

Translation Strategies in Popular Science Texts from the Perspective of Functional Equivalence Theory: A Case Study of *Generation Dread*

Xi Li*

Yunnan University, Kunming 650500, Yunnan, China

**Author to whom correspondence should be addressed.*

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Abstract: This article studies the translation strategies adopted in the English-Chinese translation of popular science texts, and selects from Britt Werley’s *The Generation of Fear* as a research case. The original text elaborates on the concept of “ecological anxiety” by integrating scientific explanation, psychological reflection, narrative examples, and emotional expression rhetoric. This study tests the applicability of functional equiprocity theory in popular science translation through multi-dimensional analysis—lexical, syntactic, textual, and stylistic analyses. This study takes “domestication” as the main translation strategy and “foreignization” as an auxiliary strategy, and uses a series of specific translation skills: vocabulary conversion, semantic expansion and appropriate vocabulary selection; syntactic reorganization; text connection and coherence enhancement; and rhetorical adaptation. The research results show that this comprehensive translation method can effectively preserve the style characteristics of the original text while ensuring the accurate transmission of its core information. In addition, this study explores the practical application of functional equivalence theory in popular science translation and explains how the translated text achieves effective information transmission by analyzing representative cases. The purpose is to provide practical insights and references for an in-depth study of the translation strategy of such professional texts.

Keywords: Translation strategies; Functional equivalence theory; Popular science texts

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1. Introduction

Popular science texts serve a dual function: they transmit specialized knowledge and make such knowledge accessible to non-specialist readers. Unlike academic scientific writing, popular science writing often combines factual explanation with storytelling, metaphor, emotional appeal, and rhetorical rhythm. These features make its translation especially demanding, because the translator must preserve scientific accuracy while also maintaining readability and reader engagement.

Britt Wray’s *Generation Dread: Finding Purpose in an Age of Climate Anxiety* is a representative popular science work on eco-anxiety. It explains the psychological effects of climate change, discusses forms of ecological distress, and offers ways of transforming fear into action. The book is not a purely technical text. It draws on environmental science, psychology, personal narrative, social criticism, and literary expression. Its translation therefore requires strategies that can handle terminology, emotion-laden expressions, culture-specific metaphors, long English sentences, and paragraph-level

argumentation.

This study focuses on the four dimensions of translation strategy, namely vocabulary strategy, syntactic strategy, discourse strategy and style strategy. This article believes that the translation of popular science texts from English to Chinese should not be limited to the strict pursuit of word-for-word reciprocity. On the contrary, translators need to first clarify the functional value of each text unit, and on this basis, choose the appropriate translation strategy that can help Chinese readers naturally understand the message connotation, language tone and rhetorical effect conveyed by the source text. By explaining how to choose translation strategies at different language and text levels, this study aims to provide a new perspective for the academic discussion of popular science translation, so as to enrich the relevant research in this field.

2. Theoretical framework and textual features

In order to ensure that the translation can be done successfully, the appropriate translation theory is crucial. The source text is an environmental science text, which has four main features: scientific, literary, popular and interesting, and its translation principle should be content-centered and reader-centered, with the correctness (scientificity) of the information transmission as the priority ^[1]. According to this principle, the translator applies Nida's functional equivalence theory to guide the translation practice, so that target language readers and the original language readers can also receive the same information, and get the same reading experience ^[2]. The translated text can reproduce the information in the original language in the closest and most natural equivalents ^[3]. Dynamic equivalence is based on what Nida calls "the principle of equivalent effect", where the relationship between receptor and message should be substantially the same as that which existed between the original receptors and the message (Nida, 1964:159) ^[4]. It refers to the use of the closest and most natural equivalent to reproduce the original message, and aims at complete naturalness of expression.

Functional equivalence is particularly relevant to popular science translation. Scientificity is the first place in popular science translation, which emphasizes that the scientific knowledge disseminated needs to be accurate; literature emphasizes that popular science reading is a genre combining science and literature, which belongs to the second place; popularity emphasizes the use of easy-to-understand language, the use of everyday vocabulary and simple sentence patterns, and the maintenance of popularity in the translation is the life of popular science translation; interest emphasizes the fact that popular science reading has to be lively and interesting to attract the layman ^[1].

The source text examined here has four major features. First, it contains terminology from climate science and psychology, such as eco-anxiety, eco-distress, denial, public mourning, and climate grief. Second, the structure is clear, and the active voice is mostly used. Unlike scientific and technical texts, popular science texts mostly use the active voice, bringing readers and authors closer together, not only improving the readability of popular science texts, but also deepening the reader's sense of participation. Third, the original text utilizes lexical and grammatical devices to achieve articulation and maintain the logic and coherence of a popular science text. Fourth, popular science text emphasizes getting rid of the inherited style of scientific and technological literature to reduce the readers' sense of bitterness, so they often use explicit metaphors, implicit metaphors, and rhetorical devices such as counterpoints to strengthen the interest of the style and enable the readers to produce vivid image of the cognition. These features justify a strategy-based analysis at lexical, sentence, discourse, and stylistic levels.

3. Methodology

This study adopts a qualitative case-study method. The material is selected from the foreword, introduction, Chapter Three, and Chapter Seven of *Generation Dread*. The analysis follows three steps. First, representative source-text expressions and sentences are identified according to their translation difficulty. Second, the translation problems are classified into four

strategic levels: lexical, sentence, discourse, and stylistic levels. Third, each example is discussed in terms of the strategy used and the function reproduced.

4. Translation strategies

It is essential to reproduce the original information using the most natural and appropriate equivalent expressions, with meaning equivalence being the top priority, followed by stylistic equivalence^[3]. The theory of functional equivalence ensures that the popular science article retains both its educational value and accessibility.

4.1. Lexical strategies: Semantic extension and sense selection

As the smallest linguistic unit in translation, words often carry linguistic meaning, referential meaning, and emotive or connotative meaning^[5]. Functional equivalence therefore requires the translator to identify the role played by a word in its immediate context and to select a rendering that performs a comparable function for Chinese readers.

Translators need to find the corresponding words in the target language to accurately convey the original information. There are three obvious characteristics of the original vocabulary: many terms, many polysyllable words, and expressions with cultural background^[5]. However, words in the source language cannot be found directly corresponding to the words in the target language. For these lexical characteristics, translators can adopt some practical practices, such as semantic extension and semantic selection.

Give a typical example. The term “hunter-gatherer DNA” in the original text is used to show that human memory of the climate crisis lacks a common narrative. If translated literally, it will overemphasize the biological inheritance and primitive way of existence, which makes Chinese readers feel difficult to understand. Here, the strategy of semantic expansion is used to functionally transform this expression into “ancestral memory”. In this way, the original biological metaphor has become a cultural image related to the inheritance of interpersonal experience, which is easier for everyone to understand. At the same time, it retains the author’s core point of view, the current climate collapse has exceeded the scope of human memory in early narratives.

Another example is the contrast between “brain, stomach and heart” in the original text. In English, “brain” usually symbolizes rational thinking, and “stomach” and “heart” represent instinct and emotion respectively. If these body organs are translated literally, the expression will be stiff and may cause readers to misunderstand. Here, metaphorical conversion is adopted to transform this contrast into a contrast between “reason, instinct and emotion”. This not only presents the cognitive and emotional opposition that the author wants to express, but also does not allow Chinese readers to understand a set of anatomical metaphors that are not in line with Chinese expression habits.

In some cases, the expression in the source language has a specific social meaning, and there is no direct corresponding expression in the target language. At this time, cultural replacement is required. For example, the word “snowflake” was used in a Fox News report to demean those who are considered too sensitive. If you translate it as “snowflake”, the pejorative taste can’t come out at all. The functional translation strategy here is to choose an expression that can express “emotionally fragile people” in Chinese culture. This not only retains the derogatory tone of the original word, but also helps Chinese readers understand the ideological framework behind the original text.

It can be seen from these examples that in popular science translation, terms need to be properly regulated, while metaphors and expressions with strong cultural colors should be handled flexibly according to the actual situation, and cannot be one-size-fits-all. Only when the expression of the target language can successfully reproduce the information, cultural and emotional functions expressed by the corresponding source language can the equivalence of words be achieved.

4.2. Syntactic strategies: Division, combination, and reordering

English is a syntactic analytical language, while Chinese is usually regarded as an analytical language. In English,

morphological changes and word order are often used to express grammatical relationships. From the perspective of sentence structure, English sentences usually follow a “structure” model, which is characterized by complete structure and a large use of conjunctions, which often leads to long and complex sentence structures. In contrast, Chinese pays more attention to function and meaning, and the use of conjunctions tends to be more cautious, thus forming a more concise sentence structure.

When an English sentence contains multiple parallel or nested elements, the method of clause division is proved to be effective. Take the sentence “They need you to stay awake, internal reinforcement and external motivation, which is not an exaggeration” as an example: the three qualities in this sentence are grammatically parallel, but have an emphasis on rhetorical purpose.

The natural expression of Chinese will disassemble the parts that need to be emphasized in the above three characteristics, and then reorganize them in a more reasonable and clearer order. From a functional point of view, this translation strategy can fully emphasize each feature, and at the same time avoid the overly compact and mechanical sentence structure - which is unnatural to Chinese readers.

The so-called sentence combination method is to combine two or more simple sentences into one sentence, or to combine parallel sentences and compound sentences into one sentence. For example, the following English sentence: “Litton, British Columbia, has a record high temperature in Canada’s history, reaching 49.6 °C”. There are subject, predicate, object, and a description of temperature in this sentence. Because the information it conveys is relatively concise and a statement of fact, it can be translated into a complete and coherent sentence. This not only maintains the scientific accuracy of the original text, but also avoids disassembling the information too fragmented.

For this kind of sentence type with a complex structural level, neither sentence division nor sentence combination can be well translated, which requires the translator to analyze the original sentence, according to the time sequence, logical order, and primary and secondary, to adjust the original sentence order when translating. “Better futures will be entirely missed if we get stuck in fear and dread” follows a common English pattern of result before condition.

According to the expression habit of Chinese, the condition part is usually placed in the front and the result is placed in the back. Adjust the sentence structure according to this language characteristic, the warning tone in the original text will become clearer and more direct, and the translation will also be more suitable for the thinking and expression of Chinese readers.

Therefore, the translation strategy at the sentence level mainly does two things. First, accurately convey the content of the proposition level in the original text. The second is to adjust the information direction of the translation to make it in line with the reading habits of Chinese readers. It should be noted that the functional equirecity at the sentence level cannot be achieved by copying the syntactic structure of English. On the contrary, it requires the translator to reorganize the semantic relationship of the original text and express it in a natural and smooth way in the target language.

4.3. Textual strategies: Cohesion and coherence

A Discourse usually consists of multiple paragraphs or sentences. The coherence here means that semantic logic should be consistent, including causal relationships, foreshadowing and other logical relationships. These relationships can help readers fully understand the message that the author wants to convey ^[6]. In contrast, the connection is formed by grammatical and lexical means, which is responsible for connecting words and words, sentences, and even paragraphs. There are several specific forms of connection, such as reference, conjunction, lexical connection, substitution, omission, etc ^[6]. Consistency and coherence work together to ensure the overall consistency and unity of the whole text. In view of the most prominent feature of popular science articles is their scientificity, the translation of such texts must give priority to logical coherence and connection, and at the same time ensure that the expression is fluent and natural.

At the discourse level, reference clarification is a relatively important translation strategy. For example, in paragraphs discussing accelerated warming, the pronoun “it” usually refers to “global warming” or “climate collapse”. If the translator translates this pronoun without discrimination and mechanically, and without any explanation, the final Chinese version is

likely to be ambiguous. Repeating the key terms in the translation can help readers quickly grasp the core topic and read along the author's discussion. This repetition is not superfluous. It plays the role of clarifying the meaning and avoiding ambiguity.

Another effective way to enhance the coherence of the discourse is to restore the theme. When describing different degrees of climate crisis, the subject may be omitted in a series of short sentences for the sake of conciseness. However, the expression habits of Chinese are different. It usually requires a clear subject to ensure readability and logical clarity. The omission of these omitted subjects in the translation can not only avoid ambiguity, but also make the whole paragraph more coherent, and the transmission of information is more natural for Chinese readers.

The coherence and connection in popular science articles must be reflected not only between individual sentences, but also between paragraphs. This puts forward a requirement for translators: they must have a strong sense of discourse connection and always maintain clear logical ideas in the translation process to ensure that the content of the whole translation is coherent in meaning.

4.4. Stylistic strategies: Rhetorical retention and affective adjustment

The original text has obvious features of a popular science text, such as the use of a large number of technical terms, scientific, but also the use of metaphorical rhetorical devices, as well as colloquialisms, epigrams, and so on, to highlight the fun and popularity of the article.

Rhetorical retention is appropriate when the original device can be effectively reproduced. However, Metaphorical adaptation is required when direct retention would sound unnatural. For example, "bringing a thought into one's arms and legs" suggests embodied awareness. A functional rendering describes the idea as being absorbed into the whole body. The strategy preserves the experiential force of the metaphor while adapting it to Chinese expression.

Stylistic adjustment also involves balancing scientific seriousness with accessibility. Popular science writing should not become either overly technical or overly literary in translation. If the translation is too technical, it loses the accessibility of the original. If it is too literary, it may weaken the precision of the scientific discussion. The translator must therefore preserve terminology while allowing sentence rhythm, metaphor, and tone to remain readable.

5. Conclusion

By analyzing the problems and solutions encountered in translation at four levels: lexical, syntactic, textual and stylistic, this translation practice demonstrates the significance of the functional equivalence theory in guiding the English-Chinese translation of popular science texts.

At the lexical level, terminology is handled through background research, translation tools, and a glossary to ensure consistency and rigor. Word-for-word translation is mainly used for established terms, while semantic extension is applied when no exact equivalent exists. For polysemous words, sense selection is determined by context to convey referential and emotive meanings accurately.

At the syntactic level, the translator adjusts English structures according to Chinese expression habits. Since English often relies on hypotaxis while Chinese favors semantic flow, sentence division, combination, and reordering are used to transform grammatical English sentences into natural Chinese semantic units.

At the textual level, functional equivalence depends on coherence and cohesion. The translator clarifies logical relations through reference, substitution, ellipsis, conjunctions, lexical cohesion, and contextual amplification, so that readers can follow causality, progression, and foreshadowing.

At the stylistic level, the translator preserves the readability and appeal of popular science writing. Culture-loaded metaphors are retained with explanation when necessary, while colloquial and emotional expressions are adapted according to context, target-reader expectations, and the natural tone of Chinese.

Disclosure statement

The author declares no conflict of interest.

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