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英語を教授言語とする英語教育について：英語による授業が及ぼす日本人英語学習者の認知処理過程への影響とは

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Impact of English as Medium of Instruction (EMI) in EFL: To What Extent Does Teaching in English Affect Thinking Processes of EFL Learners?

Hideki Goya

Introduction

In Japan, a new Course of Study will become sequentially in effect starting in 2020 (MEXT, 2017; 2018). This implementation has been taken in action with an aim to foster developments of not only foreign language proficiency but also students' deeper thinking ability (MEXT, 2017; 2018). As part of the implementation, an application of English as a medium of instruction (EMI) in English lessons will also be extended to English as a foreign language (EFL) classes at junior high schools in Japan. Many teachers are concerned of whether it would be possible to pursue simultaneous developments of foreign language proficiency and cognitively deeper thinking ability under the current changeover (Torikai, 2014; 2017). In fact, psychological experiments have confirmed an effect; by thinking in a foreign language, people show more rational and effortful behaviors through what is called the foreign language effect (e.g., Costa, Foucart, Hayakawa, Aparici, Apesteguia, & Heafner, 2014). A concern of the effect in the context of EFL is that the effect might be construed as evidence of cognitive development in favor of EMI lessons in EFL.

The purpose of the present study is to shed more light on the effect in relation with cognitive development. Especially, this study aims to investigate an alternative interpretation that the effect is in fact a result of cognitively shallow processing due to a lack of sufficient cognitive resource for complex decision, not simply because thinking in a foreign language leads to a rational conclusion. The present study further assumes that sufficient cognition may compensate for a deficiency of English proficiency

necessary for the adequate cognitive processing to reach a scrutinized conclusion. By investigating the above, the research outcome will support what English teachers in Japan should prepare for in a full implementation of EMI lessons under the new course of study.

Research Background

EMI has been globally drawing much attention of educators. In 2009, the ministry of education, culture, sport, and technology in Japan (MEXT) officially announced a shift in pedagogical measure for a language policy in English as a foreign language (EFL) classrooms (MEXT, 2009). This policy continues as effective as part of the new Course of Study, reinforcing the necessity of increasing opportunities for output activities in EFL classes and encouraging students' use of English in pursuit of the accelerating communicative competence development at all junior and senior high schools in Japan (MEXT, 2017; 2018). Such redirection of the EFL pedagogical policy emerged as a reaction against a heavy reliance on a traditional method, the grammar-translation method (GTM), which was recognized to have negatively impacted students' communicative competence development (Torikai, 2014). English teachers have been also received blame and were instructed to carry out their lessons exclusively in English so that their students would assumingly develop their communicative competence due to rich exposures to the target language (MEXT, 2019). This exposure to the target language was believed to be fruitful (Kubota, 2019) according to the traditional view of second language acquisition theories (Krashen, 1985; Long, 1985; Swain, 1985). Such view has been drawing much attention to the way in which EFL learners learn English through English (Dearden, 2014). Consequently, teaching English through English (EMI) became the center of EFL lessons in Japan.

A question regarding EMI is to what extent and in what way EFL learners would benefit from EMI lessons. In general, many, if not all, studies provided ample empirical evidence; EMI students showed better learning outcomes compared to their counterparts (Admiraal, Weshoff, & de Bot, 2006; Jimenez, Catalan & Ruiz de Zarobe,

2009). In particular, as an outcome of implementation, EMI students showed native-like proficiency in receptive skills (i.e., reading and listening) but not in others (i.e., writing and speaking, pronunciation, vocabulary). In more recent studies, however, a longitudinal study in the pre-post design found that Turkish university students had developed receptive skills such as reading and listening but not writing after two to four years of learning (Cosgun & Hasirci, 2017). Likewise, noticeable changes in receptive skills were found in a study carried out at Catalan University (Ament & Prez-Vidal, 2015). Other studies investigating the development of academic writing skills found an improvement of productive skills and knowledge such as structural knowledge, writing invention, and formality (Goya, 2016; Storch, 2009). Furthermore, Goya (2018) examined such development in his empirical research in academic writing in a college-level EFL course. Specifically, his participants (n = 10) in the writing course taught exclusively in English produced more K1-level (i.e., the first thousand level) words along with the number of sentences produced than average. On the other hand, the number of academic words used decreased over 16 weeks. With a focus on how proficiency plays in EMI lessons, Goya (2016) concluded that after a semester long project-based learning (PBL) English writing course, his participants with different proficiency levels benefited from EMI lessons equally. All in all, EFL learners benefit from learning content as well as subject matter in the target language to some extent.

The new Course of Study also stresses another important changeover cognitive development as learning outcomes. In addition to the development of communicative competence in English, there is an acrimonious dispute over whether the national curriculum standard for EFL can help develop essential skills to deal with the globalized society for students. In particular, the Course of Study issued in 2018 explicitly spoke of a necessity to foster essential skills to survive in the next generation with the expression, “active learning” (MEXT, 2017; 2018). Such implementation was to address an importance of pedagogical shift from knowledge transmitting-based pedagogy to a more autonomy development-based one so that prospective students under the current educational reform would be able to survive in a society where there

is no absolute answer to versatile issues around them (MEXT, 2017; 2018). What is necessary in our pedagogy, according to the Course of Study, is the development of critical thinking, which has been identified as one of the most important skills (Guiller, Durndell, & Ross, 2008). In fact, fostering students' critical thinking ability has become an important goal of English language education; The development of cognitive skills is described as one of the primary goals of the newly implemented pedagogical goals in EFL classes (MEXT, 2017; 2018). As the matter of fact, the current pedagogical reform undertaken aims to help learners become capable in English communication so that they can solve whatever issue they find in the global society.

However, a discrepancy exists among empirical studies (Goya, 2016; Yang & Gamble, 2013) investigating the relationship between critical thinking ability and English proficiency development as a result of EFL classes. Yang and Gamble (2013) investigated whether a lesson designed to help develop critical thinking skills in EFL would be effective for proficiency, academic achievement, and/or critical thinking ability. The study found that various comprehension activities in a variety of collaborative forms held within an authentic environment with experienced facilitators produced argumentative essays written in English demonstrated EFL successfully improved students' critical thinking skills. Contrarily, Goya (2016) did not find such effect when he investigated whether college-level EFL learners in a semester-long PBL writing course exclusively taught in English would achieve adequate development of critical thinking skills. Specifically, the study of the students' self-report revealed that none of his learners at the intermediate level developed cognitive skills. With regards to perception of cognitive development in English classes, Goya (2019b) conducted a survey with in-service EFL instructors. The study was to explore if the instructors (n = 53) serving at public high schools might strive to foster students' critical thinking skills through their EMI lessons. Texts from the questionnaire were examined through a cluster analysis to clarify latent concerns in terms of their interpretation, application, and reflection of deep learning. The study found that very few of the instructors had interpreted "deep learning" (MEXT, 2017; 2018) for cognitive development

in the Japanese EFL context. As seen above, with inconsistent empirical results as well as little understanding of deep learning among the in-service EFL instructors, whether EFL lessons under the new educational standard simultaneously cultivate the development of critical thinking skills and English language skills remains uncertain.

Findings from studies in the field of the decision-making process may help enlighten the above point. In particular, some studies in moral psychology attempted to shed light on how foreign language use might affect the participant's thought-making process and their subsequent reaction as a result of the process. In general, when people make a critical decision, a number of factors influence their process (Polonioli, 2018); In particular, language is one of them. More specifically, what language we use tends to affect, to some extent, how we think (Athanasopoulos, Bylund, Montero-Melis, Damjanovic, Schartner, Kibbe, Riches, & Thierry, 2015; Federick 2009) since as Athanasopoulos et al. (2015) contends, people perceive the world differently according to languages. To investigate the influence of languages on our decision-making process, many researchers have conducted psychological experiments. In a scenario of the experiment, participants decide whether they save one person in the path of a runaway train or five others who are on a safe trail. In order to save the man, participants need to push the button that changes the direction of the train, causing the train to kill the five safe men. In another version of the trolley problem, the footbridge version, instead of pushing the button, participants push the man standing on the footbridge arching over the trail of the train, causing him to fall into the path of the train approaching five men. Pushing the man off the bridge would stop the train so that five men could be saved.

The trolley problem has often been conducted to investigate what decision participants make in a situation where their morality is at risk (Hayakawa, Costa, Foucart, & Keysar, 2016). It is well known that the decision can vary from, a more "intuitive 'automatic' processes prompted by the emotional content of a given dilemma" (or deontological responses) to a more "rational, effortful, controlled processes driven by the conscious evaluation of the potential outcomes" (or utilitarian responses) (Greene & Haidt, 2002). Many have become interested to what extent

the use of foreign language would affect the decision compared to the use of native language (i.e., foreign language effect).

Some studies examined the foreign language effect and found that not only does use of a foreign language influence our decision-making process, but also proficiency in the language affects the process (Hayakawa et al., 2016). According to the studies with the trolley problem, participants in studies such as Costa et al. (2014) and Greene, Cushman, Stewart, Lowenberg, Nystrom, and Cohen (2009) showed utilitarian responses when dealing with the task in a foreign language. The studies argued that processing in a foreign language might lessen emotions, resulting in making utilitarian responses, rather than making deontological responses (Costa et al., 2014). Costa et al. (2014) also found that in the footbridge-problem task, participants showed more utilitarian responses in the foreign language than that in the native language. Their post-hoc analysis on different proficiency groups also found that the more proficient in a foreign language L2 learners became, the more utilitarian decisions tended to be made (Costa et al., 2014). In the same vein, Geipel, Hadjichristidis, and Suria (2015) found in their series of studies that proficiency was positively correlated with moral judgement but not with emotion rating and concluded that "the higher the language proficiency is, the harsher the moral judgement" (p.14).

However, studying the effect in relation with the foreign language proficiency showed incongruent results. A study (Čavar & Tytus, 2018) examined whether bilinguals of Croatian and German would show more deontological behavior in the decision-making task. Their bilingual participants showed similar results in both languages. Based on the findings, unlike to Costa et al. (2014), Čavar and Tytus (2018) suggested that higher competency of two languages and rich acculturation in both cultures might have diminished the foreign language effect. As seen above, although the effect appears to be task-dependent, and how proficiency affects is incongruent, proficiency seems to be a determining factor, nonetheless.

Another possible factor seemingly involved in the decision-making process in a foreign language, besides proficiency is working memory capacity (WMC) (Moore,

Clark, & Kane, 2008) which differentiates individuals in foreign language processing and learning (e.g., Koda, 2004). Moore and her colleague (2008) attempted an examination of WMC in the decision-making processing and found that people with higher WMC made more utilitarian decision in the trolley problem task. The study used 24 different dilemmas and found the association of higher WMC and longer reaction times in the personal killing situation. Moore, et al. (2008) concluded that the amount of WMC determined responses and availability of deliberative reasoning in the decision-making processing. Given that the amount of WMC affects both how we process a foreign language and our reasoning system, it is indispensable to examine how such cognitive resources manipulate our decision-making processing in a foreign language.

Although many studies confirmed that foreign language would affect the decision-making process, little information is available for the effect of foreign languages in relation to various factors (Hayakawa, et al., 2016). As is announced by the new Course of Study (MEXT, 2017; 2018), if EMI lessons are to pursue a dual achievement of proficiency and cognitive development, it would be essential to determine whether the medium of instruction would affect how EFL learners shape their thoughts through thinking in English. Yet, to date, the impact of EMI lessons in relation with distinctive influence of proficiency and cognition is limited due to a scarcity of congruent empirical evidences (e.g., Goya, 2019a). It is even less of a surprise that its impact on the combined variables has not been addressed in empirical research. Based on the literatures reviewed, the present study hypothesized that cognition and foreign language proficiency would compensatory influence the decision-making process, and the foreign language effect could only be observable due to a deficiency of both variables. In particular, in the footbridge task, the EFL participants may make more utilitarian responses because they suffer from a deficiency of both English proficiency and WMC. In order to investigate the above hypothesis, the present study addressed the following research questions;

Research Question 1: Do EFL participants show more utilitarian decisions in the

footbridge problem task in English than in Japanese?

Research Question 2: Do all groups of EFL participants (divided by proficiency and cognitive levels) show more utilitarian decisions in the footbridge problem task in English?

The present Study

Purpose

The present study aims to investigate a complemental relationship between foreign language proficiency and working memory capacity in the decision-making process to shed more light on the foreign language effect. Specifically, the present study assumes that EFL participants might make more utilitarian responses with longer reaction time not just because of using a foreign language, but because of a shortage of cognitive resources which fails to aid in the deficiency of English proficiency for processing complex information during decision-making.

Participants

In the study, 64 Japanese college students majoring in English or English education (without bilingual speakers of English and Japanese) participated in the study. Their age ranged from 18 to 23 years old at the time of investigation. Table 1 indicates mean scores (*M*) and standerd deviations (*SD*) of proficiency level and working memory capacity of the participants (n = 64).

Table 1.
Descriptive Statistics of EFL Participants

	n	*M*	*SD*
Proficiency level of English (TOEIC)	64	630.53	142.57
Working memory capacity (WMC)	64	5.34	1.09

To investigate the foreign language effect in relation to two factors of the individual difference in the footbridge problem task, the current study divided the

participants into two groups (i.e., Japanese or English) in terms of language types. Then, the study divided the English language group into four smaller groups according to their level of English proficiency (i.e., TOEIC scores) and WMC (i.e., digit span test scores). To be more specific, the participants in Group 1 (n = 12) were higher in English proficiency and WMC; those in Group 2 (n = 9) were higher in English proficiency but lower in WMC; those in Group 3 (n = 13) were lower in English proficiency but higher in WMC; and those in Group 4 (n = 8) were lower in English proficiency and WMC. Group 1's mean scores of English proficiency and WMC were 709.17 (SD = 92.93) and 6.04 (SD = .72); Group 2's mean scores were 714.33 (SD = 91.46) and 4.50 (SD = .56); Group 3's mean scores were 528.46 (SD = 83.50) and 6.19 (SD = .75); and Group 4's mean scores were 613.90 (SD = 71.01) and 4.93 (SD = .19), respectively. Table 2 displays descriptive statistics of these four groups.

Table 2.
Descriptive Statistics of Four Groups of EFL Participants According to Levels of English Proficiency and WMC

	Group 1 (n = 12)	Group 2 (n = 9)	Group 3 (n = 13)	Group 4 (n = 8)
Proficiency	709.17 (SD = 92.93)	714.33 (SD = 91.46)	528.46 (SD = 83.50)	613.90 (SD = 71.01)
WMC	6.04 (SD = .72)	4.50 (SD = .56)	6.19 (SD = .75)	4.93 (SD = .18)

In order to assure the group differences in terms of TOEIC and digit span test scores, two One-Way ANOVAs were carried out. The analyses found significant differences for English proficiency, F (3, 38) = 18.23, p < .01, and WMC, F (3, 38) = 17.64, p < .01. In order to determine where such statistical difference exists among groups, post hoc comparisons were carried out. The Bonferroni indicated that the mean scores of English proficiency were significantly different between Group 1 and Group 3 (p < .01), Group 1 and Group 4 (p < .01), Group 2 and Group 3 (p < .01), and Group 2 and Group 4 (p < .01). The mean scores of WMC were significantly different between Group 1 and Group 2 (p < .01), Group 1 and Group 4 (p < .01), Group 2 and Group 3 (p < .01), and Group 3 and Group 4 (p < .01). It is safe to say that four groups were statistically different in terms of either English proficiency or WMC. Table 3 indicates the results of the ANOVAs.

Table 3.
Results of One-Way ANOVA on Two Variables: English Proficiency and WMC

		Sum of squares	*df*	*Mean Square*	*F*	*p*
Proficiency	Between Group	404145.85	3	134715.28	18.23	.00
	Within Group	280879.77	38	7391.57		
	Total	685025.62	41			
WMC	Between Group	21.19	3	7.06	17.64	.00
	Within Group	15.22	38	.40		
	Total	36.41	41			

Analyses

In the current investigation, the dependent variables were frequencies of response types (i.e., deontological or utilitarian) and reaction time (RT in seconds). The independent variables were types of language (i.e., English or Japanese), response types (i.e., deontological or utilitarian), and group types (i.e., four groups based on different combinations of English proficiency and WMC levels). In order to compare the categorical data such as response types, a Chi-square test was administered. When comparing the numerical data such as reaction time, either t-test or analysis of variance (ANOVA) were employed.

Procedure

Three materials were included in a task packet and handed to participants before data collection: Digit span test, demographic and language background questionnaire, and the footbridge problem task either in Japanese or English. Participants were randomly assigned to either the Japanese version (n = 22) or the English version (n = 42) of the footbridge problem task.

After reading the consent form for the experiment, the participants who agreed to participate in the study were directed to follow the instructions provided. First, in order to measure their WMC, a digit span test was administered. The participants were asked to listen to recorded numerical stimuli in English, then recall and write down the string of digits heard. The combination of digits increased in complexity as the task continued. The test started with two trials of three-digit stimuli and continued up to eight-digit strings (n = 12). If the participants recalled both strings correctly, they

received one point, while they received half a point if they recalled only one of the two. The longest strings they were able to recall correctly were reported as their score and the range of the scores could vary from 3.0 to 8.0.

The participants worked on the footbridge problem task afterwards. As soon as the participants understood the scenario and viewed a cartoon depiction of the scene, they had to decide whether or not they would push the man off the bridge and circled their choice on the worksheet. A time to complete the task was measured manually; the participants were guided to refer to the time shown on the timer placed on the white board in front of the classroom. By referring to the timer, the participants recorded the time when they finished reading the scenario, and they also recorded the time when they had made their decision. The participants wrote the times in the worksheet, then the researcher manually calculated the differences of the times into seconds which was treated as reaction time. After the participants completed the task, they were instructed to answer the demographic questions in the questionnaire such as recent TOEIC scores, major at college, age, learning history of English, and their native language.

Results

Let us first report the descriptive statistics of response types (i.e., utilitarian or deontological) according to languages (i.e., Japanese or English). Participants who worked on the task in Japanese (n = 22) made seven utilitarian responses and 15 deontological responses whereas their counterparts in English (n = 42) made 16 and 26, respectively. Figure 1 illustrates the number of each response type in two languages.

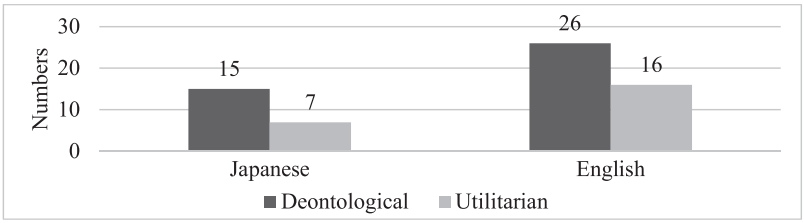

Figure 1. The number of responses produced by EFL participants in two languages.

In order to seek any statistical difference between the number of response types, a Chi-square test of independence was performed. According to the result, how the participants responded in the task between languages was not significant, X^2 (1, n = 64) = .247, p = .62, indicating that no foreign language effect was observed in the footbridge problem task.

Let us now look at what responses the four groups of the EFL participants made in the English version of the footbridge task. Participants in Group 1 (i.e., both higher in proficiency and WMC) made six utilitarian and six deontological responses; those in Group 2 (i.e., higher in proficiency, but lower in WMC) made two utilitarian responses and seven deontological responses; those in Group 3 (i.e., lower in proficiency but higher in WMC) made two utilitarian responses and 11 deontological response; and those in Group 4 (i.e., both lower in proficiency and WMC) made six utilitarian responses and two deontological responses. Figure 2 illustrates these descriptive statistics.

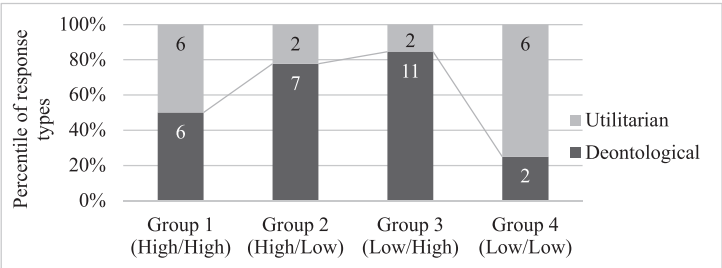

Figure 2. Percentages of each response type in all groups.

To seek statistical differences among all groups according to the type of responses, another Chi-square test of independence was performed to examine each group in terms of English proficiency and level of cognitive resources. According to the resuts, the relation between these variables was significant, X^2 (3, n = 42) = 9.15, p < .05, indicating that the response difference was statistically significant among four groups.

To identify which group was statistically different, a residual analysis was carried out; participants in Group 4 had made more utilitarian responses than deontological responses (p <.05), while other groups showed no difference in their response types. That is, EFL participants with lower proficiency and fewer WMC showed the foreign language effect in the footbridge problem task.

The study examined at the reaction time (RT) of their decision. Group 1's mean length (in seconds) of RT for utilitarian responses was 40.00 (*SD* = 15.52) and for deontological responses was 39.00 (*SD* = 20.34); Group 2's mean length for utilitarian responses was 27.00 (*SD* = 8.48) and for deontological responses was 31.29 (*SD* = 14.78); Group 3's mean length for utilitarian responses was 32.50 (*SD* = 16.26) and for deontological responses was 41.64 (*SD* = 10.87); and Group 4's mean length for utilitarian responses was 46.17 (*SD* = 17.53) and for deontological responses was 21.00 (*SD* = .00), respectively. Figure 3 shows the four groups' mean length of reaction time.

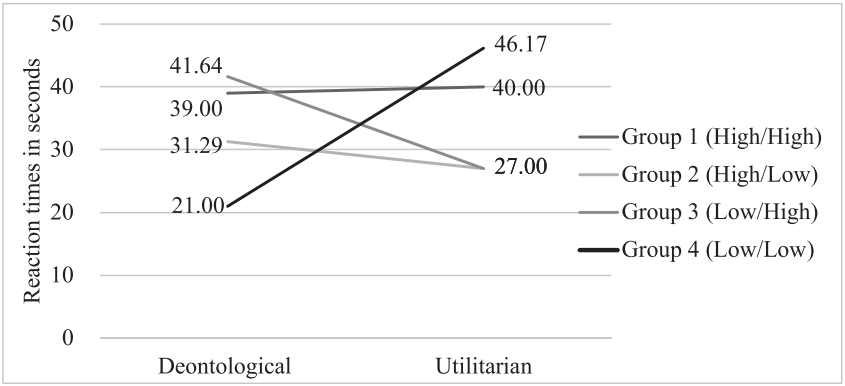

Figure 3. Reaction times for the two response types among all groups.

To seek any statistical difference between reaction times for responses among four groups, pairwise comparisons using Bonferroni were carried out. The difference of reaction times for the two response types in Group 4 was statistically significant (p < .05), which indicates that the EFL participants who were lower in both English proficiency and WMC responded slower for utilitarian responses than they did for

deontological ones. Other groups showed no statistically significant difference in their pairs, indicating that how fast they responded to the two response types was similar in terms of reaction time.

Discussion

About the foreign language effect

The goal of the present study was to examine an impact of two factors, namely, foreign language proficiency and cognitive resources, that are considered to differentiate foreign language learners in their use. In particular, the study investigated the complex relationship of the two in the decision-making task to scrutinize the foreign language effect. The present study hypothesized that EFL participants would make more utilitarian responses not because of the foreign language effect but because of their limited cognitive resources. In other words, the ample cognitive resources would probably complement the poor proficiency in the use of foreign language. In order to investigate the hypothesis, two research questions were addressed.

As for the first research question, the Chi-square test did not show any statistically significant differences between the EFL participants with the Japanese task (n = 22) (i.e., 7 utilitarian and 15 deontological) and those with the English task (n = 42) (i.e., 16 utilitarian and 26 deontological). Simply put, no foreign language effect was observed among the participants in general. This was not surprising when considering the fact that levels of English proficiency and cognitive resources were not controlled. According to the previous studies, Costa et al. (2014) found a significant impact of foreign language proficiency on the effect; the more proficient, the more likely the effect would be observed. Similarly, Geipel et al. (2015) found a positive correlation between moral judgement and foreign language proficiency. Considering the above, levels of foreign language proficiency is supposedly involved in the foreign language effect.

In addition, another factor involved with the foreign language effect is cognitive resources which are employed to evaluate and alter tentative comprehension as a result

of the simultaneous processing of complex information. The study by Moore et al. (2008) investigated the impact of cognition in a series of moral dilemma tasks. Based on their findings, they concluded that people with more cognitive resources consistently made more utilitarian responses. With their findings in mind, cognitive resources are undoubtedly involved in the foreign language processing and significantly interplay with proficiency in the decision-making process in the foreign language. To examine the foreign language effect, proficiency and cognitive resources should be taken into account.

To construe the foreign language effect in relation to the two factors combined, our study addressed another question: Do all groups of EFL participants show more utilitarian decisions in the footbridge problem task in English? As shown in the result section, our data indicated that the participants in Group 4 who were limited in both proficiency and WMC showed more utilitarian responses, and the difference was statistically significant ($p < .05$). In short, the EFL participants with lower proficiency and fewer WMC tended to make more utilitarian responses. Furthermore, their reaction times for the utilitarian responses were slower than that for the deontological ones ($p < .05$). Other participants, however, showed statistically not significant differences, indicating that they responded similarly in the task for response types and reaction times. What can be implied from the present findings as well as the reviewed literature is that the EFL participants are more likely to show "rational" behaviors through thinking in English if their English proficiency and cognitive resources are limited.

The foreign language effect and EMI in EFL lessons

In recent years, a growing number of studies of the foreign language effect encouraged a further exploration of various factors (Polonioli, 2018). Yet, the subject remains inconsistent and complex with various accounts. Despite numerous plausible accounts for the effect, recent investigations have acknowledged an interpretation; the foreign language use may require a deliberate processing for cognitively demanding tasks (Polonioli, 2018). If the processing is more deliberate, then its cognitive

processing in the decision-making task becomes slower, allowing various thoughts to be monitored, which would in turn result in more rational responses. Similarly, the study by Moore et al. (2008) revealed longer reaction times for utilitarian responses in their task, reflecting more deliberate processing in making decisions so that foreign language users may monitor and evaluate their prospective outcomes, and change the decision if necessary. In this sense, it may not be accurate to say that "language determines how we think" (Athanasopoulos, et al., 2015); rather, it is languages that determine depth of the processing, which subsequently generates and affects our thought.

In line with the study of Moore et al., our data showed empirical support for deliberate processing for utilitarian responses among those with both limited foreign language proficiency and cognitive resources. In particular, the pairwise comparison of reaction times for response types among the EFL participants in Group 4 showed slower responses for the utilitarian responses compared to the deontological ones ($p < .05$). The statistic evidenced that EFL participants would make more utilitarian responses with longer processing time if their foreign language proficiency and cognitive resources are limited. It may sound surprising; rational behaviors in a foreign language tend to be evidentially construed as traits of native-like proficiency. To put it differently, what is happening among cognitively advanced foreign language learners if their proficiency still remains limited? That is, ample cognitive resources may compensatory influence foreign language use even if the users suffer from limited proficiency. If that is the case, what is implied from this is that the participants might have difficulty in comprehending English information, which takes up their limited cognitive resources. In turn, monitored evaluation of prospective outcomes driven by cognition approved utilitarian responses not because their cognitive processing was scrutinized but because their monitoring turned to be less effective due to depleted WMC. Similarly, Hayakawa, et al. (2016) partially contends, "[t]he disfluency of using a foreign language could also contribute to the effects, because processing disfluency in general could lead to a more deliberative mode of thinking, given that increased

difficulty may signal a need for more careful consideration" (p.793). In other words, poor proficiency causes deficiency of cognitive resources, which may eventually result in slower processing. Such interpretation of the foreign language effect may cast a doubt that utilitarian responses is in fact a consequence of rational processing due to the influence of the foreign language; rather, it is due to ineffective monitoring of the complex information caused by little cognitive resources depleted by a lack of proficiency.

Some may argue, however, that the EFL participants in Group 4 had enough proficiency of English and made more utilitarian responses because, as other studies claimed (Greene & Hadit, 2002), using a foreign language reduced, to some extent, a sense of emotion among the participants so that they ended up with more "rational, effortful, controlled process driven by the conscious evaluation of the potential outcome"(Greene & Hadit, 2002). Paradoxically, Geipel and her colleague found that the footbridge problem task evoked a strong emotional response so that more deontological responses were drawn (Geipel et al., 2015). Considering the above, the sense of emotion impacted by the foreign language use and the task design, might influence EFL participants' decision.

The above interpretation is widely construed as a plausible account. Our data showed that Group 1 and 2 who were proficient in English did show no difference between response types in the footbridge problem task, which was claimed to be the emotion-evoking task. This can be explained by the finding of Geipel and her colleague (2015) who also found that as the proficiency increased among bilingual participants, language differences decreased. In the same vein, Cipolletti et al. (2016) found in their investigation that the foreign language effect in fact disappeared as proficiency developed. Given that developmental change of the effect as suggested by previous studies (e.g., Cipolletti et al., 2016), the proficient participants in our Group 1 and 2 did not show any difference between response types.

On the contrary, what needs to be carefully considered in terms of attenuated emotion is whether or not less proficient participants in Group 3 and 4 would show

more utilitarian responses. As reported earlier, Group 4 showed the foreign language effect (i.e., more utilitarian responses, $d_{ij} = \pm 25.17$, $p < .05$); however, the EFL participants with lower proficiency and higher WMC in Group 3 did not show the effect (i.e., $d_{ij} = \pm 1.7$, $p > .05$). If limited foreign language proficiency accompanies with attenuated emotion, and exclusively plays a significant role in the reduction, the EFL participants in Group 3 should have also showed more utilitarian responses. Clearly, our data did not indicate such effect at all.

Up to this point, what remains seems a key issue of how emotion is attenuated in the decision-making task. We doubt that emotion-driven thought is information that is subject to reduction along with development of the proficiency; rather, it is an additive information resulted from rich foreign language proficiency and cognitive resources for the cognitively complex task like the footbridge problem task. That is, if foreign language processors have rich proficiency and ample cognitive resources, they add more candidates as their prospective outcomes in addition to textual comprehension merely interpreted from foreign language input. In this sense, emotion is not a definitive but supplemental cause for utilitarian responses. In short, a sense of emotion decreases when processing a foreign language for the cognitively complicated task because limited cognitive resources are allocated to compensate for textual comprehension so that little is left for monitoring the evaluation for the decision.

In addition, the task endorsement of attenuated emotion clearly overestimates an end state of foreign language learning. In general, it is well argued that to be native-like in the use of foreign language is too audacious to hope for (e.g., Krashen, 1986). Costa and her colleague (2014) suggest that emotional connotation is not learnable in the classroom setting whereas native learners learn their native language through affective and rich experiences. That is, learning foreign language requires a rich context in which the language is used communicatively and functionally (Torikai, 2017). Given that foreign language requires rich contextual information, decision making in a foreign language tends to elicit less intense emotional responses than decision making in a native language. As a result, EFL participants are prone to show more utilitarian

responses.

A pertinent account of how proficiency plays a part in a compensatory function of cognition can be found in Hadjichristidis, et al. (2016). They argue that using a foreign language depletes cognitive resources so that participants may end up putting less attention on a process and fail to monitor their evaluative processing of their amoral as well as initial thoughts (Hadjichristidis, et al., 2016). When the EFL participants in Group 4 in our data processed in English with limited proficiency, such deficiency depletes their cognitive resources, which were poorer in the first place. Then, the participants must have resulted in a cognitively shallower processing. Consequently, slower processing was induced which failed to reach a thoughtful decision in the cognitively demanding task as Hayakawa, et al. (2016) suggests. In other words, even if the foreign language proficiency is limited, rich cognitive resources will simultaneously and complementarily compensate for this lack in order to make more thoughtful behaviors. All in all, our data might have provided such evidence; rich cognition compensatory aids in deficient foreign language competence so that EFL participants may act more thoughtful as a result of cognitively deeper processing.

That being said, a few caveats should also be acknowledged. First of all, responses made by Group 1, 2, and 3 looked seemingly similar quantitatively; however, the present study did not scrutinize the qualitative difference among them. Response types in the decision-making processing among Group 4 also need to be further investigated to pursue a systematic account of the combined effect of both proficiency and WMC. The prospective study needs to address the above in a more well-designed study. Furthermore, a few caveats may concern methodological issues as well. The present study treated the duration time of the task completion calculated manually at the individual level. For a more precise measurement, use of a computer lab must be necessary. As for the measurement of working memory capacity, we applied the digit span test which uses numerical stimuli to test holding and processing functions by remembering and recalling values. In a future study, use of a language-based measurement should be applied when considering qualitative difference of the memory

load. Furthermore, in order to better understand the foreign language effect and its possible causes interwoven all together, a larger number of participants with different backgrounds is necessary.

Pedagogical Implications

One pedagogical implication of this study is straightforward: when working in a cognitively demanding task, use of foreign language should not be attempted by those who are not yet cognitively mature. A recent medium of instruction policy in Japanese high schools and junior high schools calls for EMI in English lessons. The policy was implemented in the curriculum from 2009 (MEXT, 2009) despite its heated debate among educators and researchers. Nevertheless, in order to avoid shallow processing and its careless outcomes as well as to maximize the effect of EMI lessons, the followings need to be in mind for EMI lessons in Japanese EFL classes.

(1) Be aware of how cognitively demanding a given task is for EFL students. If the task requires heavy cognition, then consider in what language lessons should be instructed.

(2) Estimate how proficient own students are before conducting EMI lessons. If students are less proficient in the target language, try simple tasks and use their native language when necessary.

(3) Assure an extensive period of time for a cognitively demanding task in English. If the task completion time is enough, the students would go through more deliberate processing so as to carefully evaluate prospective outcomes; otherwise, they would make more intuitive responses if their proficiency is in short supply.

(4) Avoid teaching language skills and knowledge in a decontextualized way. Instead, teach linguistic knowledge such as vocabulary, useful expressions, and idioms in a narrative story so that a richer context endorsing emotional connotation can be provided in class.

(5) Give students a series of cognitive and metacognitive strategy trainings so that such trainings can help adequately allocate cognitive resources to processing the

language and to complete the cognitively demanding task.

Conclusion

EMI lessons have gained popularity in the world (Dearden, 2014), particularly in Japan due to a recent paradigm shift in education. The focus on the way EFL learners at junior and senior high schools learn English has been at center of this reformation. The new Course of Study aims to not only focus on deeper cognitive thinking through activities in English but also interacting with each other in English. Considering the recently globalized world, it is inevitable that people will need to communicate through a common language that is usually different from their native language. Yet, as previous studies as well as our study suggest, when making a critical decision, foreign language competence and cognitive resources determine the quality of our thought. As widely acknowledged, receiving rich amount of foreign language input is undeniably essential (e.g., Krashen, 1985). However, English lessons are more than teaching English exclusively in English; therefore, English teachers should not blindly follow what is instructed in our pedagogy. For better or worse, we as foreign language teachers should keep in mind that thinking in a foreign language shapes our thought.

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References

Admiraal, W., Westhoff, G., & de Bot, K. (2006). Evaluation of bilingual secondary education in the Netherlands: Students' language proficiency. *Educational Research and Evaluation, 12*, 75–93.

Ament, J. R. & Prez-Vidal, C. (2015). Linguistic outcomes of English medium instruction programs in higher education: A study on economics undergraduates at a Catalan University. *Higher Learning Research Communications, 5,* 47-68.

Athanasopoulos, P., Bylund, E., Montero-Melis, G., Damjanovic, L., Schartner, A., Kibbe, A., Riches, N., & Thierry, G. (2015). Two languages, two minds: flexible cognitive processing driven by language of operation. *Psychol Sci. 26*, 518-26.

Čavar, F., & Tytus, A. E. (2018). Moral judgement and foreign language effect: when the foreign language becomes the second language. *Journal of Multilingual and Multicultural Development, 39*, 17-28.

Cipolletti, H., McFarlane, S., & Weissglass, C. (2016). The moral foreign-language effect. *Philos. Psychol*. 29, 23-40.

Cosgun, G., & Hasirci, B. (2017). The Impact of English Medium Instruction (EMI) on Students' Language Abilities. *International Journal of Curriculum and Instruction, 9*, 11-20.

Costa, A., Foucart, A., Hayakawa, S., Aparici, M., Apesteguia, J., Heafner, J. (2014). Your morals depend on language. *PLoS One* 9:e94842.

Dearden, J. (2014). English as a Medium of Instruction – A growing Global Phenomenon. London: British Council.

Federick. S. (2009). Cognitive reflection and decision making. *J Econ Perspect, 19*, 25-42.

Geipel. J., Hadjichristidis. C., & Surian. L. (2015). How foreign language shapes moral judgment. *Journal of Experimental Social Psychology, 59*, 8–17.

Goya, H. (2016). Killing two birds with one stone: Does Active Learning (AL) based writing course simultaneously develop L2 learners' critical thinking and L2 proficiency? *Ryudai Review of Euro-American Studies, 60*, 69-93.

Goya, H. (2018). Content-Based Instruction in an EFL Writing Class: Is English Medium Instruction (EMI) Effective for Productive Development of L2 Lexes among Japanese EFL Learners? *Scripsimus, 27*, 27-48.

Goya. H. (2019a). "Proactive, Interactive, and Deep Learning" in English Lessons: Survey Results of English Teachers' Perception of Active Learning Based Teaching in EFL. *Scripsimus, 28*, 1-20.

Goya. H. (2019b). English as Foreign Language Teachers' Anxiety towards English

as Medium of Instruction: What Quantitative Analysis of Textual Data Tells Us. *SELT-Okinawa Review, 16*, 1-21.

Greene, J. D., Cushman, F. A., Stewart, L. E., Lowenberg, K., Nystrom, L. E., & Cohen, J. D. (2009). Pushing moral buttons: The interaction between personal force and intention in moral judgment. *Cognition, 111*, 364– 371.

Greene, J., & Haidt, J. (2002). How (and Where) Does Moral Judgment Work? Trends in Cognitive Sciences, 6, 517-523.

Guiller, J., Durndell, A., and Ross, A. (2008). Peer interaction and critical thinking: Face-to-face or online discussion? *Learning and Instruction, 18,* 187-200.

Hadjichristidis. C., Geipel. J., & Surian. L. (2017). How foreign language affects decisions: Rethinking the brain drain model. *Journal of international Business Studies, 48*, 845-651.

Hayakawa, S., Costa, A., Foucart, A., and Keysar, B. (2016). Using a foreign language changes our choices. *Trends Cogn. Sci., 20*, 791–793.

Hayakawa, S., Tannenbaum, D., Costa, A., Corey, J. D., and Keysar, B. (2017). Thinking more or feeling less? Explaining the foreign-language effect on moral judgment. *Psychol. Sci., 28*, 1387–1397.

Jiménez Catalán, R. M., & Ruiz de Zarobe, Y. (2009). The receptive vocabulary of EFL learners in two instructional contexts: CLIL versus non-CLIL instruction. In Y. Ruiz de Zarobe & R. M. Jiménez Catalàn (Eds.), *Content and language integrated learning: Evidence from research in Europe* (pp. 81–92). Bristol, England: Multilingual Matters.

Koda, K. (2004). Insights into Second Langauge Reading. A Cross-Linguistic Approach. New York: Cambridge University Press.

Krashen, S. D. (1985), *The Input Hypothesis: Issues and Implications,* New York: Longman.

Kubota, T. (2019). English Classes Should be Taught in English? An Examination from Global Perspective. Eigokyoiku. Mar. Tokyo. Taishukan.（「授業は英語で教えるべき ?: 海外の知見から検討する」英語教育 3 月号 , 大修館）

Long, M. (1985). Input and Second Language Acquisition Theory. In S. Gass & C. Madden (Eds.), Input in second language acquisition, pp. 77–393. Rowley, MA: Newbury House.

Lun, V. M. C., Fischer, R., & Ward, C. (2010). Exploring cultural differences in critical thinking: Is it about my thinking style or the language I speak? *Learning and Individual Differences, 20*, 604-616.

Ministry of Education, Culture, Sports, Science & Technology. (2009). The Course of Study for Senior High School: Foreign languages. Tokyo: MEXT.

Ministry of Education, Culture, Sports, Science & Technology. (2017). The Course of Study for Junior High School: Foreign languages. Tokyo: MEXT.

Ministry of Education, Culture, Sports, Science & Technology. (2018). The Course of Study for Senior High School: Foreign languages. Tokyo: MEXT.

Ministry of Education, Culture, Sports, Science & Technology. (2018). Annual Report of English Education at Senior High Schools 2017.

Moore, A. B., Clark, B. A., & Kane, M. J. (2008). Who Shalt Not Kill? Individual Differences in Working Memory Capacity, Executive Control, and Moral Judgment. *Psychological Science, 19*, 581-557.

Polonioli, A. (2018). A Blind Spot in Research on Foreign Language Effects in Judgment and Decision-Making. *Front. Psychol. 9*:227.

Storch, N. (2009). The impact of studying in a second language (L2) medium university on the development of L2 writing. *Journal of Second Language Writing, 18*, 103–118.

Swain, M. (1985). Communicative competence: Some roles of comprehensible input and output in its development. In S. Gass & C. Madden (Eds.), Input in second language acquisition, pp. 235–253. Rowley, MA: Newbury House.

Torikai, K. (2014). Reflection of English Education in Debate. Tokyo: Kodansha Gendaishinsho.（「英語教育論争から考える」講談社現代新書.）

Torikai, K. (2017). *Crisis in English Education.* Tokyo: Chikuma Shinsho.（「英語教育の危機」東京：筑摩書房.）

Yang, Y.-T. C., & Gamble, J. (2013). Effective and practical critical thinking–enhanced EFL instruction. *ELT Journal, 67*, 398–412.

英語を教授言語とする英語教育について：
英語による授業が及ぼす日本人英語学習者の認知処理過程への影響とは

呉屋　英樹

2017年に告示された新しい学習指導要領では、2009年度より推し進めてきた教授言語に関する方針を引き継ぎ、高等学校だけでなく中学校での英語の授業も英語で実施することが基本とされた。認知心理学の検証研究では、ひとは複雑な判断が求められる場合に、外国語で思考することで合理的な判断をする、つまり「外国語効果」があることがわかっている。本研究では2つの学習者要因と、その外国語効果との関係について調査した。本調査では、2つの要因として習熟度とワーキングメモリを取り上げ、それぞれの値によって学習者を4つの実験群に分け、それぞれに英語による「トロッコ問題」を行ってもらい、統制群には日本語による「トロッコ問題」を行ってもらった。それぞれの参加者の選択とその反応時間を比較したところ、習熟度とワーキングメモリの値が低いグループに統計学的に有意な差が確認され、外国語の使用は特定の外国語学習者の認知的処理に影響を及ぼすことがわかった。その結果をもとに5つの教育的示唆が示された。