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The Impact of Think-aloud on the Speed of Translation

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ABSTRACT

This study explored the effect of think-aloud as a cognitive technique on the speed of texts translation performed by MA translation students. The Iranian homogenized participants of the study translated two Persian texts into English and two English texts into Persian. Each text was translated under two conditions, namely with think-aloud protocol and without think-aloud protocol. All tasks were recorded on a laptop for detailed analysis. The results revealed significant effects of think-aloud on the speed of translation. The study provided explanations for the results obtained and suggested further research lines.

Keywords: Translation; Think-aloud; speed; Cognitive process; Persian; English

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1. Introduction

Koller (1995) described translation as a text processing activity and simultaneously highlighted the significance of 'equivalence' as follows:

> Translation can be understood as the result of a text-processing activity, by means of which a source-language text is transposed into a target-language text. Between the resulting text in L2 (the target-language text) and the source text L1 (the source language text) there exists a relationship which can be designated as translational, or equivalence relation (p. 196).

Concerning the translation process, a very general view is that in translation there are two stages involved: the process through which the translator analyzes the source language (SL) form in order to find out the meaning; and second the translator produces, or chooses proper target language (TL) form for this meaning which results in a product (Mollanazar, 2005). Translation studies include, therefore, two approaches namely product-oriented and process-oriented studies. The former which was the

main strand in early studies of translation dating back to more than fifty years ago evaluates the target material irrespective of what is going on in the mind of translator. However, process-oriented studies which have captured the attention of researchers as a shift from product-oriented studies to process-oriented studies, aim at providing an account of the cognitive activities undertaken by the translator through the process of translation.

Obviously, there is more to translation than just associating words in one language with those in another. Cognitive scientific approaches to translation try to understand and explain the workings of translators' minds: How do translators and the other actors involved in translation create meaning in the situations and texts they handle? How do they arrive at their strategies and choices? How do their cultural and linguistic background influence their thinking and understanding? How do they develop translation competence? All cognitive scientific approaches to answering these questions have one thing in common: they do not restrict their description to intelligent behavior like learning, problem solving, and translation.

"Their main goal is to explain the development and workings of the mental processes that make a complex cognitive behavior like translation possible" (Shlesinger, 2000; Thagard, 2005, p. 3). This is why (and how) cognitive approaches differ from other –e.g., linguistic or psychological– approaches to translation: They refer to and expand existing cognitive scientific models of the mind to describe the processes which might serve to explain the behavior and choices of translators.

Cognitive approaches focus clearly on the people and processes involved in translation and employ a primarily descriptive –as opposed to a normative– mode of research, applying various empirical and experimental research designs.

In translation studies, the methods used to date have included, for example, introspection (Seleskovitch & Lederer, 1984), theoretical analysis (Wilss, 1996; Risku, 1998), think-aloud protocols (TAPs) of individual language learners and translators (Krings, 1986; Lörscher, 1991; Jääskeläinen & Tirkkonen-Condit, 1991; Tirkkonen-Condit & Jääskeläinen, 2000). Think Aloud protocol is a method that allows researchers to understand, at least in part, the thought process of a subject as they use a product, device, or manual. The researcher observes while the subject attempts to complete a defined task. By thinking aloud while attempting to complete the task, subjects can explain their method of attempting to complete the task, and illuminate any difficulties they encounter in the process (Jackobson, 2003).

1.1Statement of the problem

The analysis of think-aloud protocols (TAPs) in translation studies began in Europe in the late 1980s. It was felt that in order to complement the hitherto predominantly deductive and often also normative models of the translation process, empirical and inductive methods should be developed. The models presented until then usually described what ideally happened or rather –with a pedagogical aim– what should happen, in translating. It was people like Krings, Königs and Lörscher in Germany, Dechert and Sandrock in Britain, Jääskeläinen and Tirkkonen-Condit in Finland, to name but a few, who were no longer happy with this state of affairs. They began to ask what actually happens when people translate.

There has always been a kind of empirical research: translation criticism and error analysis, but this was by nature product- and not process-oriented. When comparing the target text with the source text or when looking at errors, one could at best speculate in retrospect about what had happened in the mind of the translator during the translation process. In cases such as interferences these speculations may have had a high degree of probability, but other types of diagnoses were hard to arrive at. For instance, from the analysis of errors one may have inferred that a translator's foreign language competence was not good enough, but when discussing matters with him, one may have found that he had problems expressing himself in his mother tongue. What was needed was a means to find out what goes on in the translator's mind, a means to get a glimpse into the "black box", as it were.

In the field of psychology, "a method had been developed by Claparède and Duncker in connection with introspection" (Börsch, 1986, p. 198), which was taken up by Ericsson and Simon (1984) and applied to the translation process by the researchers mentioned above. In these think-aloud experiments, as they are called, subjects are asked to utter everything that goes on in their minds while they solve a task –in our case when they translate a text. These utterances are tape-recorded or videotaped and then further transcribed into think-aloud protocols, which are then analyzed from a variety of viewpoints. In addition to increasing our potential for describing and explaining the processes of translation, and thus our theoretical understanding, these analyses have at least two pedagogical purposes. (1) The strategies observed in the TAPs may serve as models for successful translating. This implies that the translators serving as subjects possess some degree of professionalism and expert behaviour. Naturally, one would not expect beginner students to exhibit this kind of behaviour. (2) If students training to become translators are used as subjects, TAPs may be used to find out where they have problems. The results of the analyses can then form a basis for translation pedagogy. One might argue that teachers of translation already know which strategies to recommend to their students. From years of experience they know what their students need. This may be true to some extent, but teaching experience shows that we sometimes draw the wrong conclusions from our students' translations. We may, for instance, have the impression that students have problems with text-comprehension while, when we talk to them, we find that they actually have problems expressing what they had understood. TAPs can help us to see matters more clearly.

Introspective think-aloud has been employed as one of the principal techniques for the analysis of cognitive information processing dealt with in translation activities (Ericsson & Simon, 1984). Jackobsen (2003) reports that intuitively the engagement of brain central processor in simultaneous cognitive activities influences the processing time and capacity of mind, as it holds true for a computer central processing unit (CPU). Contrary to this intuition Ericsson and Simon (1993, p. 62) assume that:

> [...] our fundamental assumption is that, when the CP [the central processor] attends to or activates a structure in memory that is orally encoded, then this structure can at the same time be vocalized overtly without making additional demands on processing time or capacity. At any time when the

> contents of STM [short-term memory] are words (i.e., are orally encoded), we can speak those words without interference from or with the ongoing processes.

The question that is worth posing is that whether think-aloud activities increase the cognitive load of translation process or not. Therefore, based on Ericsson and Simon's (1993) assumption, this study is going to explore the influence of think-aloud on translation speed.

1.2 Research objectives

The independent variable of this study is think-aloud activity whose influence is going to be checked on the dependent variable, namely speed of translation. Accordingly, the major objective of the study is to test whether think-aloud activity influences the speed of translation or not.

1.3 Research questions

Based on the objectives set out above the following research questions were posed to be investigated in this research:

RQ1: Does think-aloud activity influence the speed of translation from L1 into L2?

RQ2: Does think-aloud activity influence the speed of translation from L2 into L1?

1.4 Research hypotheses

The research questions of the research whose answers were supposed to help achieve the objectives of research were formulated as the following hypotheses.

RH1: Translation would not be slower with think-aloud than without think aloud from L1 into L2.

RH2: Translation would not be slower with think-aloud than without think aloud from L2 into L1.

1.5 Significance of the study

The findings of the study can provide either supporting evidence for Ericsson and Simon's (1993) claim or contrary evidence for it. Whatever the case, the results can shed light on the nature of cognitive information processing involved in translation. As such, the study can play a significant role in the development of translation studies in general, and adopting more appropriate techniques of translation in particular.

2. Methodology

2.1 Participants

Following a non-random purposive sampling, initially fifteen MA senior students of translation studies whose consent had been obtained were selected to participate in the study. They all had passed theoretical core courses on translation and were working on submitting their thesis. They were 10 female and five male students who aged 24 to 30. Because general English proficiency is one of the variables that influence the quality of translation, the researcher had to control for general English proficiency of the participants. Accordingly, all selected participants sat for a placement test, namely Oxford Placement Test. Based on the participants' performance on the test only five participants could get a score between 135-149 out a total of 200. Therefore, five participants who were at upper-intermediate level of English proficiency were selected as the final participants of the study.

2.2 Instruments

To carry out the current study, the following instruments were used by the researcher to collect the required data and measurements.

2.2.1 Oxford Placement Test

Many schools and educational institutions have used the placement test called Oxford Placement Test (OPT) by Oxford University Press for many years to measure the general English proficiency of participants. The original pencil-and-paper

placement test of Oxford Placement Test was developed by Dave Allan in 1985. In order to control for general English proficiency as a mediating variable that may influence participants' performance, this study used OPT to homogenize the participants in terms of general English proficiency

2.2.2 Laptop

The participants used a laptop equipped with required soft wares for typing and time measurement to analyze the translation process of the participants of the study made with think-aloud protocol and without think-aloud protocol. The software could measure the translation sessions time in which the participants translated the target text from L2 (English) in to L1 (Persian) and vice versa.

2.2.3 Digital bilingual dictionaries

A digital bilingual (English-Persian) was provided with participants of the study to facilitate the process of translation. It was installed on the laptop. Through the process of translation the participants could check the meaning of unfamiliar vocabularies and check other relevant information such as part of speech of the words, synonyms and antonyms of the main entries. Prior to beginning of the study the researcher made sure all participants could use the software adequately. The rationale behind using digital dictionaries was to reduce the time of translation as much as possible.

2.3 Materials

Two English excerpts and two Persian excerpts were used to be translated by the participants of the study. The difficulty level of English excerpts was measured to make sure they match the proficiency level of participants of the study. To this end, Flesch-Kincaid Grade Level (FKGL) was used to evaluate readability of the texts. This measure is primarily based on the US school system, ranging from 0-16. In this measure, the higher the score the more challenging the text is. The formula reads as:

$$\mathbf{FKGL = (0.39 \times ASL) + (11.8 \times ASW) - 15.59}$$

Where ASL is the average sentence level (the number of words divided by the number of sentences) and ASW is the average number of syllables per word (the number of syllables divided by the number of words). The FKGL of the English Excerpt one turned out to be 13.45 and the second one was 13.04. The figures revealed that the excerpts were appropriate for upper-intermediate proficiency participants, according to FKGL scale.

The Persian excerpts were selected from two passages on Iranian New year celebration (No-Ruz) to make sure the titles are familiar to participants' ear. The Persian and English excerpts included approximately the same length and number of words as measured by Microsoft word 2010.

2.4 Procedure

Five Persian students out of fifteen participants of English language translation were selected based on their performance on a version of OPT. They were trained how to think aloud in a pilot session and the researcher made sure they all knew how to work with the word processor used in this study, that is, Microsoft word (version 2010). Then, they were asked to translate two English excerpts and two Persian excerpts each one in a session. There was no time constraint for translation. They could check the digital bilingual dictionary installed on the laptop in case it was required. The participants' translation speeds were calculated with and without

think-aloud techniques and were tabulated for further statistical analysis.

3. Data Analysis and Results

The participants of the study translated the same texts as a part of data collection. There were four texts to be translated, two from English to Persian (L2→L1) and two from Persian into English (L1→L2). TA condition for each text was opposite, i.e. no TA with texts 1 and 4, and with TA during the translation of texts 2 and 3. The language direction remained the same: (L1→L2) in texts 1 and 2, and (L2→L1) in texts 3 and 4. The analysis of data resulted in the formation of following tables.

Table 1: Raw figures for task duration and keystrokes (participants 1-5).

Partici-pants	Text	TA condition	Duration Min:sec	Total keystrokes	Text prodkeys	Total keys/min	Text prod keys/min
1	1	No TA	13:13	653	525	50	40
2	1	No TA	9:48	769	542	82	60
3	1	No TA	18:42	1425	745	79	41
4	1	No TA	10:02	534	457	53	45
5	1	No TA	18:50	612	470	34	26
		Average	14:08	798	550	59	42
1	2	With TA	15:08	726	615	48	41
2	2	With TA	19:54	1089	746	57	39
3	2	With TA	32:34	1437	769	44	24
4	2	With TA	16:29	867	693	54	43
5	2	With TA	16:01	765	624	47	39
		Average	20:01	976.8	689.2	48.8	34.45
1	3	With TA	21:24	1135	967	54	46
2	3	With TA	22:01	1539	981	70	44
3	3	With TA	26:35	1987	1143	76	44
4	3	With TA	20:50	1158	965	58	48
5	3	With TA	30:42	1198	956	39	31
		Average	24:19	1403.4	1002.4	58.4	41.6
1	4	No TA	25:05	1489	1292	59	51
2	4	No TA	19:02	1970	1383	103	72
3	4	No TA	29:56	3747	1803	129	62
4	4	No TA	22:39	1712	1411	77	64
5	4	No TA	31:41	2115	1449	68	46
		Average	25:41	2209.6	1467.6	88.36	58

As displayed in Table 1 the time of task (translation) for all participants translating text 1 ranged from 9:48 to 18:50. As for text 2, the time ranged from15:08 to 32:34 with think-aloud. Text 3 which was translated with think-aloud took between 20:50 to 30:42. And text 4 was translated without think-aloud between 19:02 to 31:41.

Averaging the per-minute figures across texts, the figures found for speed with and without TA were as shown in Table 2.

Table 2: Average difference in speed for participants calculated as the average number of total keystrokes per minute and as the number of text production keystrokes per minute under the two TA conditions

Participa-nts	Total keys/min Without TA:	Text prod keys/min Without TA:	Total keys/min With TA:	Text prod keys/min With TA:
1	60	65	54	51.5
2	72	117	82	47.5
3	66	114.5	57	37.5
4	63.5	81	67.5	52
5	50.5	55.5	39.5	41
Average	62.4	86.6	60	45.9

Within participant comparison showed that the TA condition was slower for all participants on the total keystroke count. Moreover, participants were very differently affected (range 8%-42%). On the text production count, participants were also slower with TA than without TA (range 5%-42%). Unexpectedly, however, one participant was slightly faster with TA than without (3.6%). (This result was caused by participant 5's exceptionally slow translation of text 1.)

For the group as a whole, there were 27.9% fewer keystrokes overall (86.6 vs. 62.4) and 23.5% fewer text production keystrokes per minute in the TA condition than without TA (60 vs. 45.9).

Table 3: Paired Samples t-test on the difference of translation time with and without TA from L1 into L2

	Paired Differences					t	df	Sig. (2-tailed)
	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
time With TA Without TA	-11.6240	7.82882	3.996	-22.7197	-0.5283	2.9087	4	.0437

As displayed in Table 1, when participants of the study translate from L1 to L2, the average time of translation with think-aloud protocol recorded by

participants of the study is 20:01; the other text was translated without think-aloud protocol by the same participants in 14:08. The recorded time reveals a shorter time span for translation without think-aloud protocol. In order to make sure the difference is not accidental, a paired-sample t-test was run. The t-test further supported the results obtained, indicating that there is a significant difference between translating with think-aloud and without think-aloud protocols as far as the speed of translation from L1 to L2 is concerned.

As for translating from L2 to L1, Table 1 displays that participants of the study translated a text with think-aloud protocol from L2 to L1 in 24:19 on average, and without think-aloud protocol from L2 to L1 in 25:41 on average. Contrary to results obtained for translation from L1 to L2, the speed of translation from L2 to L1 with think-aloud protocol was shorter compared to the speed of translation from L2 to L1 without think-aloud protocol.

Table 4: Paired Samples t-test on the difference of translation time with and without TA from L2 into L1

		Paired Differences					t	df	Sig. (2-tailed)
		Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
time	With TA Without TA	1.4775	2.6560	1.545	-3.4407	6.3957	0.9560	4	0. 0496

In order to assure, the difference is not accidental, a paired-sample t-test was run. The t-test further revealed that the difference between translating with think-aloud and without think-aloud protocols is statistically significant as far as the speed of translation from L1 to L2 is concerned.

Moreover, as the results in Table 1 reveal, the direction of translation seems to influence the speed of translation. The participants of the study translated the text from L1 to L2 both with and without think-aloud protocol in shorter time span.

4. Discussion and conclusion

The two questions of the study were reformulated as "translation would not be slower with think-aloud than without think-aloud from L1 into L2" and "translation would not be slower with think-aloud than without think-aloud from L2 into L1" respectively.

The speed with which participants worked on the tasks, resulted in text production at an average of 62.4 keystrokes per minute without think-aloud, 60 with think-aloud. The maximum average text production speed achieved in a task was 86 characters per minute. The minimum was 26. Therefore, the first and second hypotheses of the study stating "translation would not be slower with think-aloud than without think-aloud from L1 into L2" and "translation would not be slower with think-aloud than without think-aloud from L2 into L1" were rejected. The results revealed that think-aloud slowed down target text (TT) production; both L2 to L1 and L1 to L2 translation were slower when done with think-aloud than when done without think-aloud. The difference in the time of translation with think-aloud and without think-aloud conditions both from L2 to L1 and L1 to L2 translation were further supported by inferential statistics. To this end, a series paired sample t-tests were run. The paired sample t-test further supported the results obtained, indicating that there is a significant difference between translating with think-aloud and without think-aloud protocols as far as the speed of translation both from L2 to L1 and L1 to L2 are concerned.

The analysis of the data also showed that L1 to L2 translation was about 16% slower than L2 to L1 translation. The

delaying effect of think-aloud was greater if the language direction was L1 to L2 than if it was L2 to L1, but no significant interaction of think aloud and language direction was found.

These findings concerning the delaying effect brought about by the think aloud condition are contrary to Ericsson and Simon's (1993, p. 62) claim assuming that "when the CP [the central processor] attends to or activates a structure in memory that is orally encoded, then this structure can at the same time be vocalized overtly without making additional demands on processing time". Think aloud protocols, as the results of the current study indicated, slow down the speed of translation as measured by key logging behavior in this study. One explanation is that the cognitive load is much more with think aloud protocol compared to without think aloud protocol so that the other simultaneous performance (in our case translation) would slow down.

The findings in the present study identify and quantify stronger effects of think-aloud on translation tasks than predicted by Ericsson and Simon. The knowledge activated during translation must be assumed to be stored verbally in memory. Following Ericsson and Simon, think-aloud does affect the manner and nature of information processing and the present study indicates that the influence of think-aloud on processing in translation is quite considerable.

However, due to methodological issues, for instance the few number of the participant of the study, the results obtained here should be approached cautiously as a single quantitative study does not suffice to undermine a theory.

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