College English Translation Teaching Based on Analysis of Think Aloud Data

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Abstract: To explore the strategies used in the English-Chinese translation process, the think aloud data analysis method is adopted, which enables the researcher to observe the translator's thinking process in real time. Six translators are selected from the translation college students as subjects. Among them, the translation level of the three subjects is very high, and the translation level of the three subjects is moderate. They are asked to translate two paragraphs of English text and to speak their own thinking process while doing the translation. The oral process is recorded. After the experiment is over, the experimental translations are collected as a supplement to the audio thinking data. The strategies used by the six subjects included twelve cognitive strategies and three metacognitive strategies. Quantitative analysis found that the most used cognitive strategies are "direct translation", and the least used are "guess" and "shelving".

1. Introduction

In the past, the translation academics only focused on the research of "product orientation" and "functional orientation", while the development of "process orientation" has been relatively lagging behind [1]. Some scholars are very interested in the translator's thinking process when translating. However, due to the lack of research methods, they can only be discouraged from this mysterious field. As early as 1957, the linguist Fith said that "the translator can cross different language barriers, but he does not even understand which bridges pass through." Until recently, some scholars have borrowed the research methods of psychology and introduced the "sound thinking method" to break the stalemate in the study of the translation process.

The think aloud method is an introspection method in psychology that collects data on thought processes. It requires the subject to say as much as possible about what the brain thinks about when performing a specific experimental task. In other words, the think aloud is to say and explain indirectly the linguistic features of the subject through language description. The opposite method is the reflection method, which requires the subject to review the previous mental journey after completing the task. Compared with the reflection method, one of the advantages of the introspection method is that it can observe the translator's thinking process in real time, and will not be discounted because of the lack of memory. In general, the use of audio thinking in the translation process can be summarized as follows: The researcher gave the subject a translation task and asked them to do all the thinking activities that the brain experienced while doing the translation [2]. The speech of the subject will be recorded using a tape recorder or video recorder. These languages are then transcoded into textual data for further study. The narration of the experimental object can be regarded as a reflection of the thinking process to a certain extent. Therefore, the collected text data can be used to explore translation rules, translation strategies, translation steps, and find the translator's methods and problems. Finally, the internal process of translation is studied to inspire translation teaching.

2. State of the Art

In terms of translation strategies, unlike traditional researchers' prescriptive views, think aloud researchers adopt a process-oriented and descriptive position [3]. Based on the think aloud corpus,

they summarize the strategies used by the translator in the translation process and classify them [4]. Nelson conducted two relatively large-scale vocal translation experiments on 48 English-speaking German students. By analyzing the audio data, Nelson found that each translation strategy consists of a series of nuclear elements that can be combined in any combination. Instead of using a translation-specific strategy, the subject selectively uses a general text processing strategy to solve translation problems based on the translation task at hand [5]. Boswell allowed eight French learners whose native language is German to do German or French translation. From their think aloud data, a series of "question marks" were summed up. Five strategies were proposed, including understanding strategies, equivalence extraction strategies, equivalence monitoring strategies, decision strategies, and simplicity strategies [6]. Blumenfeld's division of translation strategies is more detailed, including problem identification, language analysis, storage and extraction, comprehensive search and selection, text reasoning and argumentation, text context and task monitoring. Jan generalizes translation strategies into two categories: overall strategy and partial strategy. The former refers to the strategy used in the entire translation task, while the latter focuses on the specific operations in the translation. Daghoughi conducted a case study of psycholinguistics on the Chinese translation process of English double negative sentences [7]. Three undergraduate students in English majors were required to translate twenty sentences of English double negative sentences. Their mental activities were reported during the translation. Through the analysis of the voiced report, the researchers found that in the process of translating the English double negative sentence into Chinese, the subject's strategy application showed obvious phase characteristics. Cognitive strategies are mainly used in the first and second phases, while metacognitive strategies play a major role in the second and third phases.

3. The Semantic Proximity Calculation Model Based on Hownet

Sememe is the minimum semantic unit that defines the concept in HowNet. Its approximation calculation is the basis for the calculation of the approximation between concept definitions. Therefore, its calculation formula is first defined. This idea is used as the basic basis for defining the semantic distance formula and the semantic approximation formula between semantics. The formula for the distance between the elements can be defined as:

$$Dis\tan ce\_Atoms(a,b) = \begin{cases} \sum Weight(a') \\ Max\_VALUE \end{cases} \tag{1}$$

If the semantic distance between the semantics is large, the value of the semantic similarity between them should be correspondingly small. Thus, the formula for calculating the semantic similarity between the elements is as shown in formula (2):

$$Sim\_Atom(a,b) = \begin{cases} 1 - \dfrac{Dis\tan ce\_Atoms(a,b)}{4 \times Height(Tree(a,b))} \\ 0 \end{cases} \tag{2}$$

4. Experiment and Result Analysis

4.1 Experimental Design

The experiment is divided into three phases: experimental preparation, data collection, and data analysis.

As a warm-up training before the experiment, the researchers selected two English sentences that were not related to the experimental text, and asked the subjects to translate in an audible way. Then, the experiment officially began. During the experiment, the subject's think aloud report was recorded using a recording device. If the pause time exceeds 5 seconds, the experimenter will remind the subject. In other cases, the experimenter does not have any communication with the subject. In the data analysis phase, the researcher first translated the collected audio recordings of

the subjects into texts. Then, the data of the experimenter's translation, the voice recording of the voice recording and the questionnaire survey were comprehensively analyzed. In the end, the conclusion is drawn.

4.2 Analysis of Translation Strategies

The number of strategies for each subject to translate two paragraphs of text can be obtained by encoding and counting the think aloud data. The above data were aggregated to obtain statistical results using the translation strategies for the high-level and medium-level groups.

Table 1 Grouping Statistics of the Number of Translation Strategies Used in Thinking Strategies

	Group A	Percentage	Group B	Percentage	Total	Percentage
S1	0	0%	7	2%	7	1.4%
S2	17	9.7%	23	6.5%	39	7.6%
S3	19	10.9%	34	9.6%	52	10.1%
S4	14	8%	40	11.3%	53	10.3%
S5	11	6.3%	24	6.8%	34	6.6%
S6	19	10.9%	36	10.1%	54	10.5%
S7	13	7.4%	12	3.4%	24	4.6%
S8	43	2.5%	40	11.3%	82	15.9%
S9	10	5.7%	17	4.8%	26	5%
S10	5	2.9%	41	11.5%	45	8.7%
S11	8	4.6%	11	3%	18	3.5%
S12	3	1.7%	7	2%	9	1.7%
Cognitive strategy	162	92.6%	292	82.3%	443	85.9%
S13	5	2.9%	24	6.8%	28	5.4%
S14	5	2.9%	11	3%	15	2.9%
S15	3	1.7%	28	7.9%	30	5.8%
Metacognitive strategy	13	7.4%	63	17.7%	73	14.1%
Total	175	100%	355	100%	516	100%

As can be seen from the above table, metacognitive strategies are used less frequently than cognitive strategies based on think aloud data. The frequency of each of the six subjects selected to use each metacognitive strategy was 4 or 5 (1 is the lowest and 5 is the highest). In other words, they used metacognitive strategies almost throughout the translation process, but this was not reflected in the think aloud report. Think aloud does not provide information about the thought process itself. It is not within the personal attention. Therefore, it is believed that this is mainly because the metacognitive strategy is not a strategy for a specific problem, but a macro control of the information processing process, which is difficult to separate in the oral report. As can be seen from the statistical results, the frequency of each metacognitive strategy used by the same subject is fixed, regardless of whether text one or text two is translated. Therefore, the use of metacognitive strategies is a stable habit formed by translators. No matter what text is translated, the same translator's use of each metacognitive strategy is fixed. Because the habit has been formed, it is difficult for the subject to realize its existence. Therefore, this will not be reported in the think aloud experiment. In other words, it is difficult to accurately measure metacognitive strategies with the method of think aloud. Therefore, the latter analysis mainly examines the use of each cognitive strategy.
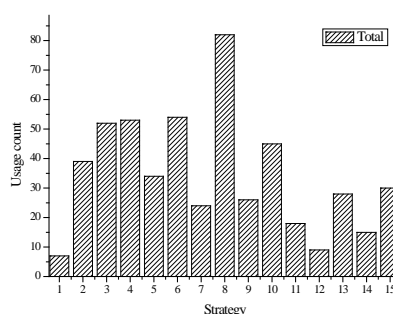
4.3 Cognitive Strategy

Fig.1 Summary of the Number of Translation Strategies Used

Overall, the most used strategy for the subjects was S8-direct translation, followed by S6-comparison and selection, S3-reconstruction, and S4-search memory. The least used strategies are S1-guessing and S12-shelving. In fact, if six subjects encounter problems during the translation process, for example, the meaning of an expression cannot be determined, they often use the method of checking data or querying the context to solve the problem. Most of the judgments are supported by evidence, not by guess. Therefore, the S1-guess strategy is rarely used.
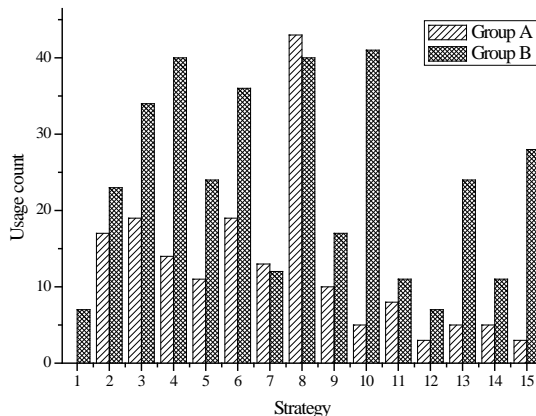

Fig.2 Statistics on the Number of Translation Strategies Used

The statistics of the two groups were examined separately. The total number of strategies used by the high-level group was found to be about one third less than the middle level group. The most used strategy for high-level groups is S8-direct translation, and the least used strategies are S1-guess and S2-shelving. In fact, the "direct translation" strategy not only uses other strategies that are much higher than the high-level group, but also accounts for a higher proportion of the high-level group than the middle-level group. This can be explained by automation theory. Combined with the theory, the thinking activities in the translation process are divided into two types: "conscious" and "automatic". The translator's deduction report can only reflect the "conscious" thinking activities, and the "automation" process is difficult to observe. The higher the level of translation, the more components of automation. Since the level of automation in the high-level group is higher than that in the middle-level group, they often can directly produce translations without thinking. Therefore, the total number of strategies reflected in the oral report is less than that of the middle level group, and the proportion of "direct translation" is higher.

4.4 English-Chinese Translation Strategy

To examine the strategies used by the experimental subjects in the process of English-Chinese translation, the researchers asked six subjects to do two English-Chinese translations using think aloud. Their oral process was recorded and translated into text form. By analyzing the corpus, the researchers found that:

A total of 15 strategies were used in the six subjects. Among them, guessing, transformation, reconstruction, search memory, structural analysis, comparison and selection, data review, direct translation, self-modification, original interpretation, reasoning, and shelving are cognitive strategies. Self-monitoring, self-assessment and self-management are metacognitive strategies.

The most used cognitive strategies for experimental subjects are "direct translation", followed by "comparison and selection", "reconstruction", and "search for records". The least used strategy is "guess" and "shelving." Although the use of the three metacognitive strategies of "self-management", "self-assessment" and "self-monitoring" is almost continuous throughout the experiment, it is difficult to separate in the think aloud report.

There are significant differences in the number of translation strategies used by the high-level and medium-level groups. The total number of translation strategies used by the high-level group was about one-third less than that of the middle-level group. The most used translation strategies for high-level groups are "direct translation", and the least are "guess" and "shelving". The most used strategies for the medium-level group are "translation reinterpretation", "comparison and selection",

"search memory", and "literary translation". The least used are "guess" and "shelving." Therefore, based on the analysis results, three suggestions for translation teaching are proposed: First, the improvement of mother tongue ability should be taken seriously. Second, language conversion skills should be taught. Third, the materials are rationally utilized to improve translation efficiency and quality.

5. Conclusion

This experiment shows that the think aloud method is an effective way to examine the translator's thinking process. Through short training, the subjects can quickly master this method, and can express their thinking process fluently in the experiment. After comparing the questionnaire survey and interview results with the think aloud corpus, it was found that the dictation of think aloud basically and faithfully reflected the thinking process of the experimental subjects. This can provide reliable data for translation process research.

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