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Translator-Author Cooperative Translation Mode Based on Information Theory

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Abstract
Cooperative translation has a long history, and many scholars have also made research on it. Cooperative translation modes can be categorized into four types according to the division of labor and cooperation methods of co-translators. And each of them is applicable for specific situations, but insufficient to some extent. This paper puts forward a new mode by adding the original author in the process of cooperative translation based on information theory, since the translation process is also a kind of information processing, and the new mode, Translator-Author Cooperative Translation mode (TACT), is applicable in the field of sci-tech literature translation.

Key words: Cooperative translation; Information theory; Literature translation; Encode; Decode

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INTRODUCTION
It is the focus of translators to reproduce the information of the original text accurately and completely. The quality and efficiency of translation are of paramount importance to translators, especially in the information age of the rapid development of science and technology. Hence cooperative translation is a significant way to improve translation efficiency. Studies have been made on this topic so far. However, in the field of sci-tech literature translation, studies on cooperative translation mode have been very limited. This paper tries to put forward a new mode by adding the original author in the process of cooperative translation based on information theory.

1. THE COOPERATIVE TRANSLATION
Cooperative translation has a long history, and many scholars have conducted studies on it. The cooperation methods and the division of labor have been studied a lot. However, there is limited study on the translation of scientific and technological literature from the perspective of cooperative translation mode.

Tan Zaixi (1992, p.17) mentioned that the *Septuagint* of the Bible was the work of the earliest collective translation activity. And the Buddhist scripture translation could be undoubtedly viewed as a brilliant page of cooperative translation, and the division of labor in cooperative translation activity was described in detail in Chen Fukang's (1998, pp.436-441) A History of Chinese Translation Theory. Beginning in the Eastern Han Dynasty, cooperative translation ran through the entire Buddhist scripture translation activity for more than a thousand years, and Zheng Yanguo (1995, pp.23-26) studied this history in his paper, *On Co-translation of Buddist Scripture*. Cheng Zhenqiu (2001, p.212) recalled the collective translation activities of translating Mao Zedong's documents and poems. Yuan Jinxiang (1989, pp.53-58) also elaborated on this history in his paper. Cao Ting (1951, pp.22-26) detailed the organization of translation, translation process, proofreading process, review process, and the management, evaluation, reward and punishment system of translators.

Zhang Derang (1994, pp.25-28) divided the cooperative translation into four types according to the division of labor and cooperation methods of co-translators. They are the type of polishing after

translation, the type of translation according to dictation, the contracting type of turning to zero, and the type of large-scale cooperation. After concluding, Wang Zheng (2005, pp.11-26) proposed that the cooperative translation modes in existence included scientific and technological translation, and literary translation; the main translation together with auxiliary translation mode, which has been widely recognized in literary translation; the mode of cooperative translation conducted by collective teamwork (application examples including Buddhist scriptures, *Selected Works of Mao Zedong*, *Harry Potter and the Order of the Phoenix*, *My Life*, *Remembrance of Things Past*), and other cooperative translation modes.

By the end of September 30th, 2019, according to the keyword search results on CNKI (China National Knowledge Infrastructure), there are 5,843 papers about science and technology literature, 6,500 articles about science and technology translation, 1817 articles about documentation translation, 137 articles about science and technology document translation", and only 209 articles about cooperative translation. In view of the limited number of relevant papers on science and technology literature translation, it is found that there are 76 papers on science and technology literature translation, of which 17 discussed translation principles, strategies, techniques, and methods, accounting for 23.68%. And there are 16 papers on syntax, discourse and translation, accounting for 22.36%. It is found that, so far scholars' discussions on sci-tech literature translation have mainly focused on the characteristics of translation texts and translation strategies and skills, and only two papers on cooperative translation and another two papers mainly discussing large-scale collective translation from the perspective of project management. So far no one has discussed the translation of scientific and technological literature from the perspective of cooperative translation mode. This paper will combine translation practice experience to try to establish existing new cooperative translation mode: translator-author cooperative translation mode and demonstrate its feasibility from the perspective of information theory.

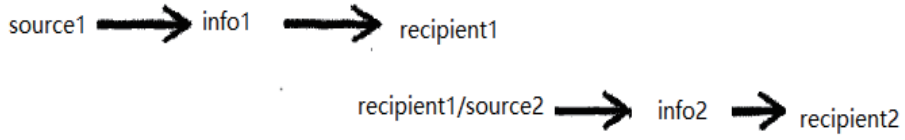
2. TRANSLATOR-AUTHOR COOPERATIVE TRANSLATION MODE

Based on previous studies, information theory, and exact translation practice, the author puts forward a new mode called Translator-Author Cooperative Translation mode (TACT). In the following part, information theory, TACT mode and its relevant analysis , and the application of this mode will be discussed in detail.

2.1 Information Theory

Information theory is an emerging discipline founded in the 1940s by American mathematicians Shannon and Wiener. In the early days, it was only used in the field of communication, and then it was widely used in various fields such as biology, medicine, and management. Information theory studies not only the expression and transformation of symbols, but also the structure, transmission, processing of signals and their relationship with knowledge. Shannon's mode consists of a series of concepts, such as information source, encoding, channel, decoding, noise, destination, etc. Information source refers to the source from which information is sent. Channel refers to the way of information transmission. Coding is the process of converting information into some kind of signal. Decoding refers to converting this signal into text, images, etc., so that the original information can be as precisely transmitted as possible. The destination is the recipient of the last message. Noise refers to various interference factors that intrude into the system or generate during signal transmission. Shannon believes that in the transmission process, misinterpretation, interference of irrelevant information, and loss due to weakened information will cause information to change.

In 1964, American linguist Eugene Nida first introduced Shannon's information theory into the field of translation and used it as an important theoretical basis for his functional equivalent translation theory. In his research, Nida (1964, p.131) found that the decoder channel is usually narrower when information is overloaded. In order to solve this problem, he proposed two solutions, which were expanding the receiver's channel capacity and adjusting the amount of information in the message. The way to expand the receiver's channel capacity is often applied in simultaneous interpretation. At this time, the interpreter can provide the listener with relevant cultural and background knowledge and explain the source information to imply meaning so as to help listeners understand.



(Liao, 1997, pp. 82-86)

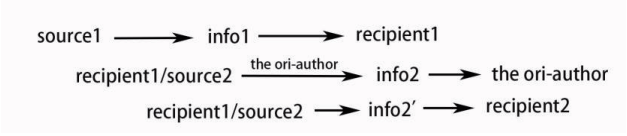
The mode mentioned above shows that there are two stages from the original author to the target language reader: one stage is that the translator (recipient1) decodes the original information (information1) of the author

(source1), and another stage that the translator (source2) translates the original information (information1) into translated information (information2) and passes it to the target language reader (recipient2).

2.2 TACT Mode and Relevant Analysis on It

According to the two stages in the figure by Liao Qiyi mentioned above, the focus of previous research about noise eliminating was mainly on the second stage. In fact, the first stage is also very important. The translator needs to be careful about the decoding process of information1. The omissions in this process will lead later steps to be meaningless. Especially for sci-tech literature, there are more difficulties for translators in understanding the logic of the original text due to their lack of professional knowledge. The first stage is that the translator (recipient1) decodes the original information (information1) of the author (source1), in which the noise in the decoding process mainly comes from the fact that the translator does not know the very professional knowledge of the original text. Drawing on the solution proposed by Liao Qiyi for the problem in the second stage, which is that the interpreter can explain to the listener to help the listener understand the translation, in the first stage the author's explanation can also be used to make the translator understand the original text better. At this time, the noise can be reduced or even eliminated by the translator.

Thus the new mode is proposed as follows.



The goal of the translator (source 2) is to transcode the decoded information into translation (information 2) and pass it to the target language reader (recipient 2). The information deviation between info2 and info1 caused by noise can be corrected by the ori-author's (meaning the original author's) cooperative translation and ancillary proofreading. Info2' is formed after the deviation between info2 and info1 is corrected. In short, in order to improve the accuracy of translators in decoding and transcoding, based on the experience and achievements of previous studies and also on practical experience, the author adds the information source (which is the ori-author) to the scope of cooperative translation, and proposes a cooperative translation mode from the perspective of information theory.

Common collaborative translation modes place the translator and the ori-author in a dualistic position. Whether it is the theory that the translator is a shackled dancer or the translator and the ori-author should be put on an equal footing, the translator is separated from the ori-author, and the identity and status of the two are compared. In fact, for the reader of the translation, the ori-author and translator are co-creators of the work. When translating, one of the focuses of the debate is whether the translator can express the ori-author's information accurately and completely. Cooperative translation is essentially born to improve efficiency and the main problem of this translation mode is whether the quality of the translation can be ensured. This new optimized mode is put forward to improve the efficiency and the quality of translation as well.

The biggest difference between this mode and the previous ones lies in the ori-author's participation. By using this mode, the translator will first read the full text and sort out the logic. When the sentences are incomprehensible, the translator can ask the ori-author to help explain. Then the translator will read the full text again, pick out professional terms which will be translated by the ori-author, and then the translator translates the full text. In the event of doubt, the translator communicates with the ori-author at any time, and finally forms a first draft. After the first draft is completed, the translator revises it to form a second draft, then returns to the ori-author for the second proofreading, and completes the third proofreading according to the ori-author's opinion. If necessary (not compulsory in this mode), the foreign experts will proofread and revise it to form the final draft.

In terms of the author's practical experience at this time, the ori-author is a postgraduate majoring in computer science in Chinese university. This ori-author has experience in reading foreign language documents. His demands are that the original Chinese papers should be translated into the target language accurately and completely so that he can get opportunities to publish it on an international journal for academic exchanges. Therefore the ori-author is willing to take part in the cooperative translation so as to collaborate to produce high-quality translation. The post-graduate scientific and technical papers are moderate in length. Therefore, from the aspect of efficiency, it is feasible for a single main translator to complete the main translation work. One of the characteristics of scientific and technical papers is that there are many professional terms. Compared with the author, the ori-author has rich experience and deep understanding in his own professional field, and more familiar with the meaning of terms and their common translation methods. In both respects, it is better to leave the terminology translation to the ori-author.

In brief, the translation process of the original text can be regarded as the process of decoding. The noise in the decoding process is mainly caused by the translator's unfamiliarity with the field of the original text. At this time, the author asks the ori-author to help eliminate the noise, namely, explain the professional knowledge and terminology so as to better absorb it for transcoding original information. The author's self-proofreading can eliminate errors in the conversion of information. The second proofreading by the ori-author can find information deviation (if any) by comparing the translation with the original information. Thus the author

proofreads it for the third time to correct the deviation. At last, if necessary, foreign experts can polish the translation to make it more acceptable.

2.3 Application of TACT Mode

TACT mode is put forward in the process of the author's practical translation and the final draft matches the demand, and the biggest feature of TACT is the participation of the ori-author, therefore, the application situation of TACT will be displayed with several examples in the actual translation process of the sci-tech paper.

E.g.1: 锁紧销

pin

In the practical translation process, the author encountered a Chinese word: 锁紧销. As a layman, the translator doesn't even understand the Chinese version of this word, let alone translating it into English. At this time, looking up a professional dictionary is certainly one method, but it should be noted that the science and technology is developing fast with each passing day, and new words are endless. Professional dictionaries cannot update the thesaurus in real time, and the network translation version cannot be trusted because of omissions. It is unavoidable that the translator clarifies the meaning of the words by all kinds of ways, but it turns out to be inconsistent with the fixed usage in the industry and it is time-consuming and labor-intensive. As a professional researcher, the ori-author has experience of reading English literature, he is familiar with professional terms in English and thus it can save labor and time to leave the terms to the ori-author for translation. This mode is an option that can ensure both translation quality and translation efficiency. In the end, the word was translated as: *pin*.

E.g.2: 但是图片中绝缘子存在部分被遮挡的情况下.....

However, in the case where the insulator is partially covered in the picture...

During the translation, the author also encountered a sentence: "但是图片中绝缘子存在部分被遮挡的情况下....." Due to the lack of professional knowledge, the translator maybe cannot accurately decode the original information when translating, whether some parts of an insulator are blocked, or several insulators are blocked. By the ori-author explaination, the translator can complete the process of eliminating noise, accurately understand that the former one is the precise meaning and then translates the original text as: *However, in the case where the insulator is partially covered in the picture...*

E.g.3: 当前，电力杆塔的巡检逐步从人工方式转换为无人机巡检方式，对无人机拍摄到的大量图像以人工判读的方式分析和识别图像中部件的位置和缺陷类别，费时费力。

Nowadays, drone inspection has gradually replaced manual inspection of transmission tower. However, it is still laborious and time-consuming to manually analyze and identify the position as well as the defect type of the components in a large number of images captured by the drone.

After discussing with the ori-author, the translator may find that the logic of concession was missing in this sentence, which should be that even though the drone inspection method saves manpower than the manual one, the trouble of manual interpretation still cannot be avoided. According to the understanding of the ori-auhtor, the original sentence means: 尽管电力杆塔的巡检已经由无人机巡检代替了人工巡检，但是采用人工对图像分析和部件位置识别等还是费时费力的。So this sentence was corrected and finally translated as: *Nowadays, drone inspection has gradually replaced manual inspection of transmission tower. However, it is still laborious and time-consuming to manually analyze and identify the position as well as the defect type of the components in a large number of images captured by the drone*. This example shows that not only this mode works during cooperative translation, but also it helps the ori-author to clarify the logic which may be confusing at first.

CONCLUSION

The newly established mode, TACT, based on information theory, takes the ori-author into consideration and can help the translator to eliminate noise in translation process and get the correct translation, which can improve both translation efficiency and quality. At the same time, the author of the paper's practical experience in the sci-tech paper translation in which this mode was put forward also proved that this mode is feasible from a practical point of view. However it still needs a lot of practice to be verified. The biggest feature of this mode is the participation of the ori-author, so whether the ori-author can communicate with the translator at any time and whether the ori-author has the ability to read English papers determine the scope of application of the mode. That is to say, under circumstances where there is an insurmountable time and space distance between the translator and the ori-author, or the two parties cannot communicate, or the original author cannot read English papers, this mode is not applicable.

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