THINK-ALOUD PROTOCOLS, EYE-TRACKING AND KEY-LOGGING IN IDENTIFICATION AND ADDRESSING TRANSLATION CHALLENGES

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Abstract

Purpose of the study: The research is focused on studying the translation process using the methods of allied sciences for improving a translation end product. This article deals with the identification of the most challenging prospective translation difficulties and analysis of the main macro- and micro strategies of translation on the basis of conducted experiments with combination of eye-tracking and think-aloud protocols and an experiment using keystroke logging. In the article we also make an attempt to undercover the basic principles which influence decision-making.

Methodology: Conclusions based on the results of the study have both theoretical and practical implications. The theoretical significance of the research is expressed with the summarizing of the main translation difficulties and translation strategies of the tested. It was also revealed that the translation difficulty is not always predictable and is not always explained theoretically. As a result of the experiments the theory of H. Krings on 3 stages of translation Micro Strategy has been confirmed. Finally, the analysis of the experiments made it possible to determine the factors influencing a particular translation solution: grammatical, contextual and stylistic accuracy and euphony of the translation end product.

Results: Regarding the first experiment, TAPs required a voice recorder, and respectively, eye-tracking assumed the usage of eye-tracker, procured by the Laboratory of Small Computer Engineering of Kazan Federal University. As equipment for the second experiment, we used a laptop with a loaded keystroke logging program recording each keystroke, as well as the time intervals between these presses. In this case, the task of the tested was to submit a written translation of the given text.

Applications of this study: This research can be used for the universities, teachers, and students.

Novelty/Originality of this study: In this research, the model of the Think-Aloud Protocols, Eye-Tracking, and Key-Logging in Identification and Addressing Translation Challenges are presented in a comprehensive and complete manner.

Keywords: linguistics, translation studies, translation process, translation difficulties, eye-tracking, key-logging, TAPs.

INTRODUCTION

The content of linguistic education shall meet the requirements of times and prepare future graduates (Bobyreva & Latypov, 2015). Therefore, we consider it important to identify and fill the main gaps in the current knowledge of students. The problem of translation process analysis and translation challenges, in particular, has been previously studied in the works of P. Kussmaul & S. Tirkkonen-Condit (1995), S. O'Brien (2009). S. O'Brien's research on translation process managed to answer such questions as "what practices are successful and count as efficient" (O'Brien, 2009). Moreover, in cooperation with S. Doherty and M. Carl she used eye-tracking as a machine translation evaluation technique (Doherty, et al. 2010).

It should be noted that in the context of the theoretical study of any translation activity, the researchers' attention is focused on the translation process, which is understood as "the set of the translator's actions in creating the translation text" (Akhmanova, 1966). The central aspect in the analysis of the translation process according to H. Krings is the concept of "translation problem", which is defined as the case when the translator for some reason finds it difficult to give a translation immediately (Krings, 1986).

With the help of think-aloud protocols that is a verbalization of thought processes (Hertzum, et al. 2015), he singled out a number of main criteria, and each indicates the case's reference to the "problem": 1) The translator's direct or indirect statements that he/she is experiencing difficulties; 2) Reference to a dictionary; 3) Translation problems realized by the translator (Komissarov, 1990). The second range includes secondary criteria for translation problem identification, but in this segment, there should be at least two signs specific to the translation problem. These criteria include: 1) Occurrence of two or more alternative variants of translation; 2) Making corrections in the translation product; 3) Underlining difficult places in the original; 4) An interpreter's dissatisfaction with the results of the translation; 5) Address to the general theoretical principles of translation in the process of translation; 6) Pauses; 7) Paralinguistic indications of difficulty (sighs, interjections); 8) Errors in translation. Summarizing, there are difficulties that occur due to deficiencies in the language competence of the tested (understanding problems) and those that depend on deficiencies in their translation competence (transmission problems).

Thus, think-aloud protocols (hereinafter referred to as TAP) allow us to identify major translation problems, to determine the translation strategies of the tested, to discover basic principles which direct the translator to the final version of the translation. Nevertheless, we acknowledge that TAP is not devoid of certain disadvantages. The main drawback is that the method does not fully reflect the actual process because some of the interpreter's solutions can be implemented intuitively. Furthermore, it is not always possible to assess consciously what a translation difficulty is. In this connection, we use eye-

tracking, taking the principle of "binding" eye movements to language activity, known as mind-eye hypothesis as a basis (Cooper, 1974). Thus, in our experiment, we combine think-aloud protocols with eye-tracking, in attempt to estrange from the arguments of introspective nature and increase testing integrity.

As for key-logging, its study area includes cognitive writing processes in general, writing strategies in professional writing or creative writing, the writing development of children, first and second language writing, and the writing in professional contexts (Leijten & Van Waes, 2013). Thus, in our research, it is focused on professional translation competence.

MATERIALS AND METHODS

It is important that the research material does not represent separate sentences, but has a semantic cohesion. The point is that we are interested in monitoring and analyzing how the translator will behave in the macro context. We consider it expedient to conduct an experiment on materials of both the Russian and English languages to analyze translation difficulties typical for the Russian language and those related to English.

1. *Research Objectives and Methods*

    It should be mentioned that the objectives of our research are stated on the basis of such a problem as the complexity of the translation process study due to ambiguousness of its interpretation. Another point is the lack of proper attention to the systematization of translation strategies. Thus, our purpose is to study the translation process, identifying translation difficulties and strategies for their solution by applying the relevant methodology.

    It leads the authors to combine eye-tracking with think-aloud protocols in the first experiment as long as their integration allows us to achieve two objectives of our experiment. We focus on fixations which are eye movements that stabilize the retina over a stationary object of interest (Duchowski, 2007), considering that fixation time is shorter when the word is easy to identify and understand (Clifton, et al. 2007). When text becomes conceptually more difficult, fixation duration increases (Rayner, 1998), so, we expect to detect translation difficulties from long eye fixations. Thus, eye-tracking allows us to identify translation problems, whereas think-aloud protocols reveal a solution technique for further analysis.

    Keystroke logging used in the second experiment also provides an opportunity for achieving the objectives of our research. It registers translation problems and demonstrates the process of their addressing by the participants of the experiment. Lastly, this method allows us to cover a larger audience.

    Furthermore, to provide well-grounded conclusions on the issue, the following theoretical and practical methods were applied to come up with a solution to the research problem: analysis of the basic concepts and theories of translation studies, observation, collecting, analyzing and synthesizing data.

2. *Participants*

    The audience of the experiment is represented by the fourth-year students of Kazan Federal University, the Russian Federation. The students majoring in Linguistics, specializing in Translation/ Interpretation are taught in the Higher School of Foreign Languages and Translation. For the correctness of the experiment, it was expedient to invite participants with similar English proficiency. Eye-tracker experiment featured 10 students, as for the experiment with key-logging the number of the tested accounts for 50 people.

3. *Instruments*

    Regarding the first experiment, TAPs required a voice recorder, and respectively, eye-tracking assumed the usage of eye-tracker, procured by the Laboratory of Small Computer Engineering of Kazan Federal University. The Tobii eye tracker provided by the Laboratory used infrared diodes to generate reflection patterns on the corneas of the user's eyes. The students translated the suggested text in the laboratory conditions. After the procedure of eye calibration, students performed sight translation. Participants of the experiment translated the text, "voicing" the translation for the recorder (including translation options, thoughts during the process and any other comments), while the tracker registered their eye-movements.

    As equipment for the second experiment, we used a laptop with a loaded keystroke logging program recording each keystroke, as well as the time intervals between these presses. In this case, the task of the tested was to submit a written translation of the given text.

RESULTS AND DISCUSSION

As a result of two experiments, we discovered such translation difficulties, which proved to be the most challenging for the students. First, the difficulties involving the use of background knowledge (80%), which were represented in the text by Latinisms – *definition of quixotic*, *locomotives of capitalism*. The evident problems with translating the unit "*quixotic*", in particular, have demonstrated gaps in background knowledge. As the interdisciplinary approach is the way to personal development and professional competence of the future linguists and their cross-disciplinary professional mobility (Olvera-Lobo, et al. 2005, Mukhametshina, et al. 2017), we would like to emphasize the importance of expanding the background knowledge of students.

Then follows a group of difficulties, united as clichés (60%), for example, *осторожно, and окрашено*. The third most challenging block of difficulties is idioms (50%): *the darkest hour is that before the dawn*. It is followed by translation difficulties represented by terms (40%), such as *labor legislation*, *civil liberties*. The succeeding translation problems are classified as expressive means (20%): metaphor *fell under the grip of drug abuse*, solecism *he doesn't like* and *she doesn't like*. The same position is occupied with the problems of combinability (20%), where the phrase *temporary measure* can serve as an example. The list is completed with the problems associated with the formula of politeness (10%): *доброго времени суток, приятного аппетита*. Surprisingly, greetings and the clichés related to the formula of politeness complicated the process of translation, despite the students' high level of language and translation competence. Apparently, this case justifies that knowledge obtained in the earlier stages of language acquisition needs in continual revision.

Speaking about common translation strategies, students used such techniques as additions which seems appropriate, especially for the written translation, because the inclusion of linking words makes the text more integral and conveys the necessary semantic shades of the original text. Working on the translation of metaphors and idioms, the students tried to convey the style of the original text. The tested looked for existing equivalents or analogs in the target language: *the darkest hour is that before the dawn – после дождя всегда наступает радуга*. However, 50% of the respondents spent a significant part of their time on this task.

Meanwhile, the main mistakes of the students were not related to the difficulty of transmission, but rather to the difficulty of understanding. Evidently, some students failed to understand the meaning of this idiom, and therefore, they could not find an adequate equivalent in the target language. To illustrate, having chosen such an option as *затишье бывает перед бурей*, some tested brought an antonymous sense in the statement. Among the other translation strategies, we identified a literal translation (*wall of misperception – стена непонимания*), calquing *(locomotives of capitalism – локомотивы капитализма)*, a descriptive translation which in this case is also contextual: *he maintained the wall of misperception – он оставался непоколебимым*.

As for the macro strategy of the students, the analysis of the translation process allows us to conclude that it consists of three stages, as noted earlier (Krings, 1986). So, during the first stage of the pre-translational analysis, the participants studied the text or looked for the necessary context (fixations and differently directed saccades). The second stage includes the translation itself, which, as a rule, is approximate at this stage. During the third stage of post-translation processing, the translator corrects and formulates the translation end product. In addition, making a translation decision is determined by a number of factors and is the most illustrative at the third stage of the translation process. Thus, the changes were mainly made on the basis of the context (*Еще я не стал долго раздумывать, мм, нет, **но я не колебался***), harmony of sounds (***деятельность ООН** за права…**по правам человека***) and grammar accuracy (*Who could think ... **who could have thought that***).

CONCLUSION

Conclusions based on the results of the study have both theoretical and practical implications. The theoretical significance of the research is expressed with the summarising of the main translation difficulties and translation strategies of the tested. It was also revealed that the translation difficulty is not always predictable and is not always explained theoretically. As a result of the experiments the theory of H. Krings on 3 stages of translation macro strategy has been confirmed. Finally, the analysis of the experiments made it possible to determine the factors influencing a particular translation solution: grammatical, contextual and stylistic accuracy and euphony of the translation end product.

The practical implications of the research are that its results can find application in the courses of translation studies, translation theory, and practice, as well as within the framework of consecutive and simultaneous translation courses. The results of experiments can also be used as didactic material for teaching the students of Foreign Language department.

ACKNOWLEDGMENTS

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