

## Application of Communicative Translation Theory in Popular Science Translation: A Case Study of Astrophysical Text

WANG Shuyan<sup>[a]</sup>; ZUO Haiqing<sup>[a],\*</sup>

<sup>[a]</sup> School of Foreign Studies, Guangxi University of Science and Technology, Guangxi, China.

\*Corresponding author.

Received 26 May 2022; accepted 29 July 2022

Published online 26 August 2022

### Abstract

Over the years, with the increasing depletion of the earth's resources, the habitable environment for humans has been shrinking. Countries all over the world are paying more and more attention to the exploration of outer space, which is advancing the development of Astrophysics step by step. This paper takes Astrophysics popular science book—*From Quarks to Quasars: the Science of Space at Its Strangest*—as the source text, analyzes the translation text regarding Zuo Anpu's version, guided by Newmark's communicative translation theory, discusses the translation methods and skills of technical terms, semi-technical words, special sentences and common sentences patterns in scientific and technological texts. It is hoped that this study will help future translations of astrophysical science works to achieve the same reading effect for readers of the target language as for readers of the original language, to help the public better understand astrophysics and awaken readers' interest in exploring it.

**Key words:** Exploration of outer space; Astrophysical translation; Communicative translation theory; Newmark

Wang, S. Y., & Zuo, H. Q. (2022). Application of Communicative Translation Theory in Popular Science Translation: A Case Study of Astrophysical Text. *Canadian Social Science*, 18(4), 78-83. Available from: <http://www.cscanada.net/index.php/css/article/view/12714> DOI: <http://dx.doi.org/10.3968/12714>

### INTRODUCTION

Communicative translation theory originated in the 1960s and was put forward by Peter Newmark, a famous English

translation theorist. The theory focuses on “reader-centered”, which strives to be faithful to the original text but not rigidly attached to it (Mohamed, 2016). Instead, it interprets the original text according to the language, culture, and pragmatic model of the target language so as to achieve the translation effect as close as possible to the readers of the original one. Concretely speaking, this theory not only emphasizes the loyalty of the target text to the source text, but also pays attention to the content absorption effect of the readers. In this sense, it is very suitable for guiding the translation of scientific and technological texts. Under its guidance, the translator can play his subjective initiative more freely—not only accurately convey the information of the source text, but also consider the acceptability of the target readers, and fully reflect the charm of scientific texts, so as to attract more and more people to actively participate in scientific exploration. While astrophysics, as an important part of science, continues to develop, reflecting the ever-changing developments and innovations in science and technology, translation studies related to it in China have lagged, mainly due to the lack of in-depth research on theoretical guidance of the text. This paper will analyze from the word and sentence level, discuss what translation skills are applicable under communicative translation theory, and demonstrate the above.

### 1. SOURCE TEXT FEATURES

The source text—*From Quarks to Quasars: the Science of Space at Its Strangest*—is a popular science reading written by Tim James, which is widely welcomed by domestic and foreign readers. Its contents include the origin and structure of the known things in the universe, the discovery and exploration of the unknown things, the laws and dimensions of the operation of celestial bodies, and so on. It is a typical informative text, belonging to the English science and technology text category. It has the common features of scientific text, such as correct

grammar, clear subject-predicate, etc. Its purpose is to disseminate true and effective information and to educate readers about the universe and celestial bodies in a simple, objective, rich and true style. These characteristics of the source text require the translation to be faithful to the expression of the content. What's more, it has its characteristic, that is, pays more attention to publicizing scientific knowledge to the public, in order to attract lay people to further understand and even explore science. Considering this, the translation of it focuses on language expression and text readability, in addition to the accuracy of the content.

## 2. APPLICATION OF COMMUNICATIVE TRANSLATION THEORY IN *FROM QUARKS TO QUASARS* TRANSLATION

To achieve the purpose of “the communicative translation focuses on the reader and aims to produce the same effect” (Newmark, 1982) in communicative translation theory, systematic analysis is usually made from the perspectives of professional terms, expressions of words, and sentences, and translation strategies. The fellow cases are presented to demonstrate the translation methods of Source and Target (S&T).

### 2.1 Vocabulary

#### 2.1.1 Terminology

*From Quarks to Quasars* is characterized by two lexical expressions: a multitude of specialized terms in the field of astrophysics and semi-technical words. The astrophysics field contains many technical terms, which are the uniform terminology for specific objects in astrophysics and have no relevant explanation in other fields, such as singularity(奇点)、gravity wave(引力波)、event horizon(事件视界), and so on. Astrophysics specialized terminology, such as Gamma-Ray Bursts(伽玛射线暴)、orbital element(轨道根数), and other rare phrases need to be resolved through retrieval (Xu, & Guo, & Yan, 2021). The translation of specialized terms has official expressions, and the translator needs to consult relevant materials to determine them when translating.

Semi-technical terms in scientific and technical texts refer to common terms in life, which are translated into professional meanings in scientific and technical texts. For example, “plasma” means “血浆” in medicine while “等离子体” in physics; The most common meaning of “spin” in life is “旋转”, and in physics, it should be translated as “自旋”; “constant” is translated as “持续不断的”, and it is translated as “常数” in math and physics. When translating, the translator should abandon the more common lexical meanings and choose the interpretation in the professional field, which requires the translator to be cautious when selecting words.

### Example 1

**Source Text:** “The next nearest suns to ours are the Alpha Centauri cluster: a three-sun system comprising Proxima Centauri, Alpha Centauri A and Alpha Centauri B, which sit another four Oort cloud distances away.”

**Translated Text:** 离我们第二近的恒星是南门二恒星系 (Alpha Centauri) ——一个由比邻星 (Proxima Centauri)、半人马座 $\alpha$ 星 A (Alpha Centauri A) 和半人马座 $\alpha$ 星 B (Alpha Centauri B) 构成的三合星系统, 它到地球的距离是奥尔特云到地球距离的两倍。

There is no official explanation for the “Three-Sun System”. It is easy to read it literally as “三星系统”. But “三星系统” has an official name—Trinary star system. After further exploration, the author found that both the “三星系统” and the “三合星系统” are composed of three stars. The difference lies between them is that the former is a superposition of two double star systems, while the latter is three single stars that are connected by mutual attraction. Combined with the above, the original author did not emphasize the existence of a double star system, so the translator translated “three—sun system” as “三合星系统” seems to be correct. Verification in Microsoft Bing, translated the “三合星系统” as “Triple Star System”, which further confirmed the accuracy of the translator’s translation. It can be seen that the reserve of professional knowledge is crucial to the accuracy of scientific translation.

#### 2.1.2 Adjectives and Adverbs

As modifiers, adjectives and adverbs are active both in Chinese and English. English is more static and prefers to use nouns. Adjectives follow immediately before nouns, very much seen in modifying noun situations. While Chinese is a dynamic language with more free requirements on the form. Adjectives and adverbs in Chinese will have different expressive effects at different positions of sentences.

### Example 2

**Source Text:** “A wormhole like that might even be able to connect two points within the same universe, allowing us to travel to different regions of space that would normally take us centuries to reach.”

**Translated Text:** 这样的虫洞甚至可以连接同一宇宙中的不同两点, 让我们能够旅行到不同的空间区域, 而这段距离通常需要几个世纪才能到达。

By reading the original sentence, the author found that in the second half of the sentence, the original writer wanted to emphasize that the distance between the two spaces connected by the wormhole is very far, so far that it usually takes humans centuries to reach. But the translator did not express this emphasis on the relationship, so the Chinese readers could not have a profound understanding of the “far” of this distance. Therefore, the author believes that the adverb “normally” can be isolated into a clause by itself to achieve the effect of emphasis, which can accurately convey the original author’s intention.

The author tries to translate this sentence: 这样的虫洞甚至可以连接同一宇宙中的不同两点, 让我们能够旅行到不同的空间区域, 而通常情况下, 这段距离需要花费几个世纪的时间才能到达。

### Example 3

**Source Text:** “Because all of this is based on theory and calculation rather than hard fact, wormholes are a topic of thrilling disagreement.”

**Translated Text:** 所有这些都是基于理论和计算, 而不是确凿的事实, 因此虫洞是一个令人激动的争议性话题。

In the original sentence, “thrilling” and “disagreement” together modify “topic”, which is translated into “令人激动的争议性话题” in Chinese. Two adjectives can indeed be used to modify a noun together in Chinese, but there will inevitably be complicated sentences, such as this sentence, which does not conform to the expression habit of short sentence patterns in Chinese. Therefore, we can try to make the adjective “thrilling” separate from the main trunk into a clause to make the Chinese expression concise and clear.

The author tries to translate this sentence into: 所有这些都是基于理论和计算, 而不是确凿的事实, 因此虫洞是一个争议性话题, 令人激动。

## 2.2 Sentence

### 2.2.1 Long Sentences

The original text is regarded as astrophysics popular science and contains many long and complex sentences, and the information contained in these sentences is fragmentary and abundant. When we are faced with a long sentence with complex information, it is generally impossible to sort out all the content immediately. At that time, we can adapt the method of sentence segmentation to separate the information points, because English emphasizes hypotactic, sentence expression values the completeness of form; Chinese, on the contrary, emphasizes paratactic and implicit cohesion, and use short sentences. And then translate them one by one, and finally connect the information points, which not only helps content sorting but also avoids information omission.

### Example 4

**Source Text:** “The four inner planets were stripped of their gaseous outer layers by solar winds while the outer planets were distant enough to keep their atmospheres, thus dividing the solar system into two regions of rocky inner planets and outer gas giants, with a circle of asteroids – remnants of a failed planet—in between.”

**Translated Text:** 四个内行星的外层大气被太阳风剥离, 外行星的大气由于距离足够远而得以保留。根据这一标准, 太阳系可以划分为岩石内行星和气态巨行星两个区域。这两个区域之间 有一圈小行星, 它们是一颗夭折行星的残骸。

### Example 5

**Source Text:** “The outer layers of a massive star shrink in the same way, but at such a velocity that they bounce off the inner core and explode back outwards, tearing the

star to pieces in an explosion so bright it radiates the same amount of energy in a few minutes that our sun produces over its 10-billion-year lifetime.”

**Translated Text:** 大质量恒星的外壳以同样的方式萎缩, 但速度不会太快, 最终外壳会从内核反弹回来, 向外爆炸, 同时把恒星撕成碎片。这个过程非常明亮, 几分钟内辐射的能量就相当于太阳在100多亿年里产生的能量。

### Example 6

**Source Text:** “Time does not flow the way we imagine it to, rather it jumps from instant to instant creating the illusion of time the way individual frames played fast on a film strip creates the illusion of motion.”

**Translated Text:** 时间的流动方式并不是我们想象的那样, 相反, 它从一个瞬间跳到另一个瞬间, 创造出了时间的错觉, 这个过程类似于在电影胶片上快速播放单个的帧, 从而创造出运动的错觉。

Examples 4 and 5 are good illustrations that we can see punctuation, conjunction, and attributive clause before the antecedent is the location of the cut-off information point; while in example 6, there are very few cohesive words, so the connection between information depends on the translator’s own understanding. Therefore, sentence segmentation is only a good helper for the translator to sort out information (Chai & Guo, 2022). In order to truly achieve accurate information expression, the translator’s professional knowledge level, logical analysis ability, and bilingual skills are still very high requirements.

### Example 7

**Source Text:** “The other problem with loop quantum gravity is that when we incorporate time into the equations, which we inevitably have to do since bending space bends time simultaneously, it stops working.”

**Translated Text:** 圈量子引力的另一个问题是, 当我们把时间纳入方程, 它就不再有效。而我们不可避免地会这样做, 因为空间的弯曲同时会使时间弯曲。

This sentence contains three clause structures, namely the predicative clause guided by “is that”, the time adverbial clause guided by “when”, and the attributive clause guided by “which”. Among them, the translation of the time adverbial clause is consistent with the original order, and it is translated as an interjection; This is because, in English, comments come before facts, while in Chinese, the opposite is true (Li, 2016). The translator first explained the fact that “不再有效”, and then explained the reason for doing so. The sentences are smooth and have the characteristics of Chinese.

### 2.1.2 Passive Voice

In the original text, there are a large number of non-subject passive sentences. This is because scientific and technological articles emphasize the objective analysis of facts, and pay more attention to the process of logical analysis and the results of the argument, rather than the sender of the action. The language characteristics of Chinese paratactic make it very common to express passive in the active voice.



### Example 8

**Source Text:** “Gravitons had been talked about for years as a possible way to reconcile quantum mechanics with gravity – the idea being that all objects emit and absorb graviton particles between them causing attraction – but nobody had ever taken them seriously.”

**Translated Text:** 人们已经谈论引力子很多年，把它作为调和量子力学与引力的可能方法，即所有物体都相互发射和吸收引力子，并由此产生吸引力。但没有人认真地对待过它。

In the original text, an entire long English sentence was translated into Chinese into five short sentences. This is in line with Chinese expression habits. In this sentence, Gravitons is the subject, “Gravitons had been talked about for years” is expressed in passive voice, the translator follows the communicative translation theory, caters to the Chinese expression habits, changes the passive to the active, and the English subject becomes the Chinese object. In the context of the target language, the subject is uncertain, it can be the scientists or the public. If the voice is not changed, target readers might have a misunderstanding. Therefore, the translator added the implicit Chinese subject -- 人们, so as to be more faithful to the original text.

### Example 9

**Source Text:** “Strings can also be stretched into 2D surfaces called branes (short for membranes) and branes can be smushed on top of each other to create 3D structures called bulks.”

**Translated Text:** 弦可以拉伸成二维表面，叫作“膜”；膜可以相互叠加形成三维结构，叫作“体”。

This sentence is clearly in the passive voice, but when translated into Chinese, there is no obvious “subject change” phenomenon as in the previous example. There is also a method in scientific and technological texts to deal with the translation of passive voice, which is to use “可以” instead of “被” (Antra & Diāna, 2019). This method is adopted in the translation of this sentence.

### Example 10

**Source Text:** “First, let’s revisit anti-de Sitter space. That’s the one where reality looks like a magnifying glass and things far away look compressed around the rim.”

**Translated Text:** 首先，我们来回顾一下反德西特空间。在反德西特空间中，现实就像一个放大镜，远处的东西看起来就像是被压缩在边缘。

In the latter part of the sentence, “things far away” is the subject. It is not the originator of the action “look”, but the receiver, so the passive meaning of the original should be retained in translation. Compared with the previous two examples, the passive voice in this sentence is not obvious in form, but it contains passive meaning. Consequently, the translator should be able to clearly identify and accurately translate the original text.

## 2.3 Translation Strategies

The specialized terminology reflects the professionalism of the text and is often fixed; the specialized sentences have different linguistic characteristics, so the treatment of both is more focused than that of the common sentences. The above two sections are the analysis of this ‘fixed’ expression. While there are also many common sentences in Astrophysics texts, and the translation of these sentences has a greater impact on the reader’s understanding of the text. In the following section, the translation of common sentences will be analyzed from the perspective of translation strategies.

### 2.3.1 Literal Translation

Science and technical texts require the information to be complete and accurate, and most translators adopt literal translation. The literal translation is very common in English-Chinese translation, as it is faithful to the content of the original text and also conforms to its structure and linguistic color, and is very popular in the translation of scientific and technical texts because it ensures that the information conveyed is “undistorted”. However, literal translation can sometimes be one-sided, which requires the translator to make adaptations depending on the circumstances.

### Example 11

**Source Text:** “When people thought of the word ‘planet’ they imagined huge spherical worlds plowing across lonely orbits — not scraggly chunks of space lint forming a loose belt around the Sun.”

**Translated Text:** “行星”这个词让人们联想到巨大的球形世界穿过孤独的轨道，而不是散乱的空间碎片在太阳周围形成松弛的皮带。

“Chunks of space lint” is the product of human space activities, such as rocket body, which is the main pollution source of the space environment. This sentence is intended to express that in the process of exploring the universe, human beings have neglected the protection of the space environment. The purpose is to get the reader’s attention. The translator’s expression makes people feel unintelligible. The reason is that it is constrained by the structure and wording of the original text. In order to realize the target language centeredness required by the theory of communicative translation, the translator must respect the differences in the basic language rules between English and Chinese, the literal translation is not advisable now.

The author tries to translate this sentence: 当提到“行星”这个词时，人们脑中浮现的是巨大的球体在空无一物的椭圆轨道上运行，而不会想到零散的空间碎片正围绕着太阳，形成松散的皮带状污染圈。

### Example 12

**Source Text:** “The only way of working up enough spacetime distortion to create gravitational waves such as the ones we picked up would be if two black holes collided — an event so extreme we do not even have a name for it.”

**Translated Text:** 要有足够的时空扭曲来产生我们所捕捉到的引力波，唯一的方法就是两个黑洞相撞。这种极端的事件我们甚至没有给它命名。

In the above examples, we say that literal translation is sometimes not desirable, but the literal translation is not the opposite of communicative translation theory. The difference between the two methods is that the latter regards the form of words and sentence expressions in the original text as one of the factors that the translator should consider.

Translators can have greater freedom in communicative translation, and the adjustment of the word order is to better fit the expression habits of the target language. The word order of this sentence has been adjusted. For the rest, the original information is translated literally to ensure that there are no omissions.

### 2.3.2 Amplification

Domestic readers often report that the professional knowledge of popular science books is too obscure, and they give up because they cannot understand them. Among them are the translation work readers of the source text, who also reported that they could not understand the book after reading the sixth chapter.

This is due to the lack of readers' professional knowledge. Therefore, we should pay attention to the role of the translator. Should the translator add translation as appropriate to explain the professional knowledge? On the basis of guaranteeing fidelity to the original text, this is certainly what it should be.

#### Example 13

**Source Text:** "In order to address the question of alien life tangibly, we have to be a bit pessimistic. There absolutely could be life out there too strange for us to recognize, but in science, we limit ourselves to what we can comment on."

**Translated Text:** 为了切实地解决外星生命的问题，我们必须有点悲观。绝对有可能存在我们无法认识的奇怪生命，但在科学上，我们只能做出谨慎的评论。

Read through this sentence, and although the general idea is correct, many expressions do not conform to the Chinese wording habits. In order to take care of Chinese readers, translators can replace literal translation by utilizing additional translation, reverse translation, and other methods according to different situations.

Therefore, the author tries to translate this sentence into: 为切实解决外星生命的问题，我们不能太乐观。宇宙中绝对可能有我们无法识别的奇特生命形态，但在科学上，我们只能谨慎评论。

#### Example 14

**Source Text:** "In the usual quantum mechanical view of things, gluons zip back and forth between the quarks that make up atomic nuclei."

**Translated Text:** 在通常的量子力学观点中，胶子在组成原子核的夸克之间来回压缩。

This sentence is taken from Chapter 7 of the source text. There is no problem with just looking at the translation, but what does "胶子在组成原子核的夸克之间来回压缩" mean? Readers who do not have a certain foundation in physics may not understand the relationship between gluons, atomic nuclei, and quarks. Quarks bind to each other by gluons, forming hadrons such as protons and neutrons, the building blocks of atomic nuclei (Pate, Raclariu, Strominger, & Yuan, 2021). The translator can make supplementary explanations to explain the relationship between the three to help readers understand.

### 2.3.3 Treatment of Rhetoric

#### Example 15

**Source Text:** "Space is bigger than big, bigger than enormous, bigger than humungous, huge, vast, immense or colossal. The only word we can use to describe the size of space is 'astronomical'."

**Translated Text:** 宇宙之大，超越巨大，超越庞大，超越博大，超越广大，超越宏大，超越浩大。我们只能用一个词来形容：“天文”。

The original text is a comparative sentence form that plays an emphasis role. Communicative translation theory emphasizes that the target language readers should be fully considered and the expression habits of the target language should be used to accurately convey the content of the source language. Keeping a steady state is the basic requirement of Chinese rhetoric, and the four-character case, as a unique structure of Chinese, is concise and graceful, which exactly has the function of balance. Although it is often seen in literary translation, it is more striking when it appears in scientific and technological translation, which is not commonly used.

The words "big, enormous, humungous..." all mean "big" in Chinese, but the translator not only retained the parallelism of the original text but also replaced these "big" with different Chinese words. Both form and content are consistent with the expression habits of the target language — Chinese, which not only reflects the richness of the Chinese language but also enables readers to have a deeper understanding of the immensity of the universe.

## CONCLUSION

From the above case analysis, it can be concluded that communicative translation theory can flexibly apply various translation methods and techniques, such as segmenting long sentences, changing passivity into an initiative, adjusting word order, and literal translation, amplification, and so on, to deal with the translation of words and sentences in popular astrophysics texts. Translators should also have a deep understanding of the source text and professional knowledge in the field. Only by doing these things can make the target language readers get the same reading experience as the source

language readers, and help the public better understand scientific knowledge.

It is always said that the journey of human beings in exploring the universe is the sea of stars. The search for correlations between everything in the universe to help achieve long-term human survival is part of the reason why scientists are trying to understand the universe. Britain and the United States have their unique views on astrophysics research. By translating relevant popular science works to Chinese readers, more Chinese people will pay attention to the romance of exploring the vastness of the universe while falling in love with it.

---

## REFERENCES

---

- Antra, R., & Diāna, R. (2019). Problems encountered in the process of translation and their possible solutions: The point of view of students of technical translation. *Vertimo Studijos*, 12. doi:10.15388/vertstud.2019.9.
- Chai, S., & Guo, Z. Y. (2022). A study on the translation techniques of long sentences in the science of fairy tales under Newmark's communicative translation theory. *Canadian Social Science*, (01). doi:10.3968/12372.
- Li, X. Y. (2016). Technological translation from the perspective of translation ethics: A brief history of time and the theory of everything, for example. *Chinese Science & Technology Translators Journal*, (01), 40-42+59. doi:10.16024/j.cnki.issn1002-0489.2016.01.011.
- Mohamed, S. I. (2016). A brief analysis of Peter Newmark's communicative translation theory. *Indian Journal of Public Health Research & Development*, (01).
- Newmark, P. (1982). A further note on communicative and semantic translation. *Babel. Revue internationale de la traduction / International Journal of Translation*, (01). doi:10.1075/babel.28.1.06new.
- Pate M., Raclariu, A. M., Strominger, A., & Yuan, E. Y. (2021). Celestial operator products of gluons and gravitons. *Reviews in Mathematical Physics*, (09). doi:10.1142/S0129055X21400031.
- Xu, Y. J., & Guo, S. J., & Yan, W. J. (2021). Translation of terminologies regarding small satellites for space science. *Chinese Science & Technology Translators Journal*, (03), 1-4. doi:10.16024/j.cnki.issn1002-0489.2021.03.001.