

A STUDY ON THE TRANSLATION OF SCIENTIFIC AND TECHNICAL ENGLISH TEXTS FROM THE PERSPECTIVE OF TRANSLATION SHIFT THEORY

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Abstract: The scientific and technical text is characterized by its extensive use of technical terminology, abbreviations, nominalized structures, passive voice, and intricate sentence structures, all of which contribute to its objective, precise, well-structured, and logically sound nature. Its primary aim is to convey knowledge and information accurately, making content precision and logical coherence the core for translating scientific and technical texts. This paper delves into the translation of *The Romance of Reality*, a scientific and technical book that explores the origins of life and the development of the universe through the presentation of various scientific and technical theories. The translator explores the applicability of translation shift theory, proposed by Catford in 1965, to the translation of this scientific narrative text (chapter one), specifically focusing on the two major types of shifts: level shifts and category shifts, including structural shifts, class shifts, and unit shifts.

Keywords: translation shift theory; scientific and technical text; the origin of life

1. Introduction

As cosmic evolution unfolds, the world gradually becomes organized, functional, and crucially sentient. Life and consciousness emerge from sufficient complexity and information integration. With advancements in science and technology, we are gradually uncovering the true origins of life. *The Romance of Reality* seeks to provide readers with a fresh perspective on the universe and breaks away from conventional thinking. Using language as a bridge, the author

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of the book delves into the mysteries of the universe, drawing from the captivating fields of physics, biology, and statistics.

This paper is based on the analysis of this book. Searching keywords in *Knowledge.com* reveals that scientific and technical text translation is mostly analyzed from the perspective of “purpose theory” or “functional equivalence”, while the translation shift theory of Catford is scarcely applied. But in fact, the characteristics of scientific and technical text translation match well with what Catford has put forward. Therefore, this paper analyzes the application of Catford’s shift theory in scientific and technical text translation with examples, aiming to provide a new perspective for translation practice of scientific and technical English texts.

2. Catford’s translation shift theory

John Catford, a linguist and esteemed translation theorist, imparted his knowledge of translation in the School of Applied Languages at the University of Edinburgh. In 1965, he published *The Linguistic Theory of Translation*, which offers a fresh perspective on ancient translation through the lens of modern linguistics, ushering in a novel approach to the study of Western translation theory.

Catford proposed that translation is the replacement of textual material in one language with equivalent textual material in another. He pointed out that the use of the term “textual material” emphasizes the fact that translation is never, or hardly ever, a case of the original language texts being replaced in its entirety by equivalent components in the another language (Catford 1965: 73). According to him, the key challenge in translation practice lies in identifying the equivalent form in the target language, while the core mission of a translation theory is to elucidate translation equivalence and the conditions governing its attainment.

Thus, Catford puts forward translation shift theory in the twelfth chapter of *A Linguistic Theory of Translation*, in which he suggests that some changes or “shifts” occur during translation. By shifts, he means “departures from formal correspondence in the process of going from the SL (source language) to the TL (target language)” (Catford 1965: 73). There are two major types of shifts: level shifts and category shifts (structure shifts, class shifts, unit shifts/rank shifts, intra-system shifts).

Sound translation theory not only offers valuable guidance for translating scientific texts but also injects fresh vitality into the process. The choice to adopt Catford’s translation shift theory for this translation practice is the result of a comprehensive evaluation of various factors. Firstly, the selected text is informational, with its primary focus on conveying information, making content more crucial than form. Secondly, while several other translation theories, such as

Functional Equivalence Theory and Translation Purpose Theory, can be applied to the translation of scientific texts, they mainly emphasize the reception of the target text by readers. In fact, translation shifts are inherent in translation practice, and the translation shift theory seeks to break language form boundaries while faithfully conveying the original message. This approach makes the translation more fluent and better aligns with the inherent requirements of translating scientific texts into Chinese. Lastly, among the many discussions and researches on translation theories, Catford's theory stands out for its depth without being overly cumbersome. It offers substantial practical value and has had profound influence. In summary, the adoption of Catford's translation shift theory is a well-considered choice to guide this paper.

3. Translation Analysis

3.1. Level shifts

Level shifts means that “a SL item at one linguistic level has a TL translation equivalent at a different level” (Catford 1965: 73). Catford argues that shifts between grammar and lexis are the only level shifts that can occur in the translation process (Mu 1991: 73). Grammatical shifts are mainly reflected in tense shift, while lexical shifts are mainly reflected in the shift of singular and plural forms.

Example 1: The steam engine, which had been around for some time, was proof that energy could be extracted from heat flow to do “work”, meaning something useful, like moving, lifting, or accelerating a body of mass by exerting a force on it.

Translation: 蒸汽机问世已有一段时间, 它证明了可以从热流中提取能量来做“功”, “功”指的是有用的东西, 比如通过施加力来移动、提升或加速一个物体。

Analysis: In Example 1, “had been” takes the form “had + past participle”, which indicates that something took place in the “past of the past”. “had been around” indicates that the steam engine was invented in the past and has been in existence for some time. However, there is no similar grammatical structure in Chinese. And the translation can only be done in a level shift. Since merely using the adverb “了” in Chinese to indicate that the action has taken place, the tone is not strong enough. Thus the translator put the words into “问世已有一段时间” to strengthen the tone and accurately convey the message to the reader.

Example 2: And some animals stay alive by eating the animals that eat the plants.

Translation: 有些动物通过吃食草动物动物来维持生命。

Analysis: Typically, the form of a Chinese noun does not normally indicate whether it is singular or plural (Mona 1992:99), and the plural meaning is indicated through isolated morphemes, while English expresses the plural meaning through an external variation of a noun.

In Example 2, “animals” and “plants” correspond to “动物” and “植物” respectively in the target text. Chinese people attach importance to groups, while Westerners emphasize individuals. Therefore, the meanings of Chinese words are generally more general and ambiguous, while that of English words are generally more specific and clear (Chen 2011). Through level shifts from the grammatical level in English to the lexical level in Chinese, the translator translates “animals” and “plants” as “动物” and “植物”, in which the plural attribute of Chinese is hidden in the sentence upon translation. The translator then adjusts the order according to the sentence structure for aesthetic purposes, thus completing the transformation from the “explicit” English quantifiers to the “implicit” Chinese quantifiers.

3.2. Category shifts

Category shifts are departures from formal correspondence. Catford argues that translation equivalence may arise between sentences, clauses, groups, words and (though rarely) morphemes (Catford 1965: 76). Accordingly, he divides translation activities into rank-bound translation, which refers only to those special cases where equivalence is deliberately limited to ranks below the sentence (Catford 1966: 76), and unbounded translation, which refers to “free” translation in which SL-TL equivalences are set up, whatever rank is appropriate (Catford 1965: 76). Due to the significant differences in the syntax of Chinese and English languages, word-for-word rank-bound translation is not able to achieve the purpose of translation activities. Therefore, in the practice of C-E or E-C translation, translators need to follow unbounded translation, namely, Catford’s principle of category shifts, Category shifts include structural shifts, class shifts, unit shifts and intra-system shifts.

3.2.1. Structural shifts

Structural shifts are mainly manifested in the change of syntactic structure, which can be subdivided into five categories: shift of passive voice and active voice, shift of affirmation and negation, shift of prepositional and post-positional determiners, shift of spiritually active subjects and spiritually inactive subjects, and shift of theme prominence and subject prominence.

Example 3: As long as free energy continues to be harnessed and dispersed, the total amount of entropy in the universe increases and the second law remains intact.

Translation: 只要自由能继续得到利用和分散，宇宙中的熵总量就会增加，第二定律就会保持不变。

Analysis: In Example 3, “as long as free energy continues to be harnessed and dispersed” is a conditional clause, and “to be harnessed and dispersed” is a passive structure as the object in the clause, in which the bearer of the action “harnessed and dispersed” is “free energy”. If the translator directly translates the passive structure as “自由能被利用和分散”, it is not in line with the reading habit of Chinese readers. Therefore, the translator subtly changes the passive structure into an active one by translating it as “得到利用和分散”, which does not change the meaning of the original text. Although the Chinese language does not often use passive sentences directly, it still uses some structures to express passive meanings, such as “经……”, “由……”, “得到……”, etc. Flexible use of these structures under specific contexts contributes to fluent expression.

Example 4: If that were the case, it would be more accurate to describe life as a regularity rather than an anomaly—not a fluke but an imperative.

Translation: 如果是这样的话，那么把生命描述为一种规律而不是一种反常现象——不是一种侥幸，而是必然，就会更加准确。

Analysis: The phrase “rather than” in Example 4 is typical in English implying a negative relation, similar to the usage of “instead of”, which means “(用……) 代替……”, but it is not easy for the readers to understand. Therefore, translators usually translate “rather than” as “而不是”, which is an obviously negative word in the Chinese translation, pointing out the hidden negative relationship in the source language.

Example 5: As alluded to in the introduction, it is the concentrated flow of energy through matter that arranges nonliving elements into a configuration that is “alive”.

Translation: 正如引言中所提到的，正是物质中能量的集中流动将非生物元素排列成“有生命”的配置。

Analysis: In Example 5, the post-positional attributive “of energy” and the prepositional attributive “concentrated” both modify “flow”. In Chinese, there is no structure like “of” put after the modified noun. Instead, it is customary to put all the modifiers before the noun. Therefore, the translator has to preplace the modifier and translate it into “能量的流动”. Since there is another modifier “concentrated” before “flow”, the translator rearranges the modifiers according to the closeness of their relationship with the headword. The most closely associated modifiers should be placed next to the headword, while the most

distantly associated placed farther apart. Thus the structure is translated as “能量的集中流动”。

3.2.2. Class Shifts

By class shifts, it means that the shift occurs between word classes, which refers to the shift from one linguistic component to another of a different type (Wang 2001:45).

Class shifts are widely used in the translation of scientific and technical texts, for example in the case of a gerund that still bears the conjugated meaning of the verb, which may evolve into various complex expressions. Scientific and technical English often use nouns to express actions, features, and attributes, thus making the language concise, abstract, and formal. Chinese, however, does not have nominalized structures. Class shifts usually break the constraints of the sentence structure of the source text and can make awkward and rigid expressions smoother and more natural. In the following, the translator will use specific examples to analyze the common types of class shifts.

Example 6: It fueled creationists' belief that life's existence was proof of divine intervention.

Translation: 它助长了创世论者的信念，即生命的存在证明了神的干预。

Analysis: In English, a sentence usually has only one predicate verb. In many cases, nouns derived from verbs are used with dynamic meanings. In Example 6, the noun “proof” is used as a predicative in the appositive clause, and “of divine intervention” is used as a post-positional attributive to modify it. A direct translation of “生命的存在是神干预的证明” would be very rigid. In Chinese, a verb is an essential component of a sentence, and a longer sentence usually has more than one verb. In line with the characteristics of Chinese with multiple verbs, the translator makes the lexical transformation from noun to verb, i.e. the noun “proof” to the verb “证明了”. Thus the translated version is “生命的存在证明了神的干预”。

Example 7: What then is the thermodynamic purpose of biology? To open new channels for planetary energy flow in an effort to more efficiently dissipate gradients and achieve thermodynamic stability.

Translation: 那么，生物学里热力学目的是什么呢？为地球能量流动开辟新的渠道，努力使梯度消散更加有效，最终实现热力稳定。

Analysis: There are two prepositions – “for” and “in an effort to” – in Example 7, both of which have been translated by transforming the preposition into a verb. First, the word “for” is often used as a preposition in Chinese, meaning “for the sake of”, and it mainly serves as a statement of purpose in the

sentence. However, by reading the example sentence, it is easy to find that the original text does not express a purpose, but implies the meaning of the object involved in leading the action subject, i.e. “给”, “替” and “帮”. Therefore, the translator translates “for” as “为”, which is in line with the Chinese idiom and conveys the meaning of the sentence more smoothly and clearly. “in an effort to” is a prepositional phrase in which “effort” means “努力” and “成就”, and the meaning of the whole phrase is similar to that of “effort”. In Chinese, a word may be used as both a verb and a noun, so the translator directly converts the prepositional phrase into the Chinese verb “努力” and adds the word “使得” to make the translation more readable.

3.2.3. Unit shifts

Unit shifts are also known as rank shifts, which refers to departures from formal correspondence in which the translation equivalent of a unit at one rank in the SL is transformed into a unit at a different rank in the TL’ (Catford 1965:79).

Example 8: In his cogent book *Vital Dust*, de Duve responded to Monod’s claim that the universe wasn’t pregnant with life, nor the biosphere with man, with the simple rebuttal.

Translation: 德·杜夫的《重要的尘埃》一书极具说服力, 在书中他简单地反驳了莫诺关于宇宙没有孕育生命, 生物圈也没有孕育人类的说法。

Example 9: It is both the destroyer and creator of organized structure in nature.

Translation: 它既是自然界组织结构的破坏者, 也是其创造者。

Analysis: In Example 8, “In his cogent book *Vital Dust*” is a prepositional phrase led by “in”, which is used as an adverbial in the original text. If it is directly translated as “在他具有说服力的书《重要的尘埃》中”, the translation is not that in line with the reading habits of Chinese readers. Therefore, the translator directly converts the prepositional phrase into a sentence, and the word “cogent” forms a separate clause: “极具说服力”. Thus the whole part is translated as “德·杜夫的《重要的尘埃》一书极具说服力”.

The expression “both... and...” is quite common in English, which means “既.....又.....”. It is often followed by two parallel nouns or noun phrases. In Example 9, “both... and...” connects “the destroyer” and “the creator”. Therefore, the translator split “the destroyer and creator” into two clauses. So, the translation is “它既是破坏者, 也是创造者”.

4. Conclusion

The Romance of Reality represents a highly specialized and logically structured scientific and technical work. To maximize the conveyance of information, the author employs many intricate, lengthy sentences with complex structures in the book. Such complexity poses quite some challenges for the translator. Through extensive literature research, the translator discovers the merits of Catford's translation shift theory, particularly the concepts of 'level shift' and 'category shift', which offer valuable insights and methodological guidance for comprehending, deconstructing, and reconstructing those intricate structures. These insights prove to be of great value in overcoming the challenges encountered in the process of translation of scientific and technical English texts.

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