便与底物分子的互补功能基团结合。

Claude2: 每个酶都有一个独特的三维结构，通常包括一个口袋或凹槽，呈现一组功能性团，定位以与反应物分子的互补功能性团结合。

ERNIE Bot: 每种酶都有一个独特的三维结构，通常包括一个口袋或裂缝，其中存在一系列功能基团，这些基团

可以与反应物分子的互补功能基团结合。

Reference Translation: 每个酶具有独特的三维结构，通常包括官能团排布的空穴或裂缝。这些官能团通常与反应分子的补充官能团相键合。

“Some words encompass various specialized meanings; hence, when dealing with such words, translators need to delve deep into the specialized field to understand how the meaning of the word should be selected in different contexts, thus choosing the most appropriate sense (Liu & Yu, 2017, p. 14).” In Example 3, three types of generative AI fail to appropriately select the meaning of the term “pocket,” failing to choose the correct and contextually suitable meaning. Both ChatGPT, Claude2 and ERNIE Bot opt for the common English meaning of the word instead of integrating the chemical context and selecting the meaning consistent with the expression in the chemical text. The translation of “pocket” is not only unidiomatic and inappropriate but also confuses target readers, leaving them pondering the true meaning of “pocket” in this sentence. This demonstrates that the three types of generative AI do not match the contextual appropriateness of meanings akin to professional translators.

3.2.2. Addition or Omission of Word Meanings

Example 4: One of these carbon atoms is titled up, out of the ring, whereas the other is titled down to form the “chair” structure shown in the figure below.

ChatGPT: 其中一个碳原子倾斜向上，脱离了环的部分，而另一个倾斜向下，形成下图所示的“椅子”结构。

Claude2: 这些碳原子中的一个被扭曲向上，即扭曲出环面，而另一个被扭曲向下形成下图所示的“椅子”结构。

ERNIE Bot: 其中一个碳原子翻转，使它突出于环外，而另一个碳原子翻转，形成如图所示的“椅”形结构。

Reference Translation: (六元环中两端两个碳原子中的一个向上翘起，偏离(由其他四个碳原子所组成)的环平面，而另一端的一个碳原子向下翘，形成下图所示的“椅式”结构。

Guo (2008) noted that due to differences in grammatical and syntactical structures, the expression styles of English and Chinese languages are not identical. Therefore, during the E-C translation of chemical text, it may be necessary to add or omit certain words based on actual needs. According to the reference translation, “ring” refers to the circular arrangement formed by the other four carbon atoms, and “one” and “the other” refer to the two carbon atoms at the ends of the hexagonal ring. After supplementing this background information in parentheses, the reference translation caters to the reader while also maintaining readability. In Example 4, even though three types of generative AI accurately translated the sentence without error, they failed to convey effective information, resulting in translations that lacked comprehensibility. Target readers without any background in chemical text reading the translations from the three types of AI will feel perplexed and at worst abandon reading the target text further, and ultimately, the communicative function of the target text will not be achieved.

Example 5: This is the same as that for the forward reaction, except for the elements of one molecule water of water, the solvent, the participation of which cannot be determined experimentally.

ChatGPT: 这与正向反应的情况相同，除了涉及一个水分子的元素，即水的溶剂，其参与度无法通过实验确定。

Claude2: 这与正向反应相同，除了水分子(溶剂)的一个元素的参与不能通过实验确定。

ERNIE Bot: 这与正反应情况相同，只是一分子水中的元素是水，而水作为溶剂，其参与反应无法从实验中得出。

Reference Translation: 正反应也如此，除水分子外，溶剂的加入也不影响实验结果。

In Example 5, the reference translation omits “of which” and “the elements”, despite the omission, the overall meaning and message of the sentence remain unaffected. Although three types of generative AI include all content from the original sentence, this sentence are excessively verbose and lack conciseness. Compared to the reference translation, three types of generative AI fail to streamline redundant information, leading to sentences that appear long, and reducing the readability of the translation.

3.2.3. Part-of-Speech Selection

Example 6: An intimate mixture of vapor and liquid enters the vapor separator d, in which sufficient time is allowed for the vapor and liquid portions to separate.

ChatGPT: 蒸汽和液体的亲密混合物进入蒸汽分离器 d，在其中允许足够的时间使蒸汽和液体部分分离。

Claude2: 蒸汽和液体的亲密混合物进入蒸汽分离器 d，在其中有足够的时间让蒸汽和液体部分分离。

ERNIE Bot: 蒸汽和液体的密切混合物进入蒸汽分离器 d，在其中有足够的时间使蒸汽和液体部分分离。

Reference Translation: 气相液充分混合均匀的混合物进入气体分离器 d，并在那里停留足够长的时间使气液两相分离。

In Example 6, three types of generative AI directly translate the term “intimate” as “close” or “intimate,” which does not conform to the context of this sentence. The term “intimate” in this context refers to a well-mixed state rather than personal relations. Lian (2010) points out that English belongs to the static language with a preference for noun phrases and prepositions in sentences, while Chinese is the dynamic language that favors verbs and uses more of them. The reference translation converts the adjective into a verb phrase, using “mix uniformly” (混合均匀), which better conveys the intended meaning and adheres to Chinese linguistic conventions.

3.3. Syntactical Level

3.3.1. Segmentation of Sentences

Example 7: However these traditional approaches are increasingly being replaced by methods such as supercritical fluid extraction (SFE) and solid-phase extraction (SPE) with a cartridge, mini-column, or disk.

ChatGPT: 然而，这些传统方法越来越被超临界流体提取(SFE)和带有装置、微柱或盘的固相萃取(SPE)等方法所取代。

Claude2: 然而，这些传统方法正越来越被超临界流体提取(SFE)和固相萃取(SPE)等方法所取代，后者使用萃取小柱、迷你柱或磁盘。

ERNIE Bot: 然而，这些传统的方法正越来越多地被诸如超临界流体萃取(SFE)和带有小柱、微型柱或盘的固相萃取(SPE)等一些方法所取代。

Reference Translation: 然而这些传统的方法愈来愈被用卡盘、小型柱或圆盘进行的超临界流体萃取(SFE)和固相萃取的方法所取代(SPE)。

In Example 7, the phrase “with a cartridge, mini-column, or disk” belongs to SPE alone or both SPE and SFE. In a strict manner, since there is the conjunction “and” before SPE, it indicates that SPE should be parallel to SFE, and thus, the

methods referred to should include both SPE and SFE. The reference translation reflects this aspect. However, three types of generative AI interpret “with a cartridge, mini-column, or disk” as belonging solely to SPE, leading to a misinterpretation of the information. In this example, none of the three types of generative AI manage to accurately segment and handle the parallel components as precisely as the reference translation does.

3.3.2. Fluency of Sentences

Example 8: The need for well-trained engineers in all disciplines of pharmaceutical discovery and development is increasing as the scope of therapeutics expands beyond small molecular weight compounds to new and more complex biopharmaceuticals and combination therapies.

ChatGPT: 随着治疗范围从小分子化合物扩展到新的更复杂的生物制品和联合疗法, 各种制药发现和开发领域需要受过良好培训的工程师的需求正在增加。

Claude2: 随着治疗范围从小分子量化合物扩展到新型和更复杂的生物制药及联合疗法, 所有药物发现和开发学科对培训有素的工程师的需求正在增加。

ERNIE Bot: 随着治疗学的范围从小分子化合物扩展到新的和更加复杂的生物药品及联合治疗, 药品探索和开发所有学科对训练有素工程师的需求不断增长。

Reference Translation: 随着治疗范围从小分子化合物扩展到新的更复杂的生物制品和联合疗法, 在药物发现和开发的所有领域中, 对训练有素工程师的需求日益增加。

“Chinese syntax is like a bamboo, characterized by many parallel structures and run-on sentences, while English syntax is more like a tree with many branches, where major branches give rise to minor ones, and these parts are linked by subordinate structures (Qiang, 2021, p.70).” In Example 8, the reference translation separates “in all disciplines” into an independent part, aligning with the characteristics of Chinese syntax. By contrast, three types of generative AI still follow English expression habits, rendering the sentence into a longer Chinese structure, and blindly imitating the original form for faithfulness at the expense of smoothness.

3.3.3. Logic Structure of Sentences

Example 9: The solubility product constant or solubility product, K_{sp} , is equal to the product of the molar concentration of the constituent ions in a saturated solution of a slightly soluble salt, each raised to the power of its coefficient in the balanced equation.

ChatGPT: 溶解度积常数或溶解度积 K_{sp} 等于在微溶性盐饱和溶液中的成分离子的摩尔浓度的乘积, 每个成分离子的乘幂等于其在平衡方程中的系数。

Claude2: 溶解积常数或溶解积 K_{sp} 等于稍微溶解盐的饱和溶液中构成离子的摩尔浓度的乘积, 每个离子的指数幂等于该离子在平衡方程式中的系数。

ERNIE Bot: 溶度积常数或溶度积, 用 K_{sp} 表示, 它等于在微溶盐的饱和溶液中各组成离子的摩尔浓度乘以其化学方程式中相应系数次幂的乘积。

Reference Translation: 溶度积常数或溶度积, K_{sp} , 等于微溶盐饱和溶液中组成离子物质的量浓度的乘积, 每个物质的量的浓度都以平衡方程式中该离子的系数做幂指数。

In Example 9, the logical structure of the latter half of the sentence hinges on the relation between the constituents in the balanced chemical equation and their exponents. Despite

multiple attempts at generating translations, three types of generative AI consistently fail to grasp the meaning of this sentence. Zhang, Wang, Gong, et al. (2021, p.90) emphasize that in the sentence, “each” serves as a pronoun referring back to “molar concentration,” and “its” stands for the “constituent ions.” Understanding is a prerequisite for accurate expression; if AI translation systems cannot understand the content of a sentence, the likelihood of accurately reproducing the original text is negligible. The author reformulates the sentence as “the molar concentration raised to the power of the constituent ions’ coefficient in the balanced equation,” and although three types of generative AI can translate this sentence, they fail to accurately translate the phrase “raised to the power of,” thus failing to convey the logic of the latter part of the sentence. Without the cognitive abilities and judgment skills of human translators, three types of generative AI cannot accurately interpret and reproduce the logical structure of sentences.

3.4. Textual Level

3.4.1. Omission of Content

Example 10: Thus, the smallest particle of fire had the shape of a regular tetrahedron; of air a regular octahedron; of water a regular icosahedron, and of earth a cube (or regular hexahedron).

ChatGPT: 因此, 火的最小粒子呈规则四面体状; 空气呈规则八面体状; 水呈规则二十面体状, 而土呈立方体 (或称为规则六面体)。

Claude2: 因此, 火的最小粒子呈正四面体的形状; 空气呈正八面体的形状; 水呈正二十面体的形状, 而土呈立方体 (或正六面体) 的形状。

ERNIE Bot: 因此, 最小的火粒子具有正四面体的形状; 空气是正八面体; 水是正二十面体, 土是立方体 (或正六面体)。

Reference Translation: 因此, 火的最小微粒具有正四面体的形状; 气的最小微粒具有正十二面体的形状; 土的最小微粒具有立方体 (或正六面体)。

English values variety and frequently employs different pronouns, and various vocabulary to convey the same meaning, and omits repetitive structures to achieve the characteristic of being concise and clear. The full version should be “the smallest particle of air had the shape of a regular octahedron” rather than “a regular tetrahedron.” Since the information following the semicolons is structurally identical, the repeated phrases “the smallest particle of” and “had the shape of” are omitted for the sake of conciseness. In Example 10, three types of generative AI never fully supplement or recreate the omitted information, leading to sentence mistranslation. The target text given by three types of generative AI does not conform to the scientific and rigorous nature expected in chemical text, and they exhibit lower fluency and poorer readability.

3.4.2. Referential Content

Example 11: The method is popular because it is non-destructive and may be applied to thermally liable compounds (unlike GC), it is also a sensitive technique since it incorporates a wide choice of detection methods.

ChatGPT: 这种方法之所以流行, 是因为它是非破坏性的, 可以应用于热敏感化合物 (与气相色谱不同), 而且 它还是一种敏感的技术, 因为它包括多种检测方法的广泛选择。

Claude2: 该方法受欢迎是因为它是非破坏性的, 并且可以应用于热敏化合物 (与气相色谱不同), 它也是一个

敏感的技术，因为它结合了广泛的检测方法。

ERNIE Bot: 该方法很受欢迎，因为它^u是非破坏性的，可以应用于热敏性化合物(与GC不同)，它^u也是一种灵敏的技术，因为它^u结合了多种检测方法。

Reference Translation: 高效液相色谱因其非破坏性以及可用于检测热不稳定成分(与气相色谱不同)而被广泛使用；高效液相色谱也是非常灵敏的技术，因为它^u可以使用多种检测方法。

Here, “the method” refers that “HPLC is the most widely used analytical separation method.” To avoid ambiguity and ensure coherence and clarity in the sentences, the reference translation accurately renders “the method” and the three instances of “it.” Cao (2019) emphasizes the principle of handling pronoun: if a pronoun can be omitted in translation, it should be; if it requires translation, it shall be translated; and for pronouns that cannot be omitted nor easily translated, they can be handled appropriately with pronouns like “其” or “之”. In Example 11, none of three types of generative AI accurately render “the method” and the three instances of “it”; they simply translated the three “its” as “它”，but the referents of these “它” are unclear. Whether these “它” refer to the same thing or different things is ambiguous, this example shows that three types of generative AI do not adhere to the aforementioned principles of pronoun handling, relying largely on generic terms like “它” and “这”.

3.5. Format Level

3.5.1. Chinese Serial Comma

Example 12: To lower our global carbon footprint and offset the effects of global climate change, we need to incorporate sustainable materials, use sources of energy with fewer GHG emissions, and develop recycling efforts to protect our inventory of renewable resources and reduce environmental waste.

ChatGPT: 为了降低全球碳足迹并抵消全球气候变化的影响，我们需要采用可持续材料，使用排放温室气体较少的能源来源，并发展回收利用的努力，以保护我们的可再生资源库并减少环境废弃物。

Claude2: 为了降低我们的全球碳足迹并抵消全球气候变化的影响，我们需要使用可持续材料，采用温室气体排放更少的能源，并发展回收利用，以保护我们的可再生资源储备，并减少环境浪费。

ERNIE Bot: 为了减少全球碳足迹和抵消全球气候变化的影响，我们需要使用可持续材料，使用温室气体排放量较少的能源，并开展回收工作，以保护我们的可再生资源库存并减少环境浪费。

Reference Translation: 为了降低全球的碳排放量和抵消全球气候变化的影响，我们需要实现可持续性材料、使用具有更少温室气体排放的能源、开发循环利用方法以保护我们的可再生资源 and 减少环境污染。

In Example 12, “incorporate,” “develop,” and “reduce” represent actions we need to take actions, which are parallel information. English uses commas to connect parallel elements, whereas Chinese often employs Chinese serial comma (、) to link parallel elements. Despite five rounds of answer generation, three types of generative AI fail to correctly convert Chinese serial comma, which can potentially affect the readability of target readers by not adhering to proper Chinese punctuation conventions.

3.5.2. Book Title Mark

Example 13: English for Chemistry and Chemical Engineering

ChatGPT: 化学与化学工程英语

Claude2: 化学和化工英语翻译

ERNIE Bot: 化学与化工专业英语

Reference Translation: 《化学化工专业英语》

“Chinese book titles constantly include book title mark, while in English, italics are used to denote book title mark. In the process of translation, three types of generative AI did not add book title mark even after five rounds of answer generation. In example 13, unless the prompt specifically included the phrase ‘help me translate the title of this book’, three types of generative AI are unable to accurately generate book title mark. If translators already know that the source text is a book, they can directly translate and add book title mark without waiting for the translation by generative AI. The aforementioned case demonstrates that compared to human translators, three types of generative AI fail to accurately convert punctuation, adapting it to conform to the expression habits of target readers. This highlights an issue where generative AI may not correctly handle punctuation marks between different languages during translation, especially if not explicitly instructed to do so. Human translators, on the other hand, are typically well-versed in these nuances and apply them naturally.

4. Countermeasures

Wu and Fan (2017) suggest that translators can use the “Method of Suspicion, Searching, Determination, and Expression” to ensure accurate translation of chemical terminology. If translators wish to correctly translate scientific and technical terminology, they shall be proficient in this method. Specifically, “Suspicion” usually refers to little understanding or only a superficial knowledge of specialized terminology; “Searching” involves translators verifying terminology to be translated through multiple channels and methods, including parallel texts; “Determination” means translators integrate the relevant definitions into the sentence to be translated, choosing the most contextually appropriate translation; and “Expression” means translators select the closest Chinese expression based on style and context during the process of E-C translation and pay attention to part of speech and collocation in the process of translating from C-English translation. If there are any doubts about terminology translated by artificial intelligence, translators can use the “Method of Suspicion, Searching, Determination, and Expression” to confirm the translation of chemical terminology.

During the post-editing process, translators can adopt the Communicative Translation Principle as guidance, correcting not only content errors made by generative AI but also format errors. Newmark (1981) emphasized that Communicative Translation focuses on the target reader, aiming to provide the same reading experience that the source text readers receive. In other words, Communicative Translation focuses on the target language and target readers, requiring translators to convey the information and content of the source text according to the target language, target readers’ interests, and reading habits, ensuring target readers can understand source text accurately and removing obstacles when they are reading the target text, so as to facilitate smooth communication. When facing the E-C translation of chemical text, translators

can first use one type of generative AI for the first translation, guided by the Communicative Translation Principle, correct errors in the selection of word meanings, addition or omission of word meanings, part-of-speech selection, segmentation of sentence, fluency of sentences, logic structures of sentences, omission of content, and referential content, as well as format errors such as Chinese serial comma and book title mark.

In the post-editing process, translators also need to master translation technology. For terminology processed using the above method, translators can manage terminology with the help of the terminology database in computer-assisted translation tools like Trados, avoiding repetitive work. Zhang (2020) stresses that the terminology database can assist translators in handling repetitive terminology, preventing repeated searches for the translation of the same terminology and inconsistency issues. For completed post-edited translations, translators can create a translation memory, promptly storing data to avoid re-translating or post-editing identical content. "The translation memory in Trados ensures consistency in the translation, which in later proofreading can save manpower and time that would otherwise be spent addressing inconsistent expressions (Yang & Wu, 2016, pp. 30-32)." When encountering the same or similar content, translators, armed with accumulated data, do not need to re-translate the same text, significantly improving the efficiency and speed of post-editing.

5. Conclusion

The paper uses chemical text as its subject matter to explore the types of errors made by generative AI such as ChatGPT, Claude2, and ERNIE Bot in the E-C translation of the chemical text. The error types of generative artificial intelligence encompass five levels: terminological, lexical, syntactic, discourse, and format level. The paper also proposes that translators can utilize the "Method of Suspicion, Searching, Determination and Expression" (疑查定表) along with a terminology database for the translation and management of chemical terminology; during the post-editing process, translators can adopt Communicative Translation Principle as guidance, correcting content errors made by generative AI and rectifying format errors from generative AI; simultaneously, translators can create translation memory to promptly store corpus, avoiding repeated translation or post-editing of the same content.

This paper aims to allow translators working on chemical translations know the categories of errors made by generative AI, thereby enhancing the quality and speed of post-editing. In the era of artificial intelligence, chemical text can be initially translated by generative AI, with human translators using computer-assisted tools like Trados to improve the efficiency and speed of post-editing. The future should be the era where generative AI and human translation complement each other.

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