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Applied Research on Figure-ground Theory in EST Translation

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Original Research Article

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Abstract: The translation of English for science and technology (abbreviation for EST) in the internet era caters to the needs of the market and boasts a promising prospect. EST is a kind of informational text characterized by its scientific seriousness, requiring the translator to demonstrate the accuracy and logicality in translated text. Results show that the figure-ground theory can be well applied to spatial orientation analysis, temporal event analysis, and syntactic analysis. Regarding the complex sentences, Tamly put forward five principles of figure-ground theory including sequence principle, cause-result principle, inclusion principle, contingency principle and substitution principle. Taking petroleum EST as the research object, this paper applies the five related principles to the syntactic analysis of long and complex sentences with examples.

Keywords: Figure-ground theory; EST; translation.

INTRODUCTION

In recent years, with the increasing development of science and technology industry in our country, the exchange of science and technology between countries is becoming more and more frequent. The translation of EST is faced up with more and more market demands, and the demand for talents of translation of EST is also increasing in various industries. And the importance of scientific translation is becoming more and more outstanding.

In terms of EST, how to improve the quality and efficiency has been a concern for professional translators. There are many scholars and translators who have done relative researches in this field, such as Zheng Shuming, Cao Hui *et al*., [1] who have adopted Catford's translation shifts to explore the transfer at different level of words, phrases and sentences in EST translation.

Wang Hao [2] combined translation variation theory with EST, applying seven flexible techniques to EST translation, namely, supplying, reducing, editing, elaborating, compressing, combining and transforming [3]. In addition, Zhang Jie, Li Ke *et al*., [4] have studied EST translation from the perspective of skopos theory, and Li Qingming *et al*., [5] from schema theory; and all of them have contributed their efforts to EST translation. These researchers have a wide range of research, including vocabulary, phrases, and sentences, but most of the research still need further in-depth studies.

A large amount of empirical studies have proved that the figure-ground theory can be well applied to the analysis of the semantic structure of long and complex sentences. It explores the temporal and spatial relationship of an event from the relationship between "figure" and "ground" in cognitive linguistics, thus providing a new perspective for the translation of long and complex sentences. Zhao Yanfang pointed out that the figure-ground theory is an important and basic feature of cognitive operation and semantic structure in cognitive linguistic analysis. In language analysis, the relationship between figure and ground is firstly shown as spatial orientation, and at the same time, the theory is also widely used in the study of temporal events and syntactic analysis [6]. In recent years, Chinese scholars have conducted a lot of research on inverted sentences, Chinese homophonic advertising languages, fables and so on, which testified the explanatory force of this theory in the study of language phenomena. In the aspect of complex sentences analysis, the "five principles" of the relationship between figure and ground put forward by Talmy [7] can explain the logical relationship between sentences and help the translator to translate more accurately. Based on figure-ground theory, this paper takes petroleum science and technology English as the research object and analyzes the five principles in complex sentences so as to provide corresponding translation skills for the translation of EST.

FIGURE-GROUND THEORY AND EST TRANSLATION

Figure-ground theory

Inspired by the famous face vase in France, Danish psychologist Rubin in 1915 put forward the Figure-ground theory, a psychological theory which later Gestalt psychologists Kohler and Kafka used to study perceptual organization, and Talmy initially applied this theory to linguistic research. The theory is in line with the path of "reality-cognitive-language" advocated in cognitive linguistics. Organizing information according to figure and ground, it is devoted to constructing languages and understanding semantics.

Talmy supposed that the figure is a moving or conceptually movable object whose site, path or orientation is conceived as a variable, the particular value of which is the salient issue; the ground is a reference object with respect to which the figure's site, path, or orientation receives characterization [7]. To illustrate with an example, "A book is on the desk." Obviously, the book appears as a figure and the desk appears as the ground, which means that there is a certain spatial relationship between the figure and the ground. In Chapter five, Talmy gave a specific introduction to the application of figure-ground theory in linguistics, and discusses the function on syntax of figure-ground theory in simple and complex sentences. In simple sentences, Talmy, according to the movement events, divided the semantic structure into internal and external elements: the internal factors included figure, ground, motion and path; the external factors included manner and cause [8]. For example, in the sentence "The pencil blew off the table", "pencil" is the figure, "table" is the ground, "off" is the path, and "blew" is the motion. If you add after the sentence "by the wind", namely the cause in the external element, which is to highlight the cognitive process of specific components in the event framework. That is to emphasize the cause for the motion. In complex sentences, Talmy further analyzed the relationship between the events (subordinate clauses) that occur at first as ground and events (main clauses) that occur late as figures, and put forward five relative principles of figure-ground theory for analyzing syntax structure of complex sentences, which will be given a detailed explanation later. The core of figure-ground theory lies in "highlighting the figure in the ground".

EST translation

EST texts are characterized by a large number of technical terms, nominalization, frequent use of the passive voice and long, difficult and complex sentences. Scientific and technological text belongs to informational text. EST focuses on meaning, mainly to convey information. In other words, it does not require a strict equivalence in the form but stress highly on the content. "Content is more important than form" is one of the most important criteria in the translation of science and technology [1]. That is to say, in terms of formal equivalence and dynamic equivalence, EST translation emphasizes dynamic equivalence. Dynamic equivalence is also called "functional equivalence" or "communicative equivalence" focusing on the meaning equivalence rather than the form, and it strives to attain the so-called "equivalence effect", which enables the relationship between the target text reader and the information to be the same as that between the source text reader and the information [9]. In addition, EST translation pays more attention to the process of readers' understanding of the translation. Since it is an informational text, it intended to convey a kind of certain information to the reader, and then the brain accepts the information and processes it, making it easily available to target readers. Taking the English text of petroleum science and technology as an example, the translation shoulders the important task of helping the reader understand the process of oil generation, storage and exploration, in which the logical sequence of the translation text must be presented accurately. Only in this way can the oil workers be guided to carry out their tasks more effectively. Just as Zhong Mingguo mentioned, "the process of reading and accepting the translated texts of science and technology is actually the process of the recipients' psychological cognition of the translated texts of science and technology based on the language of science and technology"[10].

The figure-ground theory focuses on the logical relationship between the figure and the ground rather than the form of the sentence. It can help readers clearly understand the internal logic and accuracy of the events in the target text, and ensure that the relationship between the target reader and the information text is consistent with that between the original reader and the information. This paper will analyze the relationship between subordinate clauses and main clauses of complex sentences in petroleum science and technology English from the five principles of figure-ground theory by demonstrating with examples so as to broaden the path of EST translation.

FIGURE-GROUND THEORY APPLIED IN EST TRANSLATION

As mentioned above, Talmy has discussed the relationship between figure and ground of figure-ground theory in simple and complex sentences events, finding that in complex sentences the former event as the ground (subordinate clauses) and the latter event as the figure (main clauses) abide by the following five principles: sequence principle, cause-result principle, inclusion principle, contingency principle, and substitution principle. Combining the figure-round theory, this paper takes examples of chapter two-petroleum exploration, chapter three -- oil and gas well engineering and chapter four - drilling and completion system, selected from the book, A Coursebook of E-C Translating of Petroleum Texts[11]published by

Petroleum Industry Press to analyze the guiding function of the five principles in EST translation.

Sequence Principle and EST Translation

Sequence principle: for any relationship between two events occurring in the chronological order, unmarked linguistic expression holds that the first occurrence is the ground, the second is the figure, and when the syntactic form is expressed as a compound sentence, the former is the subordinate clause and the latter is the main sentence. For example: Tom watched TV after he finished his homework. In this sentence, since the event of Tom's finishing his homework happened earlier than the event he watched TV, the main sentence is the figure and the subordinate clauses is the ground. When translating this sentence into Chinese, the sequence principle should be observed, translating it to "汤姆完成作业后看电视". Now we are going to give it a further explanation by examples from EST of petroleum.

(1) ST: After the zone is confirmed by gravimetric and magnetometric surveys, a seismic survey is carried out for a clear image of the sub-surface structure.

TT: 重力勘探和磁法勘探确定油藏的大致位置后，可用地震勘探法获得该区地下构造更清晰的轮廓。

(2) ST: When the driller stops the rotary table and uses the rig's hoisting system to lift the pipe and bit off the bottom of the hole, it is often necessary for crewmembers to suspend the pipe off the bottom of the hole.

TT:当司钻停下转盘，利用升降系统将钻杆和钻头从井底提升起来后，钻井工人常需悬停整个钻柱。[11]

In EST, the most important task of the translator is to convey the information, telling the workers in this industry how to follow the work instructions or procedures. In sentence (1), we need to convey the information of the three explanation methods: "gravimetric survey", "magnetometric survey"and "seismic survey". But then the question is how to operate?

According to the sequence principle in figure-ground theory, "gravimetric survey" and "magnetometric survey" are first used to determine the location, and then "seismic survey" is used to get the outline of the underground structure. During the whole process, the first two are the "ground" of the event and the second one is the "figure"; the emphasis of this sentence is to tell the reader that the following task is to use the method of "seismic survey" to get the outline of the structure. Such translation is also in line with the Chinese character putting the priority backward, which is conducive to the understanding and acceptance of the target readers. Likewise, in sentences (2), the main information to be told is that the drill string must be suspended after the drill pipe and the bit have been lifted.

Cause-result Principle and EST Translation

Cause-result principle: when one event results from another, the unmarked linguistic expression takes the cause event as the ground and the result as the figure.

(3) ST: The isolation of the rural world because of distance and the lack of transport facilities is compounded by the paucity of the information media.

TT:由于所处位置偏远交通工具缺乏，以致农村与外界隔绝，这种隔绝又因通讯工具的不足而变得更加严重。

(4) ST: With the rising motorization, the traffic noise has worsened in India.

TT: 随着机动化的不断提升，印度的交通污染问题越来越严重。[11]

In sentence (3), there is an evident marked phrase "because of" indicating the cause, which follows the cause event "distance and the lack of transport facilities" and "the paucity of the information media". Accordingly, the "the isolation of the rural world" is the result, as well as the figure while the "distance and the lack of transport facilities" and "the paucity of the information media" is the cause or the ground. In that way, it is labor-saving for us to make out of inner logical relation in a complex sentence. Sometimes it may not be so easy for us to find out such distinct expression of cause or result as illustrated in sentence (4), in which the structure of "with+noun" used as an advert lets us fail to predict its usage, but in the main sentence, the expression of "sth. has worsened" highlight a changed result, so we can infer that the former phrase of "with" indicates the reason.

According to the principle of prominence in figure-ground theory, we often notice the figure first. In these two sentences, "the isolation of the rural world" and "the traffic noise" are the phenomena that we can notice and are in the dominant position while less obvious factors need to be investigated are the reasons, such as "distance and the lack of transport facilities" in sentence (3).

Inclusion Principle and EST translation

Inclusion principle: larger events that contain small events is taken as the ground, and included events as the figure.

(5) ST: The search for raw materials (potash, iron ore, and coal) in the course of the industrialization in the 19th century forced the development of deep drilling engineering.

TT: 直到十九世纪工业化时代来临，为了寻找碳酸钾、铁矿和煤等资源，深井钻井工程才得到了发展。

(6) ST: It is this process of photosynthesis, which stared 4 billion years ago that has built up an atmosphere rich in oxygen while accumulating reduced carbon in sedimentary rocks as oil, gas and coal.

TT: 正是始于 40 亿年前的光合作用，形成了富含氧气的大气，同时将还原的碳以石油、天然气和煤的形式聚集于沉积岩中。[11]

In accordance with the inclusion principle, events can be classified into large event and small event, and the former is the ground while the latter is the figure. In other words, we can define the large event as the large once existed era background as a good case of " in the 19th century" and "the process of photosynthesis which started 4billion years ago" in sentence (5) and (6) respectively. Under the large background there occur some other small events which are called the figure. Taking sentence (5) as an example, we found that the development of deep well drilling engineering must be realized in the background of industrialization, which in fact, can also be explained as a reason. It can be translated into Chinese in this way " 正是因为在十九世纪的工业时代找到了碳酸钾、铁矿和煤等资源，所以深井钻井工程得到了发展。" No matter what, our purpose is to let the target readers know that the development of deep well drilling engineering is supported by technology and can be realized.

Contingency Principle and EST translation

Contingency principle: the occurrence of one event must presuppose the occurrence of another event, then this event is the figure, and the other event as the presupposition that happens inevitably is the ground.

(7) ST: This is done by sampling the rocks, e.g., in the form of drill cores, sampling the materials present in the rocks (e.g.water, oil, gas)gathering data from a great variety of geophysical borehole measurements, carrying out productivity tests, and then measuring the resulting behavior of the reservoir pressure.

TT:要获得这些资料，就要进行钻井取样(如获取岩心)，分析岩样中的物质(如水、油、气)，收集各种地球物理测井数据，进行产能试井，并测量油藏的稳定压力。

(8) ST: Production wells must be drilled and completed in such a way that the cost of subsequent production is minimal, as much as possible of the reservoir contents can be produced economically, optimum use is made of its productive capacity, a minimum number of wells is required to develop the reservoir and trouble-free production can be achieved, preferably over the reservoir's lifetime.

TT:生产井的钻井、完井必须满足以下几个条件：(1)后续的生产成本最低,(2)可以经济高效地采出尽可能多的储层资源,(3)生产设施能发挥最大作用, (4)开发井书目最少,(5)在油藏的整个生命周期中,生产井能实现无故障生产。[11]

In sentence (9), the main sentence structure is a passive voice, led by "this is done by...", followed by the gerund phrase "sampling sth. and gathering sth." ect, all of which are the presuppositions of the event of "this". If translated into Chinese structure "想要....., 就要 .....", it will well illustrate that the latter part is presupposition and the former the final goal. To reflect the logicality in TT, the first principle of sequence can not be neglected when translating the background events. Therefore, we should translate according to the original sequence, and can not change the order at will. Sentence (8) is obviously different from (7) from the perspective of translation in that it divides the whole long English sentence into one topic sentence and five short sentences; besides, it marks the clauses in order to make the translation more clear and explicit, facilitating readers' understanding and thus better guiding the work of workers in the industry.

Substitution Principle and EST translation

Substitution principle: the expected but not occurred event is the ground, and the unexpected but occurred replacement event is the figure.

(9) ST: Exploration from the land surface in the vicinity of the sea can be accurately predicted, but is not applicable for the deep sea area.

TT: 临海的陆地区域的遥感勘探成果可用以准确地预测浅海海域的地下构造，但对深海海域的地下构造就无能为力了。

(10) ST: A square Kelly drive bushing does not have drive pins; instead, the square bottom of the Kelly drive bushing fits into the corresponding square opening in the master bushing.

TT:四方形方钻杆补心没有钢钉；相反，方钻杆补心的四方形底部直接扣入方补心的四方形开孔中。[11]

In the figure-ground theory, the figure is the salient part of cognition and the focus of attention. In combination with the principle of substitution, we need to pay attention to the unexpected but occurred replacement events. In example (9), the event that has successfully occurred is "Exploration from the land surface in the vicinity of the sea can be accurately predicted", and the other event "it is not applicable for the deep sea area," which is the result on the basis of the expected failure. This event did not happen successfully, so it can be understood as the ground, which is not the focus of our attention. In this example, the key information we need to grasp is that the remote sensing exploration can accurately predict the subsurface structure in the shallow sea area.

Surely, this does not mean that we do not need to understand the ground information. In order to ensure that the information is complete and effective, scientific

and rigorous, the translator still has to translate the information as a ground event to help readers understand the context.

CONCLUSION

EST is a kind of informational text with strict accuracy and logicality, in which there are many complex sentences and long difficult sentences [10]. It is not easy to make clear the structural relationship of sentences and convey the meaning of words accurately. To put it simply, the ultimate goal of the translator is to help the target language reader figure out three questions: what, why and how. “What” is used to explain the new nouns appearing in the scientific and technological text, such as “drilling”, “square diamond”; “why” is the reason for the existence of this technology its function; "how" is naturally concerned with how to operate or put this technical product into practical use. The author firmly believes that the effective interpretation of these three questions in EST translation can bring great convenience to the work of workers in science and technology industry.

Talmy summarized the five principles of figure-ground theory in complex sentences, including sequence principle, cause-result principle, inclusion principle, contingency principle and substitution principle. They can effectively help translators to analyze the logical relationship of sentences in complex sentences and grasp the key information, which can be well applied to the translation of complex sentences and long difficult sentences in EST. Through several examples in English for petroleum science and technology, this paper also proves the strong explanatory force of figure-ground theory, indicating that the theory is doubtlessly an effective method to analyze syntax relations in EST.

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