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Effectiveness of Translation in the Improvement of Syntactic Processing Ability

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ABSTRACT

Although translating activities have been used in second language (L2) classes, limited research has investigated how this learning method contributes to L2 acquisition. Therefore, in this study, we investigated whether translation was effective for L2 understanding as well as for the improvement of syntactic processing ability. For this purpose, we conducted a syntactic priming experiment that used a segment-by-segment self-paced reading task. Syntactic priming is a phenomenon where an encounter with a stimulus affects its subsequent processing if the two stimuli have the same construction (Bock, 1986). It has been reported that syntactic processing ability improves in the case of syntactic priming (Lightbown & Spada, 2006). During the experiment, the L2 research participants read sentences containing a reduced relative clause as target sentences immediately after reading prime sentences that had the same construction either with or without translation into their mother tongue. In addition, a comprehension question was manipulated to appear after target sentences to examine whether translation contributed to the depth of understanding of the target grammar. We used a linear and logit mixed-effect model for the analysis of the collected data. The two statistical models revealed that although comprehension rates for the target sentences did not differ statistically, there was a significant difference in reading times of the target stimuli between the two conditions, indicating that sentence processing with translation produced a greater priming effect. The research result suggests that the syntactic processing ability of learners improves significantly when they explicitly translate the syntactic structure.

Keywords: Second Language Acquisition, Syntactic Priming, Parsing, Sentence Comprehension, Translation

Introduction

Whether translation should be used in the language class is an arguable issue in the teaching of foreign languages. One of the reasons for this is probably the obscurity of translation as a learning tool to help to facilitate second language acquisition. Although translation activities have traditionally been used in L2 classes, they are nowadays thought to be unsuitable in the L2 language classroom, because translation is often regarded as equivalent with the Grammar-translation method, which has been criticized in the past (Brown, 2002). In addition, many educators believe it prevents students from thinking in the foreign language, and that it is boring and time-consuming: as a result, many teachers stay away from translation as a way to teach a foreign language (Malmkjaer, 1998). However, given the previous studies that have shown the effectiveness of translation for L2 learning and for supporting learners as a scaffolding tool, it should be integrated into L2 instruction (Bhooth, Azman, & Ismail, 2013; Nation, 2003; Swain & Lapkin, 2000). What is reported on in this article is related to the effectiveness of translation for the enhancement of L2 skills, but we aim to show the positive effects of translation with strong evidence, using a psycholinguistic method. Note that translation can be thought of as either L2 to L1 or L1 to

L2, but in this article it refers to the former. With regard to L2 skills, we focus on syntactic processing ability, which has not been studied well when translation is taken into consideration.

Literature Review

Translation is one of the linguistic activities that only people with more than two languages can use. The translation process is composed of several sub-processes, which include language comprehension and production, memory, attention and visual and auditory perception (Lim, 2011). Many researchers have advocated that translation can be a good tool to teach a second language. For example, Stern (1992) considered that an appropriate amount of L1 use helped to turn input into intake. Auerbach (1993) and Wharton (2007) deemed that students could feel a sense of security with being allowed to use their L1, because they believed that they could express themselves more accurately. With regard to L1's role in the improvement of L2 skills, Goundareva (2011) showed that vocabulary training with translation did not have a positive effect on vocabulary recognition but on vocabulary production. Another example is Laufer and Girsai (2008), who investigated the effect of translation on incidental learning of new vocabulary and collocations by comparing a contrastive analysis and translation group with a meaning-focused instruction group and non-contrastive form-focused instruction group. Each group was required to take immediate tests, which included passive and active recall of single words and collocations, and delayed tests following the completion of the task. The research findings revealed that the translation group scored significantly higher on all tests than the other groups. Laufer and Girsai accounted for this result with two hypotheses. The first hypothesis is the noticing hypothesis, which, according to Schmidt (1990, 1994), assumes that learners need to consciously notice forms so that input can be converted into intake. Laufer and Girsai suggest that providing the corresponding L1 of a foreign language feature can make the form noticeable. Another hypothesis is the task-induced involvement load hypothesis (Laufer and Hulstijn 2001), which postulates a better rate of word retention if the learning entails a high involvement load consisting of 'need', 'search' and 'evaluation'. Need refers to a motivational dimension, meaning that words regarded as necessary for task completion – such as needing to know a particular word for the comprehension of a passage – are retained well. Search is defined as the attempt to find information for unknown words. This includes, for example, looking up words in the dictionary. Evaluation is comparing a word with a context and judging whether the word fits into the context. Translation is related to the need component, given that translation into L1 makes the L2 source text necessary for its activity. The search component is involved in translation, because when translating into L1 and finding an unfamiliar word, learners are required to search for its meaning. Evaluation is present as well, due to the fact that learners often make more than one translation for a given text. While some studies have reported on the effect of translation on language acquisition as has been shown above, little research has attempted to examine it using a psycholinguistic method. (Actually, some researchers have used psycholinguistic methods with theories such as the Revised Hierarchical Model, a vertical process and horizontal perspective for translation study, but those studies are for the investigation of how target and source languages are represented during word or sentence processing, and thus have little relevance to this article. For this issue, see Lim, 2011). Given that psycholinguistics is capable of offering probative evidence, it should be considered worth employing in this investigation. In addition, no research, to our knowledge, has investigated whether translation affects the improvement of syntactic processing ability. Therefore, in this study, we employed a self-paced reading task with a priming experiment, which is thought to reflect an effect similar to the occurrence of

language learning (Lightbown & Spada, 2006), to clarify the effect of translation on the enhancement of syntactic processing ability.

Method

Participants

Twelve Japanese language learners of English majoring in English education or in European and American languages and cultures at a national university participated in our study. All the participants had normal or corrected-to-normal vision and were unfamiliar with the psycholinguistic method. In order to evaluate how fluent the participants were in English, they were required to take the Versant test, which showed that their English proficiency was between A2 and B2 according to the CEFR list.

Table 1
Summary of Second Language Learners' Biological Data and Proficiency

Japanese (n = 12)	Mean	Range	SD
Age (years)	23.08	20-26	1.71
Versant Scores	50.25	41-67	7.69

Materials

We constructed 20 reduced relative clause sentences as target stimuli and 57 filler sentences, which consisted of a variety of syntactic structures except for a reduced relative clause. Each target sentence was presented following a prime sentence, but for the filler sentences, there were both prime and non-prime sentences so that the participants hardly and consciously noticed the objective of the prime experiment. At least two filler sentences with their preceding sentences were manipulated to appear between target sentences. Additionally, a yes/no comprehension question followed two thirds of both target and filler sentences with the number of correct “yes” and “no” answers counterbalanced. The comprehension question asked whether its meaning corresponded to that of each sentence. The content of comprehension questions was written with the aim of checking whether the participants understood what the subject of the sentence did. In order for the participants to perform the translation activity, half of the preceding sentences for both target and filler sentences were given with an explanation, “translate the sentence”, in the participants’ first language. One example is shown below.

Prime (either with translation or not)

(1a). The mother watched by her friend was swimming in the river.

Target

(1b). The person watched by the boy was walking very quickly.

All the words used for the target sentences were selected from those in the word list of Yokokawa (2006), with word familiarity of 4.7 on a scale from 7 (very familiar) to 1 (very unfamiliar). Both prime and target sentences contained the same verb so that the priming effect could be observed at the comprehension level (Tooley, Traxler and Swaab, 2009). The target sentences were assigned to two lists where the prime sentences were presented either with the explanation requiring the participants to perform translation or not. If a target sentence appeared in a list with its prime sentence containing the instruction to translate, the

target sentence appeared in the other list, wherein the prime sentence did not ask the participants to perform translation. This counterbalancing method was adopted to compare the target sentences across the two conditions with the exact same sentences, meaning that concerns about length and frequency of critical regions were eliminated, though those types of linguistic information were controlled well. A critical region is a place on which the results of this experiment depended on. Each participant was given only one of the two sets.

Procedure

A self-paced reading task was employed using a Superlab5 for the collection of the data of target-sentence reading times, reaction times to comprehension questions, and comprehension accuracy. The target and filler sentences were presented segment-by-segment, but all the preceding sentences were given with no segment. The experiment was divided into first and second parts. In the first part, each participant read sentences either with translation or not. If they conducted translation

Table 2
Summary of Information of All the Words Used in the Critical Region of the Target Sentences

	Mean	Range	SD
Length (letters)	6	3-9	1.70
Familiarity	5.81	4.77-6.55	0.54

at this point, they read sentences without translation in the second part and vice versa. This measure was taken to counterbalance each condition.

Prior to the experiment, each participant was instructed to sit in front of the computer screen and received aural and written on-screen instructions in their mother tongue. In the translation section, the participants were asked to first translate a given sentence into L1 orally and then, to press a space key so that the next segmented sentence would appear with a fixation mark, which indicated the beginning of the sentence. In the non-translation part, they were just instructed to read in a self-paced way; if they read with translation in the first part, they were told not to make a translation in the second part. For each condition, the participants were required to read at their normal speed, attempting to comprehend the sentences as much as possible and to answer the yes/no comprehension questions. The experiment started with eight practice items to familiarize them with the procedure. It took each participant approximately 20 minutes to complete the task.

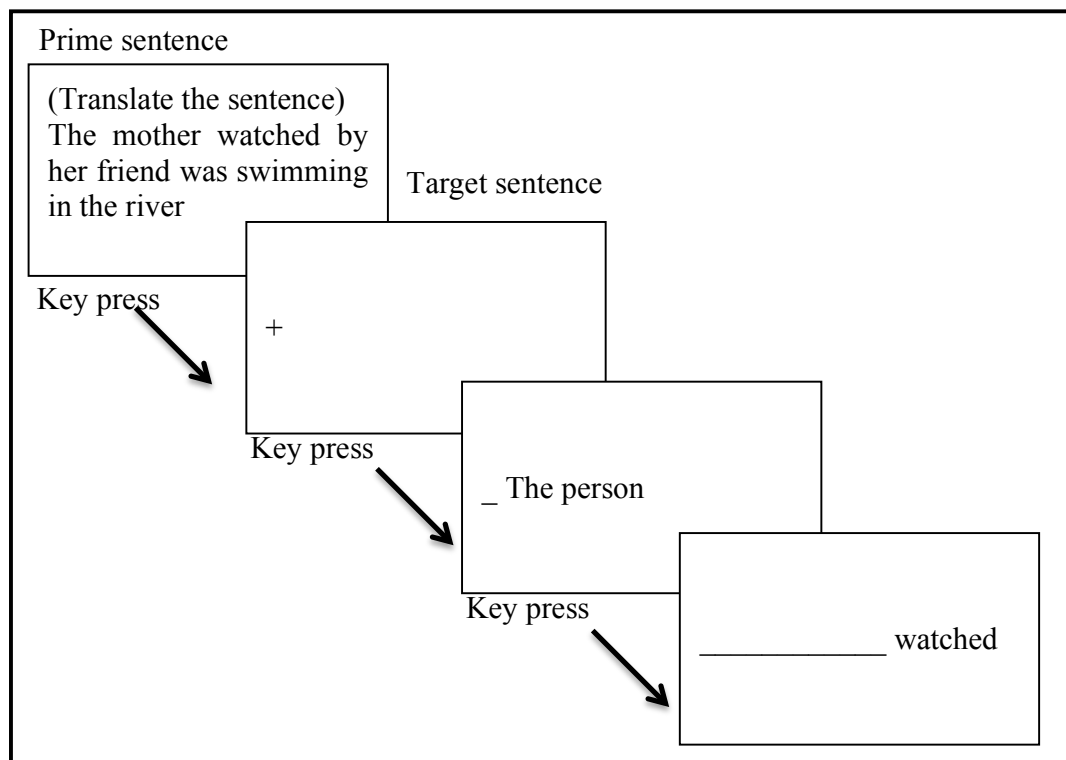


Figure 1. Experimental procedure. Prime and target sentence presentation.

Results

For comprehension questions that followed filler sentences, the response accuracy was approximately 88%. This high accuracy rate indicates that the participants tried to read carefully and focused on the experiment. The accuracy rate of the comprehension questions for the target sentences was 63% with translation and 60% without translation. The reason for the low accuracy rates can probably be attributed to the difficulty processing a reduced relative clause. In order to investigate whether these figures are statistically different, we conducted a logit mixed-effect model (Jaeger, 2008). The model consisted of "condition" (translation or non-translation) and "proficiency" as centered fixed factors, and "subject" and "item" as random factors with random slopes and intercepts for subjects and items. The statistical model found no significant main effects of both condition and proficiency (Estimate = 0.466, $SE = 1.106$, Wald's $z = .421$, $p = .67$; Estimate = -0.020, $SE = .057$, Wald's $z = -.349$, $p = .73$), which indicated that translation did not affect the level of the L2 participants' understanding of the syntactic structure (this will be discussed further below).

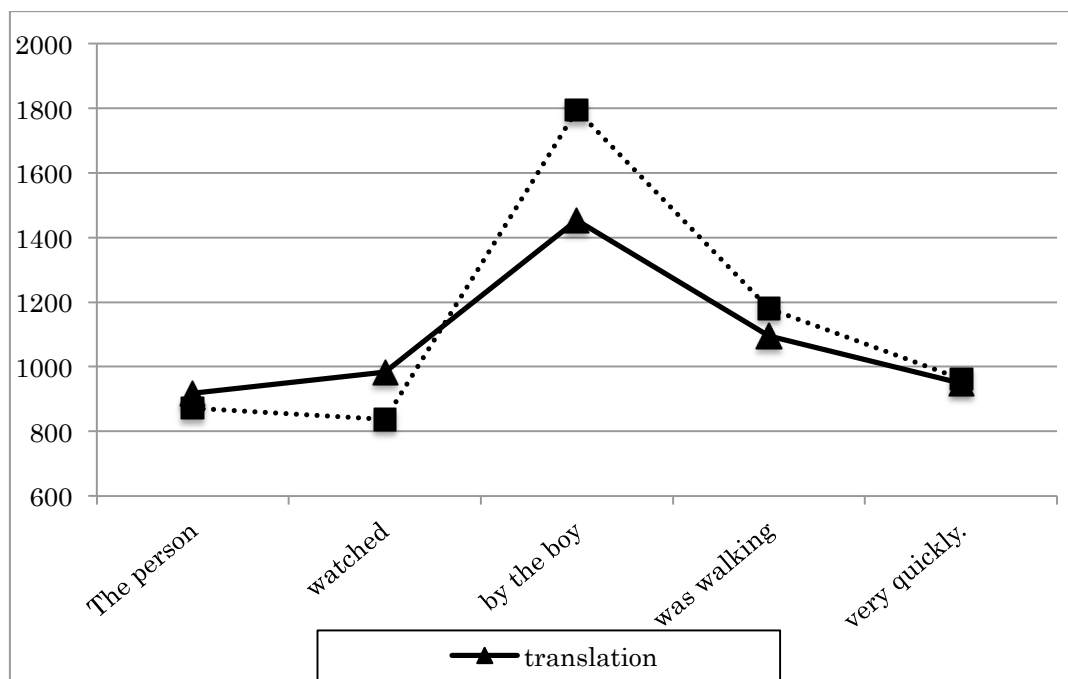


Figure 2. Segment-by-segment raw reading time data for the target sentences of each condition.

Before analysing the reading time data, we removed the collected data above 4000 milliseconds for items within individual segments of each condition, and then eliminated the remaining data higher and lower than 3 in the standard deviation of the mean in an attempt to weed out any possible outliers. These processes affected less than 0.01% and 0.02% of the collected data, respectively. Note that any target sentences with an incorrectly answered comprehension question were excluded from the outlier removal procedures as well as from the statistic model reported below. For the analysis of the data, we performed linear mixed-effect models with condition and proficiency as centered fixed factors, subject and item as random factors, with reading and reaction time data transformed into z -scores as response variables.

The linear mixed effect models found no significant differences in reading times of all the segments except for Segment 3 between the two conditions (Table 1). This means that the participants were able to read the experimental stimuli more easily after they processed the same syntactic structure with translation into their L1, compared with no translation. There was no main effect of proficiency on reading times of each segment. With regard to the summed reading times of the comprehension questions for the target sentences, again, we found no major effect of condition and proficiency, Estimate = -0.365, $SE = .188$, $t = -1.944$, $p = .08$; Estimate = -0.030, $SE = .018$, $t = -1.667$, $p = .12$, suggesting that the degree of difficulty answering the comprehension questions in each condition did not differ for the participants, though it seems numerically different (translation: 3455 vs. non-translation: 4202).

Table 3
Linear Mixed-Effect Models by Segment and Measure

<i>Measure</i>	<i>Translation vs. Non-translation (critical region)</i>			
	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<i>Segment 1</i>				
(Intercept)	-0.034	.227	-0.152	.88
Condition	0.135	.112	1.202	.23
Proficiency	-0.010	.027	-0.365	.72
<i>Segment 2</i>				
(Intercept)	-0.114	.180	-0.634	.54
Condition	0.226	.172	1.311	.20
Proficiency	-0.029	0.019	-1.543	.15
<i>Segment 3</i>				
(Intercept)	0.241	.158	1.520	.15
Condition	-0.486	.157	-3.101	.008 **
Proficiency	-0.022	.017	-1.291	.23
<i>Segment 4</i>				
(Intercept)	0.130	.189	0.691	.50
Condition	-0.194	.167	-1.157	.27
Proficiency	-0.006	.021	-0.297	.78
<i>Segment 5</i>				
(Intercept)	0.027	.149	0.185	.86
Condition	-0.048	.149	-0.322	.75
Proficiency	0.007	.016	0.425	.68

Discussion

The purpose of this study was to examine whether L2-L1 translation could affect the development of syntactic processing ability as well as the degree of comprehension for the targeted syntactic structure. The self-paced reading and priming experiments found significantly decreased reading times of reduced relative clauses on the critical region after participants conducted translation of the same syntactic structure into their L1, compared with the time they did not. This suggests that the syntactic knowledge was primed more greatly due to the translation activity, that is, a greater learning outcome could be expected in grammar study if it was translated into learners' L1 (Lightbown & Spada, 2006). However, the subsequent processing was not affected by the translation activity, which also did not make any difference in accuracy rates for the comprehension questions following the target sentences. We would usually expect that ease in processing a specific part of a sentence results in the facilitation of understanding the sentence and in the processing-speed advancement of the subsequent sentence parts. There are several possible reasons that could account for this result. First, because a reduced relative clause is one of the most difficult constructions to process, the facilitation effect of priming could not contribute to the participants' understanding level as well as their sentence processing after the critical region.

Higher comprehension rates and reduced reading times might have been observed if an easier structure had been targeted. It was also possible to predict that L2-L1 translation would positively affect their accuracy, but it was too slight to observe with the type of comprehension questions used in this study, which only asked what the subject of a sentence did (e.g., *The person watched by the boy was walking very quickly: Q. The person was walking/watched the boy*).

Conclusion

In this study, we investigated whether and to what extent L2-L1 translation contributed to the improvement of syntactic processing ability. The research findings showed that L2 learners benefited more significantly from the priming effect when they translated the preceding sentence into their L1, although it may not be a good method for the comprehension of the sentence. Future studies might explore the effect of translation with different syntactic structures or on another linguistic feature.

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