Article

An Empirical Study on the Cognitive Processes and Translation Strategies for Foreign Language Majors Based on the Think-Aloud Protocols

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Abstract: Think-Aloud Protocols (TAPs) are empirical research methods suitable for small-sample longitudinal investigations which have significant application in foreign language translation research. Taking the 2nd and 4th-year English majors of Yancheng Institute of Technology as the object of investigation, this study explores the cognitive processes and translation strategies of foreign language majors. It is concluded that investigating the cognitive processes and translation strategies of foreign language majors through the Think-Aloud Protocols has a very positive significance for improving their translation proficiency.

Keywords: Think-Aloud Protocols; translation units; cognitive processes; translation strategies

1. Introductory Remarks

Think-Aloud is one of the commonly used methods for collecting research data in psychology and cognitive science research, with a wide range of applications in foreign language teaching. From the perspective of research practice, the role of Think-Aloud in foreign language translation research is particularly significant [1]. Studies have shown that in translation tests, students trained via the Think-Aloud Protocols perform better than untrained students in translation effectiveness. Meanwhile, the study reveals that the translation processes and techniques employed by successful and unsuccessful translators are different and that learners' translation techniques can be trained and improved through the Think-Aloud Protocols. Therefore, investigating the translation cognitive processes and translation strategies of foreign language majors through the Think-Aloud experiments is of very positive significance for improving students' foreign language translation proficiency [2].

2. Research Objectives

This study addresses two issues:
1) How do Chinese students select translation units in English-to-Chinese poetry translation? (*strategic study*)
2) What are the cognitive processes of the translator within a translation unit? (*process study*)

3. Research Design

This study adopts English poetry translation (English-to-Chinese poetry translation) to examine the performance of translators on the above research questions. The subjects were second-year undergraduates and fourth-year undergraduates majoring in English;

second-year undergraduates were considered beginner-level translators and fourth-year undergraduates were considered higher-level translators.

4. Research Methodology

4.1. The Subjects

The subjects were four second-year and four fourth-year undergraduate English majors from the School of Foreign Languages, Yancheng Institute of Technology, all of whom had certain translation experience. These subjects received a one-week technical training before the Think-Aloud test.

4.2. Test Apparatuses

The test material included a digital voice recorder, plain A4 paper, and pre-printed translation materials. The translated material was taken from a poem entitled 'Father's Bedroom' from the collection *Life Studies* by Robert Lowell, an American free-verse poet.

4.3. Test Procedure and Data Acquisition

The test was conducted in a standard classroom with each subject tested individually and given unlimited time to complete the translation task.

After the test, the researcher calculated the ratio of the silence-time to the total time for each subject individually and excluded cases in which this ratio exceeded 5%. Meanwhile, the effectiveness of the recordings was evaluated, and the less effective cases were excluded. Finally, the researcher obtained two more desirable samples: one second-year undergraduate student (subject 1) and one fourth-year undergraduate student (subject 2).

5. Findings and Discussion

5.1. Selection of Translation units

The analysis of unit selection involves two major parts: firstly, the description of the think-aloud process of the two subjects when translating; secondly, the process is analyzed to find out the patterns and characteristics of the subjects' selection of translation units [3].

Looking at Subject 1's think-aloud report, we can tell that Subject 1 processed the poem three times: the first time for relocation; the second and third times for comprehension and scrutiny.

During the first stage of relocation, the translator divided the translation process into seven parts, each dealing with one sentence. When dealing with the first sentence, the translator read through the sentence to grasp its general meaning. It is then cut up into sense groups and translated; when an obstacle to comprehension or translation of a sense group is encountered, there is only a brief pause for reflection, and then it is set aside, and the next sentence is dealt with. In dealing with sense groups, the translator analyzes the logic of word collocation. In the absence of reference materials and reference books, the translator usually sets aside words they do not understand. When encountering difficulties in sentence breaking, the translator studies the grammatical structure of the sentence and tries to establish the logical relationship between the noun phrases; if there are more unfamiliar words in the sentence and there are collocations that do not conform to the general logical relationship, the translator tends to put the sentence aside temporarily.

In the second stage of comprehension and scrutiny, the translator linked the translated content with their hypotheses, meanwhile calling on substantial background knowledge to comprehend the source text to identify or modify their hypotheses and those parts that were set aside in the light of these understandings. The third stage of comprehension and scrutiny focuses on verifying the translation, during which the translator does not make major changes to the translation.

Judging from Subject 2's think-aloud report, we can see that Subject 2 processed the translation of the poem four times: the first time was to read through the poem and summarize the general meaning; the second time was to relocate; the third was to check and revise the translation; and the fourth was to transcribe and embellish.

In the first stage of reading through the entire poem, the translator attempted to make tentative translations of some words without documenting them.

The second phase of relocation is the main element of the think-aloud report, which falls into seven sections. First is the translation of the title. The second is the translation of the body of the poem, in which the translator mainly exhibits the following behaviors: slicing and dicing the sentences into sense groups, which are translated as units. The translator consults the dictionary when encountering unfamiliar words, puts the words into phrases, and puts aside unsatisfactory translation results. In relocation, the translator typically translates at the level of words, phrases, and sense groups.

In the third stage of scrutiny and revision, the translator focused on sentences, sense groups, and phrases, and noticed the provenance of the poem's parts.

In the fourth stage of transcription, the translator embellished the translation and addressed issues that had been shelved earlier.

From the analysis of the think-aloud translation process of these two subjects, it can be seen that the so-called translation unit is actually a conversion cycle in the translation process in which the translator transforms the information of the source text into that of the target text [4]. The translator's translation process is a continuous one consisting of these cycles. Although the translation unit can be measured and represented in terms of the specific linguistic units of the source text, the fact is that it is a cycle of working memory operations converted from the source text to the target text. It consists of a series of cognitive processing processes, and a translation unit represents a cycle of cognitive behavior in translation. In essence, therefore, the translation unit actually depends on the amount of information the translator can process during the cognitive processing cycle of a particular translation process. In addition, the translation units are not exactly linear and parallel to each other serially; there is a hierarchy or level between them [5].

By comparison and analysis of the translation process of these two think-aloud examples, the current study reveals that the translation act begins with a predetermined unit that the translator generally has in place. In general, the default translation unit is usually the sentence. That is, the translator typically sets the sentence as the default translation unit. However, this default setting is not static; it exhibits regular fluctuations as the difficulty of comprehension and relocation varies. Where the translator feels that understanding and expression are difficult, the translation unit tends to become smaller; where the translator feels that understanding and expression are easy, the translation unit often becomes larger. As the difficulty of comprehension and expression increases, the translator's translation unit generally becomes smaller in sequence along the direction of sentences, sense groups, phrases, and words [6]. Different translation units are also generated at different stages of the translation process: at the relocation stage, the translation unit is generally smaller; at the scrutiny and revision stage, the translation unit tends to become larger [7].

Why are translation units variable? In general, they represent the amount of information the working memory can process. Typically, the sentence is the intended translation unit for the average translator because it is a relatively complete unit of information and is commonly used to manipulate language (the amount of information contained in a sentence meets the requirements of human cognitive processing). However, when sentences contain more difficult components, the working memory is overwhelmed and has to be reduced in size. If the sentence does not impose difficulties on the translator, the translator's working memory has the capacity to process more information and therefore expands the scope of information processing, which is the reason for the instability of the translation unit in the translation process [8].

5.2. The Cognitive Process of Translation Units

Since the translation unit is actually a cycle of translation cognitive activity, what kind of process is it? By analyzing the processing of translation units performed by the two subjects, this study derives a flowchart of the cognitive processing of translation units shown in Figure 1.
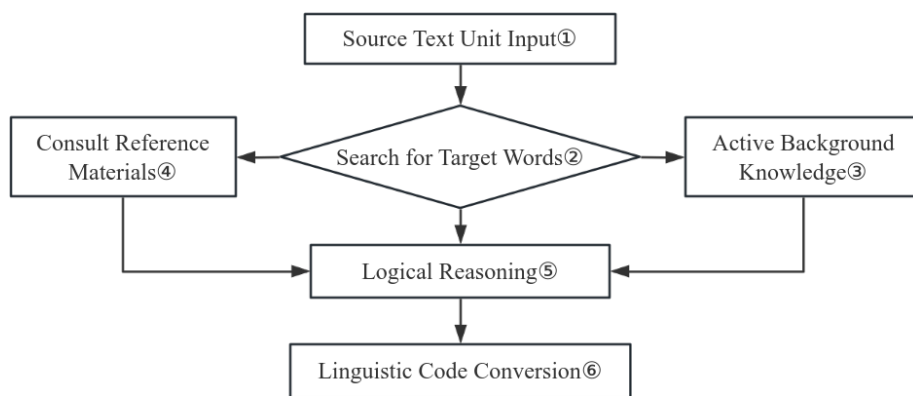

Figure 1. Cognitive Processing Flow of Translation Units.

The flowchart represents three cognitive models:
1) Patterns of cognitive operations consisting of ① ② ④ ⑤ ⑥;
2) Patterns of cognitive operations consisting of ① ② ③ ⑤ ⑥;
3) Patterns of cognitive operations consisting of ① ② ⑤ ⑥.

The first model represents a cognitive process in which cognitive operations develop in the following direction: source text unit input → search for target words → consult reference material → logical reasoning → linguistic code conversion. The reason why ② to ④ occurs in this model is that new words appear in the translation unit. For example, Subject 2 reported this thinking process when dealing with"Chinese sandals with blue plush straps". "Chinese sandals with blue plush straps. Chinese slippers (clears throat), accompanied by blue plush, plush, I look it up, p-l-u-s-h velvet, velvet strap, strap is ...... strap, velvet strap, that's Chinese slippers, slipper, Chinese slippers with blue velvet straps."

The second model represents a cognitive process in which cognitive operations develop in the following direction: source text unit input → search for target words → activate background knowledge → logical reasoning → linguistic code conversion. For example, subject 1 went through the following thinking process when processing"was still raised a few inches by resting on volume two of Lafcadio Hearn's Glimpses of Unfamiliar Japan": "a few inches by resting volume two, the word volume seems to have many meanings, there's size, cube, and then there's also a book, oh, this one might be about books, no, volume two also refers to the channel? And then blah, blah, blah, blah, this is a show, huh? of unfamiliar Japan means this channel, and then that Lafcadio Hearn's, ah, I see, it's supposed to be a person's name, it's an overview of unfamiliar Japan that he's skimming through, it's just kind of roughly looking at it, roughly browsing through it. Glimpses, Glimpses, and then Channel 2 broadcast what should be a program."

The third model represents a cognitive process in which cognitive operations develop in the following direction: source text unit input → search for target words → logical reasoning → linguistic code conversion. The model is a cognitive operation process when dealing with simpler translation units, which do not contain unfamiliar words [9]. For example, when Subject 2 processed "blue dots on the curtains", his cognitive operations were: "Blue dots uh, on the curtains, blue dots printed on, are dots here from the

sun? Or are they the blue, oh, blue dots on top of the curtains? on the curtains, uh, blue dots, on the curtains, on the curtains, uh, printed, printed with blue dots."

The above three patterns of cognitive processes of translation units illustrate, on the one hand, the diversity of translation cognitive behaviors, i.e., different translation units have different cognitive processing, on the other hand, the regularity of translation cognitive behaviors, i.e., the cognitive processing of translation units is limited and predictable [10]. The diversity of cognitive behaviors of translation units suggests that in translation practice and teaching, specific problems should be analyzed and that there should not be a so-called standard translation model. The regularity of cognitive processing of translation units reveals that human translation behavior is limited, predictable, and imitable. At a certain level of translation research, human beings can develop language translation machines with artificial intelligence.

6. Conclusion

Through the above analysis, this study draws the following conclusions: the translation unit is generally preset in terms of sentences, yet it is a dynamic and changing unit. There is a correlation between the size of the translation unit and the difficulty the translator perceived in comprehension and expression: the greater the difficulty, the smaller the unit. There are three general patterns of cognitive processing for translation units:

1) Source text unit input → search for target words → consult reference material → logical reasoning → linguistic code conversion.
2) Source text unit input → search for target words → activate background knowledge → logical reasoning → linguistic code conversion.
3) Source text unit input → search for target words → logical reasoning → linguistic code conversion. These patterns reflect, to some extent, the diversity and regularity of cognitive processing in translation units.

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