

On E-C Translation Strategies of Scientific and Technical Text—A Case Study of *Electric Dreams*

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With the deepening of international exchanges, more and more scientific and technical texts need to be translated and disseminated. Therefore, this paper aims to analyze the translation strategies of scientific and technical texts at the lexical, syntactic, textual, and stylistic levels. From the perspective of Functional Equivalence Theory, this paper discusses the E-C translation strategies of *Electric Dreams*, which not only promotes the further understanding of the texts but also provides specific references for translators in the scientific and technical fields.

Keywords: Functional Equivalence Theory, scientific and technical text, translation strategy, *Electric Dreams*

Introduction

The scientific and technical text is a particular type of text conveying information in science and technology, which focuses on new scientific research and cutting-edge technology development in order to meet high requirements for the accuracy of facts and the credibility of data.

Electric Dreams illustrates the crucial importance of transitioning to the use of green energy instead of relying on fossil fuels, which are harmful to the environment and result in the depletion of resources. Moreover, it uses graphs to show how to store excess solar and wind energy to generate electricity. This scientific and technical text uses a lot of technical terminologies, as well as long and complex sentences. Therefore, this paper proposes E-C translation strategies to address translation challenges at the lexical, syntactic, textual, and stylistic levels.

An Overview of Functional Equivalence Theory

Eugene A. Nida is a famous American linguist whose Functional Equivalence Theory has exerted a remarkable impact on modern translation studies (Snell-Hornsby, 1988). Functional Equivalence Theory emphasizes that the target text brings the same reading effect to its readers as the source text, so that the target audience can comprehend the deep meaning of the original text, which shows that translation aims to convey the meaning of the source language. However, communicating the meaning is just the first step; it is more critical to achieve stylistic equivalence. As Nida (2001) mentioned, translation is the reproduction in the recipient language of the closest natural equivalence of the source language information, first in meaning and then in style. A good translation needs to be free from the constraints of the form and structure of the source language. Therefore, Nida (2004) proposed four steps of translation: analysis, translation, reorganization, and examination.

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Based on the translation steps, following the four rules of the Functional Equivalence Theory is necessary. The first is lexical equivalence, which requires the translator to find the target words that are similar to the original words in the translation process. However, the same word has different meanings in different contexts, and translators need to consider the meaning and usage of words in various contexts and choose the closest meaning to achieve lexical equivalence. The second is syntactic equivalence, which requires the translator to analyze the sentence structure first and then adjust the word order. Therefore, under the premise of not changing the meaning of the source text, it is essential to get rid of the bondage of the original form and select the proper sentence pattern to achieve syntactic equivalence. The third is textual equivalence, which focuses on the cohesion and logical relationship between sentences and paragraphs. Therefore, in the process of translation, it is essential to clarify the logic of the context and focus on the translation of conjunctions or pronouns that are more conducive to the understanding of the target language, so as to make the translation conform to the expression habits of the target language and thus achieve the effect of textual equivalence. The fourth is stylistic equivalence. Different translation styles have different characteristics, which require the translator to clarify the stylistic characteristics of the source text. In the case of literary translation, the translator should retain the rhetorical devices of the source text to reflect the beauty of the artistic conception of the source text; and in the case of non-literary translation, the translator should not excessively beautify the language to reflect the objectivity and accuracy of the source text, so as to achieve stylistic equivalence.

Textual Analysis of *Electric Dreams*

The purpose of the scientific and technical texts is to clearly convey the relevant information about scientific innovation. Therefore, this section mainly analyzes *Electric Dreams* at the lexical, syntactic, textual, and stylistic levels.

At the lexical level, there are a large number of technical terminologies, such as “renewable energy” (可再生能源), “wind turbine” (风力机), and “fossil fuel” (化石燃料), which are so professional that the translator should ensure the accuracy and standardization of terminology translation. Tan (1999) mentioned that the expression of information not only enables readers to understand the translation, but also enables them to feel the accuracy, vividness, and authenticity of language expression.

At the syntactic level, there are many long and compound sentences in the source text that use complex modifiers to ensure accurate understanding of the content. For example, “Another innovative project that emerged after the blackout was a ‘virtual power plant’, also built by Tesla with some initial government funding”. This sentence contains an attributive clause guided by “that”, a non-predicate structure, and an accompanying adverbial, making it complex with multiple additional components. Therefore, it is essential to clarify the sentence structure. At the same time, this text uses a lot of passive voice to emphasize objectivity. For example, “The blackout was triggered by a violent storm that knocked over more than 20 electricity pylons and cut three of the four major transmission lines in the state”. Using the passive voice makes it more obvious to know the point of the sentence.

At the textual level, there are many pronouns and conjunctions, enhancing the precision of logical expression between sentences. For example, “Tesla uses sophisticated software to coordinate the individual systems, so they function like a single power plant. This allows it to trade surplus solar energy stored across the battery network

on the electricity market”. In the sentence, “This” refers to the content of the previous sentence, which makes the connection between the two sentences closer.

At the stylistic level, a series of figures conform to the accuracy and objectivity of the scientific and technical text, which further enhances its persuasiveness. For example, “South Australia covers almost 1 million square kilometers—more than seven times the area of England—but has a population of just 1.8 million. Almost 90% of the state is desert, so most people live along the wetter, cooler south coast, largely in the capital Adelaide”. In this sentence, there are several figures, such as “1 million square kilometers”, “1.8 million”, and “90%”, which are more intuitive to convey the meaning of the source text and more helpful for readers to understand the text.

Case Study of *Electric Dreams* From the Perspective of Functional Equivalence Theory

Under the guidance of Functional Equivalence Theory, this section takes *Electric Dreams* as an example to analyze the translation strategies.

At the Lexical Level

English lexis often has multiple meanings. The same word has different meanings in different fields. Therefore, the translator should determine the accurate meaning of the terminology according to the context. In addition, due to the differences between Chinese and English, nouns are commonly used in English, while verbs are commonly used in Chinese. When translating, it is significant to convert the part of speech. The following examples illustrate the translation strategies guided by Functional Equivalence Theory at the lexical level.

Example 1:

ST: Next door is the newly built renewable energy park, home to 50 wind turbines and 250,000 solar panels.

TT: 隔壁是新建的可再生能源园区, 这里有50个风力涡轮机和25万个太阳能电池板。

In Example 1, “panel” needs to be noted that it is commonly translated as “专家组”, but in this text, it turns out that “panel” is a terminology related to energy. So it cannot be translated into “专家组”. “Panel” has multiple meanings; it also has the meaning of “板”. When it is paired with “solar”, they can form a professional terminology, so it is translated into “太阳能电池板”.

Example 2:

ST: Koutsantonis believes the state’s supply would have gone down regardless of its energy mix, due to the severe damage to transmission lines.

TT: 库桑托尼斯(Koutsantonis)认为, 由于输电线路受损严重, 无论其能源结构如何, 该州的电力供应都会下降。

In Example 2, converting English adjectives into adverbs in Chinese and converting English nouns into verbs in Chinese are common strategies in E-C translation. In the source text, “damage” is a noun. Due to the differences between Chinese and English, English uses more nouns, while Chinese uses more verbs. If it is directly translated into “对输电线路严重的受损”, it does not conform to the Chinese expression habits. When “damage” becomes a verb, it is obviously “severe” modifying it, so “severe” is translated into an adverb in Chinese.

In conclusion, the first strategy is to understand the multiple meanings of a word and then select the most appropriate one according to the specific fields. As Gao and Yang (2022) indicated, in some specialized fields, common words can have different meanings, often determined by the subject area. The second strategy is conversion. Due to the differences between Chinese and English, conversion is significant in accurately

conveying the meaning of the source text into the target language, which requires a deep understanding of the context.

At the Syntactic Level

The frequent occurrence of passive sentences is one of the major features of scientific and technical texts. What's more, the extensive use of long and complex sentences is one of the difficulties of this text translation. Therefore, the following examples illustrate the translation strategies of the passive voice and subordinate clauses.

Example 3:

ST: The chief landmark now is a tall tower topped by a dazzling light, where sunlight reflected from 23,000 mirrors on the ground is focused to power four giant greenhouses in which tomatoes are grown.

TT: 现在的主要地标是一座高塔，塔顶有耀眼的光线，地面上23000面镜子反射的阳光聚焦在这里，为四个种植番茄的巨型温室提供动力。

It is a very long sentence that contains a lot of modifiers, so this long sentence can be divided into a main sentence and an attributive clause. In the attributive clause introduced by "where", there is another clause guided by "in which". After clarifying the sentence structure, it is easier to grasp the key information conveyed by the original sentence and reorganize the sentences in order to make the translation in line with the Chinese expression habits, so as to achieve Functional Equivalence Theory in syntax.

Example 4:

ST: This hydrogen could then be stored and converted back into electricity when needed, either by burning it or feeding it through hydrogen fuel cells.

TT: 这些氢气可以储存起来，在需要的时候通过燃烧或通过氢燃料电池供能的方式转换回电能。

In this example, there are two typical passive voices, i.e., "be stored" and "be converted". According to Nida's Functional Equivalence Theory, translation does not only pursue the surface correspondence of text, but also should conform to Chinese expression habits. The passive voice in this example is not translated into "被储存" and "被转换" because the Chinese translation "被" will add a layer of subjective meaning to the text, losing the objectivity of the scientific and technical text. So, in the process of translating, the translator can use appropriate Chinese words to convey the passive meaning, such as "可以" instead of "被".

In general, it is common to find many complex sentences in this scientific and technical text. So, the translation strategy is to carefully consider the sentence structure and the connection between the main clause and the subordinate clause. What is more, in E-C translation, English often uses the passive voice, while Chinese uses the active voice. When translating passive voice, in addition to the transitions between the subject and the object, there is another translation strategy to use an appropriate alternative word in Chinese to convey the passive meaning, such as "可以", "由", instead of "被".

At the Textual Level

As Cai (2023) indicated, in addition to ensuring the accuracy of technical information, other difficulties in the translation of scientific and technical texts involve the correct understanding and expression of the meaning of the original text, logical coherence, readability of the translation, cultural elements, and textual characteristics. It is important to ensure the cohesion of the components in form and semantics in order to achieve textual equivalence. Considering the differences between English and Chinese, the following examples illustrate how to achieve Functional Equivalence Theory at the textual level.

Example 5:

ST: I meet Adam Langham, a chemical engineer in the Adelaide suburb of Netley, who has 58 panels on his house and car port. They produce 12 times more power than he, his wife and two children consume.

TT: 我遇到了阿德莱德郊区Netley的化学工程师亚当·朗廷(Adam Langham), 他的房子和停车场都安装了58块面板。这些面板产生的电量是他、妻子和两个孩子耗电量的12倍。

If the preceding and following words appear more than once, English often uses pronouns instead, while Chinese will accurately translate what the pronoun refers to. In the E-C translation of this sentence, the terminology “面板” is repeated twice in the phrase “58块面板” and “这些面板”. This repetition of “面板” in the Chinese translation serves to emphasize the large electric quantities and is an appropriate way to convey the meaning in Chinese.

Example 6:

ST: The government discontinued its subsidy in 2011, but smaller payments are still offered by private electricity companies, meaning the family makes more than enough money to pay off the upfront cost of the installation.

TT: 政府在2011年停止了补贴, 但私营电力公司仍提供小额补贴, 这意味着这家人赚的钱绰绰有余, 足以支付安装的前期成本。

In the translation, the added words “这” and “足以” are used as conjunctions to connect the sentences and show the relationships between the preceding and following sentences. The added word “这” summarizes the previous sentences and adds a subject to the last sentence, which promotes the cohesion of the source text, so as to convey the meaning better. What is more, the source text “the family makes more than enough money to pay off the upfront cost of the installation” forms the relationship of purpose, so the added word “足以” runs through the sentence, more in line with Chinese expression habits.

In conclusion, as the repetition of words is rare in English, pronouns tend to be used to refer to the meanings that are mentioned earlier. In English, the translator often uses pronouns as a substitute, while Chinese uses a lot of repetition. Therefore, the first strategy is to use the repetition of a word instead of the literal translation of pronouns. In addition, in the process of translation, it is necessary to pay attention to the cohesion and logic of the text. The second strategy is to add linking words to make the text easier to understand, so as to achieve functional equivalence at the textual level.

At the Stylistic Level

Only after the translator has mastered the characteristics of both the source language and the target language can the translator create a target text that truly reflects the style of the source language. The scientific and technical texts carry fewer cultural factors, so the accurate translation of the source language information into the target language is far more important than the conversion between two language cultures. As Lin (2022) indicated, with the development of social practice, the integration of disciplines and the endless emergence of interdisciplinary are an inevitable trend. As a translator, it is required to enhance the awareness of this aspect and strive to navigate the sea of translation between humanity and science and technology.

Example 7:

ST: The chimney is gone and the sky is a pristine blue. The chief landmark now is a tall tower topped by a dazzling light, where sunlight reflected from 23,000 mirrors on the ground is focused to power four giant greenhouses in which tomatoes are grown. Next door is the newly built renewable energy park, home to 50 wind turbines and 250,000 solar panels.

TT: 烟囱不见了, 天空一片湛蓝。现在的主要地标是一座高塔, 塔顶有耀眼的光线, 地面上23000面镜子反射的阳光聚焦在这里, 为四个种植番茄的巨型温室提供动力。隔壁是新建的可再生能源园区, 这里有50个风力涡轮机和25万个太阳能电池板。

In this example, the main information is to describe the surrounding scenery of Port Augusta, but it is a scientific and technical text. Therefore, it is necessary to consider the characteristics of the text and not to beautify the language. Due to the accuracy of the scientific and technical texts, it focuses on objective descriptions of things rather than subjective assumptions.

In general, the language expression of scientific and technical texts is precise and accurate. In the process of translation, it is necessary to follow the language style of the source text, describe it straightforwardly, and not deliberately beautify the language. It is important to convey the information objectively without losing the seriousness and conciseness of the source text, so as to achieve Functional Equivalence Theory at the stylistic level.

Conclusion

Using *Electric Dreams* as an example, this paper discusses the translation strategies of scientific and technical texts. Specifically, in order to conform to the expression habits of the target readers and achieve the readability in both the source and the target, the translator should firstly be guided by the Functional Equivalence Theory and be familiar with the linguistic characteristics of scientific and technical texts. Secondly, the translator can intuitively find out how to achieve functional equivalence at the lexical, syntactic, textual, and stylistic levels to reach the acceptability of the translation, which not only achieves high-quality translation, but also provides a basis for further research on the translation of scientific and technical texts.

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