

# Translation of Academic Papers in the Field of Petroleum Engineering from the Perspective of Relevance Theory

Yijie Hou

*School of Foreign Languages  
Xi'an Shiyou University  
Xi'an, China*

Hui Liu

*School of Foreign Languages  
Xi'an Shiyou University  
Xi'an, China*

**Abstract**-Unlike general papers, academic papers are scientific, creative, theoretical and professional. Under the background of China's opening up policy and the implementation of the "Belt and Road" initiative, the exchanges and cooperation with other countries in the field of petroleum engineering become more and more frequent. Therefore, the demand for translation of academic papers in petroleum engineering is also increasing. It is hoped that the methods based on relevance theory can provide good enlightenment and reference for the translation of academic papers in this field.

**Keywords**-relevance theory, petroleum engineering, academic paper translation

## I. INTRODUCTION

Academic paper is one of the main bases to measure the professional level of professional technicians. It is different from the general papers, experimental reports or popular science articles, but a more formal style. Academic papers are new scientific research results or innovative insights and scientific records on experimental, theoretical or observational aspects of an academic subject. Or a scientific summary of a known principle applied to actual progress, to be read, communicated, or discussed at an academic conference; Or published in an academic journal; Or a written document for other purposes [1]. Academic papers are scientific, creative, theoretical and professional.

Petroleum and natural gas is non-renewable energy which plays a significant strategic role in the development of industry of all countries. China is a major energy consumer. The development of economy depends heavily on oil, which boost the development of oil industry and science and technology in this field, meanwhile, a large amount of new things emerge. Under the background of the Reform and Opening-up policy and the "Belt and Road" initiative, China and other countries collaborate much more frequently in the field of petroleum engineering so that the need of academic papers in this field is dramatically increasing. Enhancing the study of academic papers in the field of petroleum engineering helps promote academic exchanges and the transformation of scientific and technological achievements. Through a comparative analysis of academic papers in the field of petroleum engineering, this paper discusses the translation skills

commonly used in academic papers from the perspective of relevance theory, in the hope of providing good enlightenment and reference for the translation of academic papers in this field.

## II. RELEVANCE THEORY AND TRANSLATION

Relevance theory is about communication and cognition. It is not only develops the communication theory but also involves the immigration of cognitive concepts. It replaces the four categories (quantity, quality, relation, and manner) with relevance theory under the framework of the Gricean theory. It is a successful simplification of the Gricean theory while retaining its original explanatory power [2].

Relevance theory holds that cognitive-inferential process is the most basic model in the process of language communication, and communication is a cognitive process. The purpose of communicating is to make both sides understand their intentions. In order to achieve successful communication, we must find the best correlation between the other side's discourse and the contextual hypothesis, infer the implicit meaning of the context through reasoning, and ultimately achieve the contextual effect. The degree of relevance depends on the contextual effect obtained and the effort made in dealing with the utterance. The greater the contextual effect, the stronger the relevance; the smaller the processing effort, the stronger the relevance [3].

Wilson's student Gutt, made a thorough study based on Relevance Theory. By the year 1991 in his book *Translation and Relevance: Cognition and Context*, he put forward Relevance Translation Theory, which regards translation as a reasoning process involving brain mechanism. It is a verbal communication behavior [4]. The success of the communication between the source language writer and the target language readers depends on whether the translator can make appropriate language conversion according to the specific context. The translator first infers the cognitive context of the original text, makes contextual assumptions, finds the optimal relevance, correctly understands the intention of the original text, flexibly uses the necessary translation skills, and accurately conveys the intention of the original author's to the target readers.

### III. ANALYSIS OF TRANSLATION SKILLS OF ACADEMIC PAPERS IN THE FIELD OF PETROLEUM ENGINEERING FROM THE PERSPECTIVE OF RELEVANCE THEORY

Academic papers in the field of petroleum engineering are highly professional. In order to obtain the optimal relevance, translators must have excellent professional knowledge in addition to relevant social, cultural and encyclopedic knowledge. Otherwise, the communication between the source language author and the target language reader cannot reach the optimal. The textual features and language environment of academic papers in the field of petroleum engineering determine that the translation must follow the principles of faithfulness, accuracy, smoothness and standardization. Among them, "faithfulness and accuracy" reflects the consistency of information between the original text and the translation, while "smoothness and fluency" and "standardization" reflect readers' acceptance and recognition of the translation [5]. The characteristics of academic papers in the field of petroleum engineering are well-structured, logical, long sentences, complex sentence structure, objective statement and many professional terms. Based on the above characteristics, appropriate methods should be adopted to achieve the optimal relevance in translation, so as to achieve the effect of accurate expression.

#### A. *Add Words That Have Meaning Without Forms in the Original English Text*

The purpose of addition is to make the translation not only accurately express the meaning of the original text, but also more consistent with the expression habits and grammatical rhetoric in Chinese [6].

Ex.1. Lost circulation events are not uncommon occurrences and have a range of consequences, from increasing well construction costs to jeopardizing well stability.

Translation: 井漏并不罕见, 会导致多种后果, 轻则增加建井成本, 重则危害井眼稳定性。

Ex.2. The system takes advantage of a dual fiber combination with a solids package that can be optimized for efficiency.

Translation: 该堵漏系统的优势在于, 混合使用了两种纤维, 并结合使用了通过优化可提高堵漏效率的固体颗粒。

Ex.3. The earth model encompasses a seismic volume of data--the drilling volume of interest (DVI) -- centered on the planned well trajectory and includes any nearby offset wells.

Translation: 地质模型包含以计划井轨迹为中心的地震数据体--目标钻井体 (DVI), 并且包括任何邻井数据。

“轻” and “重” in example 1 have been added to the translation to indicate the degree of the effect of the well leak. The translator explains the implicature of the source

text to the greatest extent, increases the relevance, reduces the cognitive efforts of the target language readers, and maximizes the contextual effect; “在于” and “并” in example 2 have been added to the translation so that the logical relationship of the sentence is more clear to the target language reader, and make them more clear about the source language writer's intention, and find the optimal relevance to communicate successfully. In example 3, to emphasize “the drilling volume of interest (DVI)”, the translator make “centered on the planned well trajectory” the attributive to modify “a seismic volume of data”. Therefore, the word “的” is added, which is translated as “以计划井轨迹为中心的地震数据体” so that the optimal relevance can be obtained by reducing the cognitive efforts, and the translation is more consistent with the target language readers' way of expression.

#### B. *Omit Words That Do not Comfort to Chinese Habits of Thinking, Language and Expressions*

Ex.4. Important benefits of these solutions include the time they save by not having to pull out the hole and the limited time need for treatments to have the desired effect.

Translation: 这些堵漏材料的优点包括易用性以及无需起钻和短时间达到预期效果的省时性。

Ex.5 In recent years, service companies have introduced perforating charges that penetrate deeper and create larger perforation tunnels in concrete test targets than ever before.

Translation: 近年来, 服务公司不断引进新的射孔技术, 射孔弹在水泥靶上的穿透深度越来越深, 产生的通道也越来越大。

Ex.6 Marine seismic survey rely on a strong acoustic source to generate sound waves that travel to the seafloor, penetrate and reflect from subsurface rock layers and return to the surface, where they are recorded by hydrophone sensors.

Translation: 海上地震勘探依靠强大的生源产生声波, 声波传至海底, 穿透岩石, 从岩层面反射回至海面, 并由水中检波传感器记录声波信息。

In example 4 the definite article “the” is omitted, which is more consistent with the expression habits in Chinese. The adjective "important" which modifies “benefits” is left out. “important benefits” is translated to “重要的优势” literally, but there is no such expression in Chinese, therefore, it would be redundant if “important” is translated, which would cause the target language readers to pay more unnecessary cognitive efforts. In example 5 “than ever before” is omitted, which mainly depends on the differences in expressions between Chinese and English. Comparative form is used in the source text, but there is no such form in Chinese. Thus when translating, the use of the comparative form must be abandoned. More appropriate and acceptable Chinese expression may be adopted to cater for the target language readers to achieve successful communication. In example 6 the antecedent “where” is

omitted in the attributive clause “where they are recorded by hydrophone sensors” and this sentence is combined with the preceding one sharing the same subject “sound waves”. By doing so, the translation is logically clear and smoothly expressed.

### C. Flexible Part of Speech Conversion

Due to the different ways of thinking and expression habits of English and Chinese, such as the absence of articles and inflexion in Chinese, there are bound to be differences in word construction and expression between the two languages. In order to avoid or reduce the misunderstanding caused by these differences, flexible part of speech conversion is needed.

Ex.7. Failure to do so may leave a large fraction of the reservoir untouched and, consequently, large volumes of hydrocarbons inaccessible.

Translation: 不能做到这一点, 就可能无法有效改造大范围储层, 因此大量油气也就无法得到开采。

Ex.8. The potential for drilling disruptions forces operators to investigate opportunities to improve efficiencies, but they cannot sacrifice acquisition of crucial data in the name of expediency.

Translation: 由于钻井作业可能会被迫中断, 因此作业者都在寻找提高作业效率的机会, 但是不能为了提高效率而牺牲关键数据的采集。

Ex.9. The next advance in seismic sources was the introduction of the tuned airgun -- a collection of airguns activated at specified time intervals -- which increases source strength and minimized the size of the bubble pulses. Inrelative to that of the primary pulse, creating a wavelet similar to that from an explosive source.

Translation: 地震源的进一步进展是引入调谐气枪组合--一组气枪在特定的时间间隔被激发--从而增加震源强度并最大限度地减小气泡脉冲相对于主脉冲的大小, 产生一个近似爆炸源产生的子波。

In example 7 the noun “failure” in the original article is converted into the verb “不能.....”, the prepositional phrase “a large fraction of” is converted into a noun “大范围”, “large volumes of” is converted into a noun “大量”, and the adjective “inaccessible” is converted into a verb phrase “无法得到开采”. By means of part of speech conversion, the translation is more consistent with the expression of the target language, so that the translation presents the best contextual effect. In example 8 the noun “disruptions” in “The potential for drilling disruption” is converted to the verb “中断”. It can be inferred that, if drilling operations are not to be interrupted, opportunities for increased efficiency must be sought, together with the acquisition of critical data. In example 9 the noun “introduction” is converted to the verb “引入”; and there is no inflexion “creating” in Chinese, thus it is translated to “产生”. The

closer the relevance between the context and the utterance is, the easier the inference will be.

### D. Appropriate Sentence Pattern Adjustment

Due to the different ways of expression between English and Chinese, such as long sentences are often used in English while short sentences are often used in Chinese; nouns are preferred to be used in English while verbs are preferred to be used in Chinese and so on. These differences will lead to errors in the understanding of language users, making them pay more cognitive efforts to understand the language but fail to achieve the expected contextual effect. Therefore, it is necessary to use appropriate conversion techniques to make the translation more consistent with the expression of the target language, so as to make the optimal relevance of the target language readers.

Ex.10. During a fracturing treatment, specialized equipment pumps fluid into a well faster than it can be absorbed by the formation, causing pressure on the formation to rise with until the rock fractures or breaks down.

Translation: 在水力压裂作业过程中, 利用专业化设备将压裂液注入地层, 注入速度超过地层的吸收速度, 导致地层上的压力不断升高, 直至岩石破裂。

Ex.11. Many processes combine to form the complex mixtures found in the subsurface, including the transport mechanisms that delivered sediments and rock fragments to their current resting place, heat and pressure applied during burial and subsequent lithification and a myriad of internal and external forces acting on the rocks.

Translation: 地下复杂岩石是多种过程共同作用的结果, 包括将沉积物和岩屑搬运到当前沉积地区的运移机理、在埋藏和成岩时的热力和压力过程以及作用在岩石上的各种内里和外力。

Ex.12. To ensure consistency with the area’s structural geology, geologic horizons and velocities observed in the offset wells, the geoscientists input anisotropic velocities into the predrill model.

Translation: 为确保与邻井观测到的区域构造地质、地质层位和层速度保持一致, 地学研究人员还将各向异性速度引入到钻前模型。

In example 10 the long compound sentence in the source text is divided into short sentences in Chinese, and the structure of the translation is clear and logical, so that the target language readers can get the optimal relevance in this cognitive context. In example 11, the translation “Many processes combine to form the complex mixtures found in the subsurface”, the translator replaces the subject-verb structure with a Chinese modifier-core structure and adds the word “结果” at the end of the sentence; “The transport mechanisms that delivered sediments and rock fragments to their current resting place” is converted into the passive voice. In example 12

“observed in the offset wells” is preceded as the attributive to modify “the area’s structural geology, geologic horizons and velocities”, and the translation is “与邻井观测到的区域构造地质、地质层位和层速度”. The use of these skills makes the translation much closer to the expression of the target language and more acceptable to the target language readers, so that the target language readers can understand the intention of the source language writer without too much effort.

#### *E. Preserve the Form of the Original Article*

By following the language norms of the target language, accurately conveying the content of the original article and the intention of the source language writer, readers can obtain the optimal relevance while retaining the form of the original article.

Ex.13. By incorporating an innovative downhole anchor with a whipstack assembly, drillers can set whipstocks in open holes without concern for cement plug integrity.

译文: 通过结合新型井下锚定器和造斜器组合, 司钻便可在裸眼井内设置造斜器, 而无需担心水泥塞的完整性问题。

Ex.14. Any failure of the cement require the operation to start over: drill out the cement, trip out of the hole, acquire and mix a new batch of cement, set a new plug, allow it to cure and attempt another kickoff -- all at substantial added cost.

Translation: 水泥塞发生任何失效都会迫使作业者重新开始作业: 钻掉水泥塞、起钻、获取并混合水泥浆、打新的水泥塞、候凝并重新进行侧钻作业——这些工作会大幅增加作业成本。

Ex.15. The model builders then use the amended velocity model to constrain seismic depth migration, relocate geologic structures to their correct positions and recompute a high-resolution image of the subsurface.

Translation: 然后建模人员利用更新后的速度模型约束地震深度偏移, 将地质构造重新归为到正确的位置, 并重新计算地下构造的高分辨成像。

In example 13, 14 and 15, on the premise of accurately conveying the semantics of the source text, the translation retains the basic consistency in form, and the ostensive information of the translation is explicit and clear. On the account that the translation is smooth, concise and clear, the target language readers do not need to make great efforts to obtain the optimal relevance.

#### IV. CONCLUSION

Petroleum is an important energy source, and the development of industry is inseparable from petroleum. The rapid development of Petroleum Science and technology has also led to the development of petroleum engineering academic papers, which has brought challenges and opportunities to translators. Translation is not only an interlingual communicative activity, but also a pragmatic behaviour. As a translator, how to better grasp the translation of petroleum engineering academic papers? Under the guidance of relevance theory, flexible translation skills should be adopted to balance the communicative relationship between the source language writers and the target language readers. Successful translation can be obtained if the optimal relevance is achieved in a specific context.

#### REFERENCES

- [1] Li Da Editor-in-chief. *Analysis of SCI Paper Writing*, Tsinghua University Press, Beijing, 2012, pp.45-48.
- [2] Louise Gummings. *Pragmatics. Multidisciplinary Perspective*, Peking University Press, Beijing, 2007, pp.17.
- [3] Nicholas Allott. *Core Terminology of Pragmatics*, Beijing Foreign Language Teaching and Research Press, Beijing, 2016, pp.188.
- [4] Zhao Yanchun. *Interpretation of Translation by Relevance Theory* [J]. *Modern Foreign Languages*, 1999 (3). (in Chinese)
- [5] Fu Yonglin, Tang Yueqin. *Scientific and Technological Translation*, Foreign Language Teaching and Research Press, Beijing, 2012, pp.18.
- [6] Zuo Guangming, Li Chun. *Science and Technology Style Translation Course*, Wuhan University Press, Wuhan, 2012, pp.52.