

Petroleum English Translation Study under the Guidance of Schema Theory

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Abstract

Petroleum is known as the "blood" of modern industrial civilization. Under the background of economic globalization and energy strategy, the development of petroleum English translation is not only a key point, but also a difficult point. Petroleum English is a branch of ESP (English for Specific Purpose), which has its special linguistic features, such as vividness, professionalism and interdisciplinarity. The core content of modern schema theory is that "the understanding and expression of new things depend on the existing schema in people's mind", that is, when decoding new things, people need to combine the new things in front of them with known concepts, experiences and background knowledge. The three research perspectives of language schema, content schema and formal schema can be well combined with the characteristics of petroleum English, so as to play a guiding role in petroleum English translation.

Keywords

Schema Theory, ESP, Petroleum English Translation.

1. Introduction

With the implementation of China's international energy strategy, China's overseas oil market continues to expand, and international petroleum science and technology cooperation is becoming more and more frequent. In order to meet the needs of the internationalization of the petroleum industry, it has become one of the important goals of personnel training in petroleum universities to cultivate international petroleum talents who can extract the core information of relevant English literature without obstacles and can smoothly carry out science and technology and communication in English [1]. At the same time, China is a major importer of petroleum in the world, so in order to improve the anti-risk ability of China's petroleum trade and strengthen its integration with the international community, the research on petroleum text translation is of great importance [2]. Petroleum English is not only English for Specific Purposes, but also a branch of scientific English. Therefore, the translation of petroleum English requires the translator to master its unique linguistic and professional characteristics. Schema theory explores the translation process from the perspective of thinking and cognition, and provides effective guidance in petroleum English translation. At present, there are few researches on petroleum English under the guidance of schema theory at home and abroad. This paper analyses the characteristics of petroleum English in terms of lexical level, syntactic level and textual level, and puts forward corresponding translation strategies under the guidance of schema theory.

This paper is divided into four parts. The first part is a brief introduction to schema theory, including the core content, development process and classification of schema theory. The second part analyzes the characteristics of petroleum English from the aspects of vocabulary, syntax and text, so as to grasp the key points and difficulties of petroleum English translation as a whole. The third part mainly analyses the translation strategies at the lexical, syntactic and

textual levels under the guidance of schema theory and combined with the characteristics of petroleum English. The fourth part is a summary of this study.

2. Schema Theory

In philosophy, the early mode of thought is called "schema". The term was first used in Kant's Critique of Pure Reason to discuss the problem of a prior cognition. One of the first to use the concept of schema was the English cognitive psychologist Frederick Bartlett, who applied it to modern psychological research, arguing that our memory of discourse is based not on straight reproduction but on constructive nature. This interpretive process uses the information in a text together with past experience to construct a mental representation [3]. According to Nishida, schema is a series of knowledge summarized from past experience, which is organized as related knowledge groups and can guide our behavior in familiar scenes [4]. Later, schema theory has been developed in many research fields such as anthropology, artificial intelligence and linguistics, but its core content is the proper understanding of new things based on past experience.

As for the research direction, there are two mainstream research directions at present. One is the three research directions of linguistic schema, content schema and formal schema proposed by modern schema theory. Linguistic schema refers to two aspects of language form and semantic structure, including collocation, grammatical use, etc. Content schema refers to the understanding of the background knowledge of the text; formal schema refers to the translator's grasp of the structure of the text, including morphology, syntax and discourse. The other is proposed by Liu Mingdong. There are two crucial stages in the translation process: comprehension and expression. Liu believes that the key to comprehension is to decode the source language correctly, in the comprehension stage of translation, the translator should have and activate the existing schemata related to the source language in his brain to ensure the correct decoding of the source language; while the key to expression is to encode the target language properly, in the expression stage of translation, the translator's encoding of the target language schema should be conducive to activating the existing relevant schemas of potential readers, and at the same time help them establish more new schemas to achieve the purpose of cross-cultural communication in translation. In this way, Liu believes that from the perspective of "schema", translation requires the translator to correctly process the various schemata in the source language and successfully re-encode them in the target language. Therefore, the translation process is essentially a process of schema conversion [5]. Liu divided the content of schema translation into four parts: language schema, context schema, stylistic schema and cultural schema. Language schema refers to language knowledge in terms of vocabulary, grammar and usage. Context schema refers to "language use environment"; style schema refers to the stylistic style of the text; cultural schema is the block of knowledge structure about culture. The schema theory adopted in this paper is mainly based on three research directions of modern schema theory.

3. Characteristics of Petroleum English

Petroleum English is one of English for Special Purposes (ESP) and also belongs to the category of scientific English. Petroleum English has its own language characteristics and objective attributes: brief, clear and logical. Generally, petroleum English has the characteristics of accuracy, objectivity, conciseness, interdisciplinary, figurative, humorous and frequent emergence of new words [6]. Next, the author will analyze the characteristics that are easy to be difficult in the process of petroleum English translation from lexical level, syntactic level and textual level.

3.1. Lexical Characteristics

As a branch of English for science and technology, petroleum English has strong professionalism, and we should pay attention to the difference between petroleum English and other scientific and technological texts in translation. The characteristics of petroleum English vocabulary are mainly reflected in the following points: multi-image humorous words, multi-general words, multi-compound words.

3.1.1. Vivid Words

In petroleum English, there are many human, animal, or other unrelated nouns that refer to a certain term. These vivid expressions add an impressive dose of humor to serious technical writing. For example, bulldog (打捞矛); wildcat (探井); core holder; sweet gas (无硫气); edge water (边水); horsehead (驴头, referring to the top of a pumping unit); dead oil (脱气原油), etc. However, as these words have a conventional meaning in People's Daily life, it is easy to lead to ambiguity in translation.

3.1.2. Common Words

Some petroleum words, such as platform, are formed by directly adding new meanings to common English words. For instance: reservoir (水库/油藏); bean (豆子/节流器、油嘴); drainage area (排水面积/供油面积), etc. However, due to the translation of these words which is closer to daily life in people's inherent cognition, which means these words have corresponding meanings in daily life, some conceptual confusion may be caused in translation.

3.2. Syntactic Characteristics

Petroleum English mainly describes the objective facts such as petroleum process flow and phenomena, so its sentence structure is mostly passive sentences with strong objective attributes and long sentences reflecting strict logic.

3.2.1. Passive Sentences

The task of petroleum science and technology English is to describe and express the essential characteristics of objective things, the process of change and the relationship between it and other things. The use of passive voice is an important means for petroleum science and technology English to pursue the objectivity and normalization of narrative. The use of passive sentences can not only avoid unnecessary personal use, but also help to present facts more objectively.

3.2.2. Long Sentences

Generally speaking, long sentences are rigorous and accurate, which are suitable for elaborating complex theories, ideas and processes, while simple sentences and short sentences are not competent for these job. Petroleum texts are tend to express complex thinking and describe complex techniques, processes, methods and scientific experiments[6]. Therefore, long sentences often appear in petroleum English to explain the phenomenon, explain the problem and present the process. However, in the pragmatic habits of Chinese, long sentences do not often appear. Therefore, it is difficult to translate long sentences in petroleum English into Chinese.

3.3. Textual Characteristics

The generation of discourse depends on the continuity of linguistic elements, which in turn have the function of mutual interpretation. A discourse refers to a linguistic unit composed of sentences and paragraphs, which is a integrity of coherent and cohesive information[7]. Petroleum English is a branch of scientific English, with the general characteristics of it, such as rigorous organizational structure, professional and other characteristics.

3.3.1. Rigorous Logic

As a branch of scientific English, rigorous logic is a major characteristic of Petroleum English. As it involves the introduction of petroleum technology process, the description of the operation of each link is often closely associated. Therefore, from the perspective of the textual level, the article often contains the internal logic relationship.

3.3.2. Professionalism

Because petroleum English involves a large number of professional terms and professional background knowledge, therefore, only on the basis of understanding the whole background knowledge of the original text can the information be accurately translated.

4. Petroleum English Translation Strategies under the Guidance of Schema Theory

In general, modern schema theory holds that schema refers to a set of structures or blocks of interacting knowledge and experience that can constitute cognitive ability[8]. Petroleum English is highly specialized and emphasizes the application of background knowledge, which puts forward higher requirements on the cognitive ability of translators in the process of Chinese translation. Therefore, it is feasible to analyze the translation strategies of petroleum English under the guidance of schema theory. Under the guidance of schema theory, the translator works out the translation strategies of petroleum English at the lexical, syntactic and textual levels.

4.1. Lexical Translation of Petroleum English under the Guidance of Schema Theory

4.1.1. Vivid Words Translation-the Combination of Literal and Free Translation

The appearance of figurative humorous terms in petroleum English is actually a metaphorical phenomenon, and the meaning of metaphor lies between two different things. The result of mapping some features of things in the source language to the target language is based on the similarity between things in the source domain language and things in the target language [5]. Therefore, under the guidance of the content schema, the translation of such words should follow the principle of establishing the connection between the subject matter of the source language and the subject matter of the target language.

When translating such petroleum terms, the figurative character should be preserved as much as possible, and the terms should be literal translated. For example, "edge water" refers to the vertical line on the upper interface of oil and water at the contact surface of oil and water. The translation of "边水" not only retains the image of this term, but also can be easily understood by readers with relevant professional knowledge. Therefore, literal translation can be adopted. However, in the case that the retention of the original image will affect the understanding of the readers of the target language, a free translation method with more professional expressions should be adopted in combination with the relevant knowledge of petroleum majors, such as "dead oil". If the word dead oil is translated directly into "死油", readers may be confused. However, based on the relevant background knowledge, it can be known that, the "dead" here refers to the separation of the gas dissolved in oil, so the word can be translated as "脱气原油" in combination with professional knowledge.

4.1.2. Common Words Translation-the Combination of Terminologization and Background knowledge Association

Context schema emphasizes that context is the only factor determining meaning [9]. Therefore, although the common words in petroleum terms have conventional expressions in daily life, the words should be understood in a specific context when translated, and the content schema

requires the translator to apply the objects described in the text to the professional knowledge such as concept, technical interpretation and application [10].

Therefore, when translating the common words, based on the intention of terms given in the original text, we should choose the expressions of terms that are more likely to correspond to the background knowledge in the target language to avoid ambiguity. For example, the expression "reservoir" in daily life is a reservoir, that is, a large space for storing water. However, the context must indicate that this large space is for storing oil. Therefore, the translation of this word should choose "油藏".

4.2. Syntactic Translation of Petroleum English under the Guidance of Schema Theory

4.2.1. Transferred Words Translation-the Combination of Terminologization and Background knowledge Association

Language schema emphasizes that the translator must be very familiar with the linguistic forms and semantic structures of the source language and the target language in order to produce an excellent translation suitable for the target culture. Due to the significant differences between Chinese and English, passive sentences are not commonly used in Chinese expressions. Therefore, in most cases, if the passive sentences in English are translated without the transformation of the voice, the target language readers may have some difficulties in understanding the information. Therefore, the passive sentences in petroleum English should be translated into active voice to the greatest extent.

Example 1:

SL: Unless the topography is very flat, the pipe must be bent using a pipe bender to "fit" the ups and downs of the trench.[11]

TL: 除非地形地貌非常平坦, 否则必须用弯管使管子弯曲, 以"适应"管沟的高低起伏。

Analysis: The original "must be bent" is passive voice, the translator changed the voice and translates it as "弯管使管子弯曲", more in line with the language schema of the target language

Example 2:

SL: If water is lost from the cement slurry before it reaches its intended position in the annulus, its pumpability will decrease and water sensitive formations may be adversely affected.[12]

TL: 如果钻井液在达到预期位置之前就损失水分了的话, 那么其泵送能力将会降低, 并且水敏地层也可能会受到不利影响。

Analysis: In this sentence, "water is lost" is in the passive voice in the original text, but if this sentence is translated according to the original voice, the translation will be "水分被流失". But the actor of this action is not emphasized in this sentence, so there will be some difficulties for readers to understand this translation. In the second half of this sentence, "may be adversely affected" is in the passive voice, and if the voice is not modified, it will be translated as "可能会受到影响". There is faultless semantically, but this translation is wordy and does not conform to Chinese expression habits. The translation of this sentence as "受到影响" adopts the method of changing the active to passive, which is more helpful to the linguistic form of the target language and conforms to the basic principle of language schema.

Example 3:

SL: Certain procedures must be followed to open or close a well. Before opening, check all the surface equipment such as safety valves, fittings, and so on.[12]

TL: 开关油井必须遵循一定的步骤。开井前要检查所有地表设施, 如安全阀, 管道配件等。

Analysis: In this sentence, the expression "Certain procedures must be followed" is in the passive voice. If it is directly translated according to the original voice, the translation will be

"一定的程序必须要被遵循". This expression in the passive voice is different from that in Chinese. The translation will have the feeling of translationese, which will also have a certain negative impact on the reader's reading experience. Therefore, when translating this sentence, the translator adjusts the expression structure to the verb-object structure, which is more in line with the expression habits of the target language, so as to optimize the reader's reading experience and conform to the basic principles of language schema.

4.2.2. Long Sentence Translation-Segmentation of the Long Sentences and Adjustment of the Word Order

Formal schema is the translator's understanding of the structure of the text, including the understanding of syntax. The final translation cannot completely follow the form of the original text, because there are differences between the formal schema of the original text and the target text, and the target text should be inclined to the formal schema of the target reader [8]. English emphasizes hypotaxis and applies more long sentences; Chinese emphasis on parataxis and uses more short sentences. Therefore, long sentences in petroleum English need to be segmented and arranged in a certain logical order in order to conform to the habits of target readers in terms of logic, content and form, and connect with the formal schema in the target readers' brains.

Example 4:

SL: The quantity of gas produced will determine whether or not the gas will be produced in the field or routed to processing facility where the stream can be conditioned to make it marketable and at the same time recover the valuable impurities.[11]

TL:

产出的天然气的量，是决定天然气是在气田生产，还是输送到可调节气流、并使其可销售、同时又可回收有价值杂质的加工设施去处理的因素。

Analysis: A long sentence in the original text consists of a main sentence, an adverbial clause of concession and an adverbial clause of place. If translated in the original order, the sentence would be

"产出的天然气数量将决定天然气是在现场生产，还是输送到处理设施，在那里可以调节流，使其可销售，同时回收有价值的杂质。" It can be seen that the translation in accordance with the original word order may cause confusion to readers logically, which is inconsistent with the formal schema of the target language reader. Therefore, the translator divided the original sentence, separated the main sentence from the two adverbial clauses, and also separated the parallel components in the two adverbial clauses, and re-adjusted the order of the sentence to a certain extent, so as to make the target language more in line with the reading habit and formal schema of the target language readers.

Example 5:

SL: The surface formations may also have low fracture strengths which could easily be exceeded by the hydrostatic pressure exerted by the drilling fluid when drilling a deeper section of the hole.[12]

TL:地表形态的断裂强度也可能较低，因此，当钻进较深的井段时，钻井液施加的静水压力很容易超过这种强度。

Analysis: The long sentence of the original text is composed of a main clause and an attributive clause. The attributive clause is very long, which contains a postpositive attributive exerted by the verb "exerted" and an adverbial clause of time exerted by "when". English is a hypotaxis language, while Chinese is a parataxis language. Therefore, such interlinking expressions in the original text do not accord with the expression habits of the target language readers. In Chinese, adverbials of time are often placed at the beginning of the sentence, so the translator puts the adverbial of time in the original text before the translated sentence. Moreover, because Chinese

is a parataxis language with many short sentences, there are usually clear logical relation words between sentences to highlight the logical relation contained in the sentences, and the fracture strength of the surface formations is the reason why the hydrostatic pressure exceeded this strength. Therefore, the translator added a logical relation word "因此", which represents the causal relationship, to highlight the logic, thus following the principles of linguistic schema and formal schema.

Example 6:

SL: One of the major concerns in a multiplayer system is that interlayer cross-flow may occur if reservoir fluids are produced from commingled layers that have unequal initial pressures.[12]

TL:

水基钻井液是钻井作业中最常用的泥浆体系。与油基泥浆系统相比,该系统成本较低,易于维护。然而,众所周知,水泥浆在进入地层后会引引起岩石力学性质的变化。如果水泥浆改变了岩石的性质,可能会导致井眼不稳定,对地层造成永久性损害;而且,在配制水基钻井液进行水力压裂时,需要大量的水以制造高压注入井筒。

Analysis: The long sentence in the original text consists of a subject and a long predicate clause. The predicate clause contains an adverbial clause leading by "if" which contains an attributive clause guided by "that". It can be seen that this sentence is a typical interlocking long sentence in petroleum English, reflecting the characteristics of rigorous logic. But if this sentence is translated according to the original order, the translation will be "多层系统的一个主要问题是,层间窜流可能会发生,如果储层流体是从初始压力不等的混合层中产生的话". In the expression of causal relationship, English generally describes the result before displaying the cause, while Chinese generally explains the cause before describing the result. Therefore, such a translation does not conform to the expression habit of the target language and violates the principle of language schema. Therefore, the word order of the sentence should be translated according to the order of explaining the cause first and describing the result, so as to conform to the expression habit of the target language.

4.3. Textual Translation of Petroleum English under the Guidance of Schema Theory

4.3.1. Rigorous Logic-Logical Manifestation

Since the subjects involved in the English translation of petroleum science and technology include the sender and receiver of information, the petroleum science and technology text attaches great importance to logical coherence, which can reflect the intrinsic logic of the original content[13]. However, as mentioned above, English is a language of heavy conformation and mostly consists of long sentences, so there are no obvious logical relation words to reflect the logic in the text. But in Chinese, the logic of writing is obvious. Under the guidance of schema theory, the translator needs to have the cognitive schema of the source language, including the textual logic intended by the original author, and then according to the expression habits of Chinese, add translation and logical relation words according to the specific situation to carry out logical manifestation.

Example 7:

SL: Water base drilling fluid is the most common mud system that is employed in the drilling operations. It is less expensive and easy to maintain as compared to oil mud system. However, water mud is known to cause change to the mechanical properties of a rock after entering the formation. If the water mud modifies the properties of the rock, it may lead to unsteadiness of the borehole and cause permanent damage to the formation. A lot of water is required in composing water base drilling fluid to conduct hydraulic fracturing as these are injected with high pressure into a wellbore.[14]

TL:

水基钻井液是钻井作业中最常用的泥浆体系。与油基泥浆系统相比,该系统成本较低,易于维护。然而,众所周知,水泥浆在进入地层后会引发岩石力学性质的变化。如果水泥浆改变了岩石的性质,可能会导致井眼不稳定,对地层造成永久性损害;而且,在配制水基钻井液进行水力压裂时,需要大量的水以制造高压注入井筒。

Analysis: This chapter introduces the relative advantages and disadvantages of water-based mud system and oil-based mud system, and the second half describes the two parallel disadvantages of water-based mud, but there is no obvious linking word in the original text to indicate the parallel relationship, which will lead to the wrong understanding of the characteristics of water-based mud, so the translator added "and" to indicate the parallel relationship. Reflecting the rigorous logic of the chapter. In addition, the relatives representing transition, progression and assumption in the article must be reflected in the translation, which is the key point to clearly reproduce the logic of the original text on the basis of the cognitive schema of the source language.

4.3.2. Professionalism-Accumulation of Professional Knowledge

The petroleum engineering involves a wide range of subjects. Petroleum related disciplines include seismic exploration, well logging, drilling technology, oilfield chemistry, storage and transportation, offshore petroleum technology and other specialized fields. Therefore, the professional knowledge involved in petroleum English is more specific and professional. Content schema requires translators to have a full understanding of the background knowledge of the original text and a certain degree of familiarity with its professional knowledge. Therefore, effective translation of petroleum English should be based on the translator's comprehensive petroleum professional background knowledge. In the professional background knowledge, the occurrence frequency of professional terms is especially high, so the accumulation of professional terms should be highly valued. Therefore translators should actively accumulate knowledge of petroleum engineering, especially petroleum terms and related interdisciplinary disciplines knowledge, to translate high-quality translations that are conducive to the transnational communication of petroleum professional information.

Example 8:

SL: The overall ESP system operates like electric pump commonly used in other industrial applications. In ESP operations, electric energy is transported to the downhole electric motor via the electric cables. These electric cables are run on the side of (and are attached to) the production tubing. The electric cable provides the electrical energy needed to actuate the downhole electric motor. The electric motor drives the pump and the pump imparts energy to the fluid in the form of hydraulic power, which lifts the fluid to the surface. [12]

TL:整个电动潜油泵系统的操作与其他工业应用中常用的电泵类似。在ESP作业中,电能通过电缆传输到井下电动机。这些电缆连接到并在生产油管的一侧进行工作。这些电缆提供的电能用以驱动井下电动机,而电动机驱动电泵以液压动力的形式向钻井液输送能量,以此将钻井液提升到表面。

Analysis: This paragraph describes the working principle of the electrical submersible pump (ESP). The abbreviation "ESP" itself has a variety of meanings, such as "Electronic Stability Program" and "Extrasensory Perception", which all can be expressed by the abbreviation ESP. But in petroleum English, the abbreviation refers to electrical submersible pump, which is a device which has a hermetically sealed motor close-coupled to the pump body. If the translator is not familiar with the relevant background knowledge of petroleum engineering, it is very much likely for him or her to translate this topic word wrongly. Content errors may also occur in the content related to it below. According to the basic principles of content schema, translators should be very familiar with the content and knowledge background of the

translated material, so that they can accurately translate the highly professional original content.

5. Conclusion

Petroleum industry has a great influence on the country and people's livelihood, it is an indispensable resource for the survival the world. It is of great importance to grasp the petroleum market and carry out the effective international communication in petroleum industry to conduct the international cooperation in this field . Therefore, the translation of petroleum English plays a very important role in international communication of petroleum industry. Petroleum English belongs to a branch of scientific and technological texts, and it has its special writing characteristics in terms of lexical level, syntactic level and textual level. In terms of lexical level, petroleum English has the characteristics of owning abundant of vivid words and plenty of common used words. At the syntactic level, petroleum English has the characteristics of owning plentiful of passive sentences and long sentences; at the textual level, petroleum English has the characteristics of rigorous logic and strong professionalism.

Therefore, it is necessary to combine the characteristics closely and choose appropriate translation strategies when translating such texts. This paper analyzes the difficulties in the translation of petroleum English at the above three level, and puts forward the corresponding translation skills under the guidance of schema theory. In order to make a marginal contribution to the international exchange of petroleum technology.

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