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Investigating the Cognitive Processes of Translation Writing Tasks

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Despite universal criticism of the grammar-translation method, the use of translation tasks in English education continues to remain prominent in secondary schools and on entrance examinations in Japan. However, very little is known about the cognitive processes and the pedagogical value of translation tasks. In this exploratory study we investigated the cognitive processes of learners performing translation writing tasks from Japanese to English. Three 1st-year Japanese university students were selected from a group that practiced Japanese to English translation tasks for one semester. The participants translated a variety of sentences from Japanese to English as well as an excerpt from a short paragraph. Through one-on-one semistructured, stimulated recalls, we were able to ascertain which cognitive processes factored prominently in the tasks, including lexical, grammatical, and syntactic knowledge. The results indicate that lexical processing accounted for the largest proportion of attentional resources, followed by syntactic processing.

文法訳読法に関しての普遍的な批判があるにも関わらず、日本の中高英語指導や入学試験において、訳読タスクは未だに重要な位置付けにある。しかし、訳読タスクにおける認知プロセスと教育的価値についてはほとんど知られてはいない。この研究では日本語から英語に翻訳するライティングタスクにおける認知プロセスについて調査した。日本語から英語に翻訳するライティングタスクを一学期間行った日本の大学におけるグループから3人の一年生が被験者として選ばれた。被験者たちは日本語の様々な文章や短い段落の抜粋を英語に翻訳した。その後、研究者と被験者が一対一で行った半構成的、刺激再生法を通して、訳読タスクでは、語彙、文法、統語知識を含むどの認知プロセスが顕著に現れることを確認することができた。研究結果は訳読タスクにおいて、語彙的処理が最も多くの注意資源を費やし、その次に統語（構文）処理が続くことを示唆している。

Although research on L2 writing complexity has seen an increase of interest over the past few decades (Byrnes, Maxim, & Norris, 2010; Ortega, 2000, 2003; Polio, 2001; Wolfe-Quintero, Inagaki, & Kim, 1998), little is known about tasks that help learners develop syntactic complexity. Ortega (2003) defined syntactic complexity as "the range of forms that surface in language production and the degree of sophistication of such forms" (p. 492). Several studies have used a dynamic systems perspective to measure learners' development of syntactic complexity over time (Spoelman & Verspoor, 2010; Verspoor, Lowie, & van Dijk, 2008; Verspoor, Schmidt, & Xu, 2012), but few if any studies have compared the effect of different writing tasks on the development of learners' L2 writing complexity. Marlowe (2016) looked at the effect of three different writing tasks on syntactic complexity in L2 writing. In that study, groups of learners performed either sentence-combining, timed writing, or translation writing tasks. The results showed that among the three tasks, sentence-combining and translation significantly outperformed timed writing on several complexity measures, but did not differ significantly from each other. Marlowe speculated that "translation in the form of Japanese to English and sentence-combining might tap into similar cognitive processes that are conducive to developing complexity in L2 writing" (p. 7), and called for further research to understand differences or similarities in the cognitive processes between these two tasks. The research presented in this paper is the first half of an exploratory qualitative study of the cognitive processes of learners performing sentence-combining and translation tasks. This paper is a report on the results of the translation tasks exclusively.

Grammar Translation Method and Translation Tasks
What is widely known as the grammar-translation method was considered the dominant approach to foreign language education in Europe between 1840 and 1940 (Richards & Rodgers, 2001). Generally, this approach includes the study of grammatical rules, learning through dictionaries, memorization of words, and different forms of translation. Today, the instructional methods associated with the grammar-translation method are

somewhat reviled among modern linguists who subscribe to communicative language teaching (CLT). H. D. Brown's (1994) assessment of the grammar-translation method was that it "does virtually nothing to enhance a student's communicative ability in the language" (p. 53). Richards and Rodgers (2001) remarked that it is "remembered with distaste by thousands of school learners" (p. 7).

Despite its poor reputation, the grammar-translation method is still reflected in college level textbooks and widely practiced in many places around the world (Richards & Rodgers, 2001). In Japan, it is often found in the form of translation tasks, which remain an entrenched form of instruction, as evidenced by teacher practices (Gorsuch, 1998; Hino, 1988; Nishino & Watanabe, 2008) and textbooks approved by the Ministry of Education, Culture, Sports, Science and Technology (MEXT; Kobayakawa, 2011, 2014). Despite arguments that translation tasks have little value in modern foreign language education, the fact is that aspects of this method continue to be used in language pedagogy around the world. Although grammar-translation might lack communicative value or theoretical basis, the question still remains as to whether translation tasks bring any pedagogical value to the classroom. The purpose here is to offer empirical evidence in order to reexamine the value of tasks associated with the grammar-translation method. Therefore, to further understand what role translation tasks play in SLA, if any, it may help to examine the cognitive processes and potential pedagogical value of translation tasks.

The Noticing Hypothesis and Attention

Over the course of several papers, Schmidt (1990, 1993, 1995) argued that SLA is driven by what learners pay attention to and notice in the target language. Essentially, noticing is a conscious process by which learners notice either formal features of the input or the gap between the input and the learner's output. Although there is considerable debate regarding the role of attention in learning (Truscott, 1998), it is generally accepted that attention is an important factor in L2 learning. Schmidt (2001) later drew upon the work of Tomlin and Villa (1994) to further refine the *noticing hypothesis* by separating the attention process into three subsystems: (a) alertness, which is the learner's readiness and motivation to receive the input; (b) detection, which is the learner's selection or engagement of the input; and (c) orientation, which is directing attentional resources to a certain type of class of information. This study focuses specifically on the role of orientation during translation writing tasks.

Attention, which is influenced by instructional techniques and tasks, is considered an integral aspect of the process of SLA (Gass, 1997; Long, 1996). Tomlin and Villa (1994) argued that aligning attentional resources to a specific stimulus can have the effect of

facilitating further processing, especially in the case of when learners are oriented to significant differences. Therefore, instructional techniques such as sentence-combining and translation tasks can orient the learners to particular formal linguistic features, making them conducive to noticing differences. However, attentional resources directed toward one type of sensory information can come at a cost to other types or classes of information. The original hypothesis in Marlowe (2016) was that sentence-combining would outperform both translation writing tasks and fluency writing because sentence-combining tasks hone in on practicing syntactic operations whereas translation tasks require attention to several aspects of the language.

Purpose

The purpose of this study was to understand the particular aspects of language that learners direct their attentional resources toward during Japanese to English translation tasks. Although translating from English to Japanese is also a common form of translation task, translation tasks from Japanese to English were chosen, in keeping with the earlier research (Marlowe, 2016) on which this study was based. This study investigated the following research questions:

RQ1. Which aspects of language do learners direct their attention toward during sentence translation tasks (L1 to L2)?

RQ2. Which aspects factor most prominently in sentence translation tasks?

RQ3. To what degree do these aspects share attentional orientation?

Method
Participants

The participants included three students at a national university in Western Japan. All participants were male native speakers of Japanese, and practiced translation writing tasks as part of their regular in-class writing course. The participants were chosen based upon their writing scores from a yearlong writing course taught by the primary researcher. Self-reported scores for the TOEIC (and Eiken, see Table 1) were used for reference, but these scores reflect the test for listening and speaking only. Using the average scores from two paragraphs and two essays submitted during the academic year, the participants generally represented three levels of writing proficiency. Table 1 provides the relevant information on the three learners (names are pseudonyms).

Table 1. Participants

Names	Sex	Age	Average writing score	TOEIC
Kohei	Male	20	72.5	595
Yuzu	Male	19	83.5	500
Yuichi	Male	19	91.5	500*

Note. *This score is based on estimated conversion of Eiken level 2 (see Nagashima, 2001)

Procedure

In order to investigate the cognitive processes of translation tasks, stimulated recall methodology (Gass & Mackey, 2000) was utilized. According to Lyle (2003), "stimulated recall is a family of introspective research procedures through which cognitive processes can be investigated by inviting subjects to recall when prompted by a video sequence, their concurrent thinking during that event" (p. 861). Stimulated recalls have been used in L2 writing research as a means to access the thought processes that occur during writing tasks. In order to overcome criticisms of the method (Ellis, 2008) and enhance validity, careful consideration was given in following the guidelines set by Gass and Mackey (2000) including providing training tasks and limiting the time between the task and the recall.

The general procedure for the stimulated recalls in this study included asking participants to complete several translation tasks, review a recording of the completed task, and verbalize their thinking during the process of completing each task. The tasks consisted of a practice drawing task, three practice sentence translation tasks, nine sentence translation tasks, and three sentence translation tasks that were part of a paragraph. All of the sentence translation tasks were designed by the first author and were carefully controlled for vocabulary and idiomatic expressions. The focus of the tasks included linguistic aspects that the participants had practiced as part of the earlier quantitative study (Marlowe, 2016), including coordinating conjunctions, adverbials, and noun modifiers. The practice drawing task was used to orient the participants to the method of stimulated recalls. The practice sentence translation tasks were used to familiarize participants with stimulated recalls for the main translation writing tasks.

Participants were first asked to read an explanation about the study and sign a consent form before receiving a brief explanation of the procedure. Next, they completed the practice drawing task followed by a set of three practice translation writing tasks. They were then asked if they had any questions or concerns before moving on to the main

tasks. After completing each set of three translation writing tasks, participants were asked to review the written record, the video record, or both and to explain their thinking. All stimulated recalls were conducted in the participants' L1 (Japanese) by the second author to ensure that they were able to express themselves accurately and in specific detail. Occasionally, follow-up probing questions were used to elicit more detail or to clarify meaning.

After completing the recalls, a follow-up interview was conducted regarding the tasks and participants' experiences practicing them in class. Each participant was asked the following questions in order to ascertain their overall view and opinions of the tasks:

1. What do you think about these tasks?
2. What were some of the things you found helpful?
3. What were some of the things you found challenging?
4. What did you focus on the most when completing these tasks?
5. How do you think these tasks help you with your writing?

Each session took between 45 minutes to an hour total to complete. The sessions generally included 5 to 10 minutes for reading the study explanation and signing the consent form. The practice sessions took approximately 10 minutes. The main tasks including recall lasted anywhere between 25 and 30 minutes and the interview took about 10 minutes.

Analysis

The data set primarily comprises comments made during the stimulated recalls. Comments made in response to follow-up or probing questions were used to verify coding in the stimulated recalls. Additionally, comments from the postinterview were used to provide insight into the results.

All of the stimulated recall and postinterview audio data were transcribed and translated from Japanese to English. The five codes used for this study were *syntactic*, *grammatical*, *lexical*, *semantic*, and *metacognitive*, adapted from Mackey, Gass, and McDonough (2000), a study that focused on verbal interactional feedback. Adaptations included the following: First, *phonology* was eliminated because it is a factor only in speaking and listening tasks, and the current study focused only on writing tasks. Second, *metacognitive* was added as a category that was adopted from Uzawa's (1996) analysis of think-aloud

protocols of three different types of writing tasks. Finally, *morphosyntactic* was divided into two categories, morphology and syntax, respectively. This was done because the overall purpose of the study focused on investigating syntactic complexity. However, we recognized that these two codes are occasionally inseparable and therefore allowed for passages to receive multiple codes. Subcodes were also used during the coding, but were not analyzed in the results.

Syntactic comments were those that referred to the organization of the sentence and included sentence formation, sentence structure, word order, phrasal and clausal order, and conjoining sentence parts. *Grammatical* referred to rule-based knowledge of the language and included rules, morphology, and mechanics. *Lexical* referred to words or vocabulary and included known words, unknown words, translation, and word choice. *Semantic* referred to the meaning or logic of language and included meaning, understanding, and clarifying. *Metacognitive* referred to the participant's awareness or understanding of the task or approach to solving the task and included task, strategy, evaluation, experience, and level of difficulty. Examples of some of these codes, taken from the data, can be found in the Appendix.

In order to establish intercoder reliability, the first author initially performed the coding. Then, 53 randomly selected primary codes were passed on to the second author to code independently. This accounted for over 30% of the total content, which is above the 10% that is considered as sufficient (Lombard, Snyder-Duch, & Bracken, 2004). Cohen's kappa, which excludes chance values, was used to calculate interrater reliability. The kappa value was .74 with a 95% confidence interval of .583 to .872 and significant with $p < .001$. This is considered a "substantial" level of agreement, especially for an exploratory study (Landis & Koch, 1977). Furthermore, the researchers discussed any differences in the coding until reaching mutual agreement.

Results

Overall

Drawing upon the research of Mackey et al. (2000) and the data gathered for this study, the researchers identified 176 processes across five primary categories. As illustrated in Table 2, the aspects of language that learners directed their attention toward during sentence translation tasks were primarily lexical. Syntactic processing also played a relatively large role. Little attention was focused on semantics, while grammatical and metacognitive attention were roughly equal.

Table 2. Overall Results of Stimulated Recalls

Process	Total	Percent
Syntactic	37	21
Grammatical	24	14
Lexical	71	40
Semantic	18	10
Metacognitive	27	15

Table 3 shows how individual results varied among the participants, especially in the amount of syntactic and metacognitive processing. Despite this variation, the majority of the attentional resources among all participants were clearly lexical. Syntactic processing accounted for the second largest category for Yuzu and Kohei. Attention to metacognitive processing was relatively low for Yuzu and Kohei, but accounted for the second largest amount of attentional resources for Yuichi. Moreover, even though Yuichi's attention appears to have been more evenly divided among syntactic, grammatical, semantic, and metacognitive processes, lexical is still clearly the largest category, just as for the other participants.

Table 3. Individual Results of Stimulated Recalls

Process	Yuichi		Yuzu		Kohei	
	Number	Percent	Number	Percent	Number	Percent
Syntactic	13	13	10	26	15	34
Grammatical	16	17	2	5	6	14
Lexical	35	38	16	41	18	43
Semantic	10	11	6	15	2	4
Metacognitive	20	21	5	13	2	4

In summary, the data presented here illustrate that there are at least five processes of attentional orientation that could be identified through the use of stimulated recall methodology, including syntactic, grammatical, lexical, semantic, and metacognitive. Second, attention to lexical aspects of language during translation tasks accounted for

the largest amount of attention overall and among individual participants. Third, attention to syntactic aspects of language during translation tasks accounted for the second largest amount of attention overall, but only for two of the three participants specifically. Finally, there appears to be a large amount of variation between the other processes among the three participants. One notable difference is that the two most proficient writers, Yuzu and Yuichi, paid more attention to metacognitive processing. This might indicate that higher proficiency writers focus more attention on metacognitive aspects of the task.

Discussion and Results

The objective of this study was to explore attentional orientation to aspects of language during translation writing tasks from Japanese to English. From the results of the stimulated recalls, these translation tasks appeared to divide attentional orientation between five primary cognitive processes. Essentially, some of the same processes described in Mackey et al. (2000) were found, with the exception of *metacognitive*, which we had adopted from Uzawa (1996). This makes sense, as writing is a self-paced task that allows for reflection and revising, whereas conversation is an interactive task that happens in real time, leaving no record of what transpired. The participants in this study seemed keenly aware of the task requirements and frequently made comments relating to evaluating the results of their written translation. This might indicate that translation tasks divide attentional orientation into multiple aspects of the target language. Indeed, reflecting on being part of the translation writing task group in the earlier quantitative study (Marlowe, 2016), Yuichi remarked, "I thought that we in [the translation group] were required to use our brain more fully than those in [the sentence-combining group]."

Three main ideas emerged from analyzing the participants' responses. First, the results indicate that translation is primarily a lexical task. Attention to lexical aspects of the language during translation tasks commanded a large proportion of the learner's attention. The struggle with vocabulary was also revealed in comments in follow-up interviews. Yuzu stated that the tasks made him feel that his "vocabulary was poor." Kohei said that one of the main challenges of the tasks was being "unable to come up with the proper English words." This was echoed by Yuichi when he stated "I often find it difficult to come up with English expressions that perfectly translate the original meaning." Despite the challenges, Kohei felt that struggling with vocabulary encouraged him to "try new expressions." The results of the stimulated recall data combined with the participants' comments support the findings that lexical processing accounted for the largest portion of attentional resources when translating written material.

Second, syntactic processing accounted for the second overall largest portion of attentional resources. One possible reason may have to do with the nature of the tasks, which provided instructions for the use of a specific target grammar. Without having to come up with the proper grammatical structure, learners instead might focus available attentional resources towards sentence structure. When asked about the most challenging aspect of the translation tasks, Kohei claimed it was sentence structure. He further elaborated: "I do understand that Japanese and English have different structures, but I believe it is essential not to make mistakes in the basic structures." However, Yuichi's results showed that grammatical aspects of language were just as important as syntactic processing. He stated, "While I paid attention to the sentence structures, such as SVO and SVOC, I was being careful in choosing the right verb for the subject and the right tense for the story." This was reflected in Yuichi's individual data results, in which grammatical processing accounted for a slightly larger proportion than syntactic. Although overall there was more syntactic than grammatical processing, this could be attributed to individual differences. During the postinterview, Yuichi mentioned that he was an English instructor at a cram school and that he had reviewed a grammar textbook for his job. He further admitted that "the teaching process is a learning process for myself." Yuichi's focus on grammar in his own teaching might have contributed to his focus on grammar while performing the translation writing tasks.

Finally, the other four processes were roughly equally divided among the remaining attentional resources. The overall results appear to indicate this, but there was a lot of variation between the individual participants. On the one hand, the overall data show the remaining categories ranging from 10% to 21%. If these categories were equally divided after removing the lexical proportion, they would account for 15% each. Therefore, it appears on the surface that the remaining categories divide into relatively equal proportions. However, when analyzing the data on an individual level, distinct variations are revealed. One is the higher levels of metacognition of Yuichi and Yuzu as compared to Kohei. This could be contributed to Yuichi's and Yuzu's higher writing proficiency. Some research suggests that metacognitive strategies tend to be more evident in advanced learners (Dreyer & Oxford, 1996; Oxford, Judd, & Giesen, 1998). Perhaps, as learners strengthen basic sentence writing skills in areas such as grammar and syntax, they are able to focus more attentional resources toward higher order thinking about the task, such as comparing and evaluating the results of the translation. Accordingly, Kohei, who had the lowest writing proficiency score, allocated 48% of his attentional resources to grammar and syntax combined, whereas Yuichi and Yuzu focused less on those aspects.

Implications, Limitations, and Conclusion

This study provides several notable implications for L2 writing instruction and research. First, translation tasks, being primarily a lexical task, might be helpful for strengthening lexical access and developing lexical knowledge. Second, translation tasks might divide attentional orientation into multiple aspects of the target language. The advantages and disadvantages of this division of attentional resources are beyond the scope of this study, but it is possible that different aspects of the language competing with one another for limited attentional resources may be detrimental to learning. This would be in line with the view of Ellis (2008), who claimed that "learning is more likely to occur when attention is focused . . . learners are more likely to experience interference when attempting to attend to more than one aspect of the L2" (p. 441). Third, individual differences among learners, such as proficiency, might be a contributing factor to the variation of division of attentional orientation when performing translation tasks.

There were several limitations that may have affected the results and that indicate directions for future research. The first limitation is the small number of participants, which makes it difficult to generalize to learners beyond this study. Future research should include more participants, particularly multiple participants at different levels of proficiency, in order to get a better understanding of the role of proficiency in these tasks. Second, individual differences, including aptitude, motivation, and learner beliefs, were not taken into account. As this was a small qualitative study designed to explore questions raised by a previous, larger, quantitative study, more in-depth information about the learners was not gathered from the participants. Future researchers might gather such information through surveys, interviews, and observational data. Finally, although the researchers sought to follow the guidelines laid out by Gass and Mackey (2000), there are legitimate questions about the validity of introspective methods such as stimulated recall methodology. It is important to understand that this method is not a perfect representation of the thinking process, but rather a window that provides an indication of what learners might be grappling with cognitively while performing language tasks.

In conclusion, the data presented here are limited, but indicate a path to understanding more about the pedagogical value of translation tasks in developing syntactic complexity in L2 writing. The results indicate that translation tasks appear to be primarily lexical but also draw learners' attention to syntactic aspects of the target language. Although translation is often lumped in with modern linguists' negative perspectives on tasks related to the grammar-translation method, perhaps the type of translation tasks performed by learners in this study provides some pedagogical value that is often over-looked under the current dominant paradigm of CLT. In this study, the primary benefits of translation appear to be substantially lexical rather than syntactic. Regardless, future research in this area should compare translation with other writing tasks in order to determine whether translation tasks are more or less conducive to other writing tasks in hastening the development of L2 writing.

Bio Data

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Appendix
Examples of Stimulated Recall Codes
Syntactic

- "I originally wanted to modify the subject of the sentence by using a relative clause starting with *that.*" (sentence structure)
- "I wondered which adverb should come first, and wrote *loudly on Saturday*." (word order)
- "I decided to use the conjunction *and* to combine *ryoko surukoto* and *atarashii hito-bito ni aukoto*." (conjoining)

Grammatical

- "*Wear* is a transitive verb, so I added an object *it*, meaning the business suit." (rules)
- "I started the sentence by writing *Akiko sang* and continued it with *songs*, the plural form." (morphology)
- "I was not sure of the spelling of the name *Kurisu*." (mechanics)

Lexical

- "For the verb *taberu*, I used *eat*." (known)
- "I could not immediately think of the English equivalent for *fukuten*." (unknown)
- "I translated *sono okano cho-jo* de as *on the top of the hill*." (translation)
- "I wondered if I should go with *get on* or *ride*, and decided to use *get on*." (word choice)

Semantic

- "I chose the word *bright* because it would go well with the shiny image of the watch." (meaning)
- "I understood the part *yoku internet de mono wo kau* as the result of the previous sentence." (understanding)
- "I realized that the *it* would mean the *color*, not the *dress*, so decided to use the noun *dress*." (clarifying)

Metacognitive

- "The target grammar point was noun modifiers, I focused on the use of the adjective *hikaru* when I read task #1, *Hayato wa hikaru kindokei wo kata*." (task)
- "I added *always* when I realized I had missed the adverb *itsumo* as I checked my translation." (evaluating)
- "I wondered if I should use *on*, *at*, or *in* with *sale*, and chose *on* because I have seen it used in that way." (experience)