

論文

The Transformation of Metalinguistic Knowledge and Its Relationship with L2 Proficiency

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Abstract

This study investigated the transformation of Metalinguistic Knowledge (MK) and its relationship with second language (L2) proficiency in a department that requires students to study abroad for about a year. It was a longitudinal study with a total of 74 female university students divided into three groups based on the year of entry. The TOEIC IP and TOEFL iBT were employed as L2 proficiency tests and the accumulated grade point average (GPA) was used as a measure of academic achievement. The grammaticality judgment test (GJT) was used to elicit MK. The results showed that MK develops after significant exposure to the target language. Students corrected more errors using grammatical rules after study abroad than they did before going overseas. In particular, they were able to correct and state more explicit rules. These results suggest that MK is not static itself. The relationships between MK and the GPA and between MK and L2 literacy tend to become stronger after exposure to the target language, which implies that MK, L2 literacy and the GPA might be related to cognitive aspects of language.

Keywords: Metalinguistic Knowledge, L2 Proficiency, Study abroad, Cognitive aspect of language

Background

There has been a little research on relationships between L2 proficiency, academic achievement, and MK. These variables are essential for research on the relationship between linguistic and cognitive abilities. This study attempts to clarify university students' change of MK and the relationships among L2 proficiency, MK, and academic achievement resulting from significant

exposure to the target language. MK can be divided into several categories such as phonology, grammar, semantics, and pragmatics. This study focuses on the grammatical aspect of MK. In general, it includes knowledge of grammatical terms. When people explain the grammatical rules of an L2, they usually use L1 with L1 grammatical terms. MK and knowledge of grammatical terms are similarly categorized, but their main function is a little different. The former might be strongly

related to cognitive processing while the latter may be weakly correlated with it (Iida, 2012). Since Hu (1999) defined MK as “abstract and analyzed knowledge of grammatical rules perceived to underlie language use that is more or less subject to conscious representations” (p. 26), it can be defined as abstract and analyzed knowledge of grammatical rules perceived to underlie language use in this study. This knowledge is conventionally operationalized as having participants not only correct an error, but also verbalize grammatical rules for its correction in a grammaticality judgment task with the help of learned terminology or in everyday language of L1. Since MK is usually described by using L1, it can be argued that knowledge of L2 grammar is founded on L1 grammatical terms and description of L1. This study is significant in that university students’ change of MK before and after study abroad is examined quantitatively and qualitatively. Moreover, the relationships between MK, L2 proficiency, and academic achievement before and after study abroad are examined. These relationships will make a suggestion concerning the relationship between L1 and L2, in particular ones between MK based on L1 and L2 proficiency and between language and cognition. This research gives some hints to the relationship between language and thought.

With respect to the relationship between L2 proficiency and cognition, studies on bilingualism provide a crucial insight for the present research. There have been a large number of debates over bilingualism and cognition in childhood bilingualism. Because “bilingualism is simply about two languages” (Baker, 2011, p. 2), L2 learning can be included into bilingualism. Reviewing research on the relationship between childhood bilingualism and cognition from an historical point of view, Baker (2011) divided it into three periods: the period of detrimental effects, the period of neutral effect, and the period of additive effects. He did not mention the relationship between adult

bilingualism and cognition, which indicates that there is no problem with language and cognition as far as adults are concerned. At present in Japan, some people may not believe that children’s ownership of two languages interfere with efficient thinking. It is a common belief that L2 learning in elementary school will help pupils to communicate with people in the world in the future. In the case of university students, an increasing number of university departments in Japan are conducting classes in the English medium because of globalization. Although some people are against such a language policy at university (e.g., Saito, 2017), there has not been appropriate research to examine the relationship between L2 use and cognition in the university classroom.

As Baker (2011) stated a recent trend of research on bilingualism and cognitive functioning has centered on MK of bilingual children, MK can be used as a way to examine the relationship between L2 proficiency and cognition. In childhood bilingual studies, Bialystok (1987a, 1987b, 2001a, 2001b) discovered that bilingual children judged more accurately than monolingual children the grammaticality of a sentence than. Bialystok (2001a) concluded that bilingual children in general do not always have metalinguistic advantages or universally superior metalinguistic abilities, but balanced bilinguals have increased metalinguistic abilities especially in those tasks that demand selective attention to the information. The selective attention is concerned with two components: bilinguals’ enhanced analyzing of their knowledge of language; and their greater control of attention in internal language processing.

Then, how about the MK of Japanese university students, in particular university students who had much exposure to the target language? The role of MK has not been highly regarded in second language learning in the present teaching methodologies in Japan that aim at developing communication skills to cope with so-called globalized skills demanded by the

business community. One reason for this might be that this knowledge cannot be considered as a useful tool for communication. Since it is abstract and analyzed knowledge, MK may sound very difficult and ineffective for most people who are learning a foreign language. However, as Hockett (1965) mentions, reflexiveness is one of the characteristics that distinguishes animals from humans. Using a language, one can talk about language. This characteristic is one of the unique properties of human language. Although some kinds of animals can understand basic human language, they cannot talk about language. MK is one concept of knowledge about language.

A great deal of research on MK in both monolingual and bilingual children has been conducted. However, the research body as a whole produced conflicting results about the relative state of development in word awareness and syntactic awareness for monolingual and bilingual children (Biaystok, 2001c). Developmental psychologists have shown that children start dealing with language as an object of thought when they are 5 years old or later (Tunmer, Pretz, & Herriman, 1984). MK of L1 learners is developed not only in accordance with the development of grammar, but also increased in special linguistic education, which suggests that there may be some similarities and differences between L1-based MK about L2 and L2 proficiency.

Most empirical research has been conducted to find a relationship between MK and L2 proficiency. Previous research on MK about L2 compared to MK about L1 produced some important findings. Green and Hecht (1992) studied the MK of 300 German learners of English, finding that L2 learners did not always possess grammatical rules that had been taught.

Numerous researchers have been investigating the role of MK in L2 language learning. The research on the relationship between MK and L2 proficiency for L2 learners can be divided into three positions: the non-interface model, weak interface model, and interface model. First,

Krashen's monitor model can be categorized as a non-interface model. The definite role of MK is given by Krashen's monitor model (1981). Despite the fact that Krashen did not mention the role of MK itself, we can deduce from this model that the role of MK is to check the grammaticality of a sentence produced by the acquired competence. Next, the weak interface model shows a weak correlation between MK and L2 proficiency. Alderson et al. (1997) claimed that there was no evidence to support the belief that students with higher levels of MK performed better in French or that they improved their French proficiency at higher rates than other students during university study. The other study is Han and R. Ellis (1998), who claimed that knowledge of grammatical terms played an insignificant role in general language proficiency, but that analyzed explicit knowledge obtained from delayed grammaticality judgment tests was found to be significantly related to a proficiency test (TOEFL) score. This analyzed knowledge can be categorized as MK and explicit knowledge. Finally, among several studies that show a close interface between MK and L2 proficiency, Renou (2001) stated that MK had a high correlation with L2 proficiency as far as advanced learners were concerned. Roehr (2008) showed that L2 proficiency and MK of advanced university learners of L1 English learners of L2 German correlated strongly. Also, Roehr found that MK and language-analytic ability might constitute components of the same construct. However, the strong correlation might have been caused by the definition of L2 proficiency because Roehr used a L2 proficiency test based on knowledge of German grammar and vocabulary. The study is significant in that it clarified that MK is similar to analytic ability. The finding was further confirmed by Iida (2010) who revealed that MK led to some good performance on L2 reading.

Research questions

While Previous research on MK and its

relationship to L2 proficiency has been reviewed, little has focused on the role of MK except for research done by Roehr (2008) and Iida (2010). Also, the three positions regarding the relationship between MK and L2 proficiency suggest that MK might not be static. It might be dynamic in that the relationship changes according to learners' learning environment. Therefore, the purposes of the present study are to examine whether MK is dynamic or not and if MK functions like cognitive abilities. Thus, two research questions are formulated:

1. How do the amount of and quality of university students' MK based on L1 change before and after significant exposure to L2?
2. How do the relationships among university students' L2 proficiency, MK, and the GPA change after significant exposure to L2?

Method

Participants

A total of 74 female undergraduates who had experienced study abroad participated in the study. They were all students of an international studies at a university located in the Kansai area. They enrolled in this department in April, 2008, 2009, and 2011 and classified into three groups (Table 1). Students of this department are required to study at English-speaking universities for about a year while they are second and third-year students. Almost all students in this department are interested in studying English itself, communicating with English-speaking people and learning their cultures. Students were selected randomly for the present study from those who had gained admission in 2008, 2009, 2010 and 2011. They were divided into three groups: Group 1 comprised 32 students enrolled in 2008; Group 2 composed of 18 students enrolled in 2009; and Group 3 made of 24 students enrolled in 2010 and 2011. They all studied English and took courses related to

international studies under the same curriculum¹.

Although Japanese universities usually require students to study for four years at university, the curriculum of this department has three stages of learning: the pre-departure, the study-abroad-, and the post-study-abroad programs. This study dealt with all stages of learning in this department. In the pre-departure program, which begins from the first-year spring term and ends in the second-year spring term, students study English intensively to get high TOEFL iBT and GPA scores. Students' choices of English-speaking universities are decided based on these scores. A placement test was administered during orientation to track students into small classes based on their scores. The number of students in each English class was usually less than 12. They studied academic English speaking, listening, reading, and writing intensively in the English program to study universities overseas. The total number of English hours in the curriculum for three semesters (1st-year spring, 1st-year autumn, and 2nd-year spring) was about five hundred hours in the pre-departure program. In addition, they studied content subjects mostly through English: British Studies, North American Studies, Japanese History, and Japanese Cultures courses as required subjects and other courses as elective subjects. These courses were usually conducted in English.

The length of staying overseas varied from country to country or from university to university. For instance, while some students studied in Britain for nine months, others studied in Canada for twelve months. Therefore, the students stayed in an English-speaking country at least for two-semester. A student' English-speaking university out of twenty-eight universities was decided based on her highest TOEFL iBT and GPA scores in the first-year. In this study abroad program, students were divided into three types of sojourn overseas: direct entry into academic courses, courses from ESL to academic, and ESL-only. Students who obtained higher TOEFL iBT scores than the

admission scores set by each university could take academic courses from the beginning, although the number of such students was a few. About five percent of students enrolled in academic courses directly. About eighty-five percent of students in this department moved from ESL courses to academic courses while overseas. They always studied hard to obtain the English proficiency that each university required. However, about ten percent of the students who were not successful in enrolling in academic courses. In this program students who take only ESL courses overseas cannot transfer credits to their home university, so that students in the ESL program studied hard to get through it. Even if students could not take academic courses overseas, they usually take more courses at their home university after returning to graduate in four years. After study abroad, students usually took a few English skills and content courses and got involved in writing graduation essays in English in 3rd-year autumn and 4th-year spring and autumn seminar courses.

Data Collection

I employed in the present study two kinds of L2 proficiency tests, the grammaticality judgment test (GJT), and the accumulated grade point average (GPA) scores in the present study, which are summarized in Table 1. For research question 1, the TOEIC IP and TOEFL iBT tests were used to measure students' development of general and academic English skills, respectively. The students registered in different years took different L2 proficiency tests before and after study abroad.

The TOEIC IP test, which is comprised of the reading and listening sections, elicits L2 learners' general English skills including business English. On the other hand, the TOEFL iBT test assesses learners' academic English skills. The test is a computer-based examination, evaluating four academic skills: reading, listening, speaking and writing. The GJT was employed to elicit MK. According to Bialystok (2001), the GJT itself is metalinguistic in that focusing on the form of a sentence during language processing needs MK, which is different from the normal processing of language that emphasizes meaning. MK was elicited by the correction and justification sections in the GJT (e.g., Bialystok, 2001; Renou, 2001). In this test, participants first had to judge a sentence, identify an error if the sentence had one, correct the error, and finally state a rule for the correction. It is composed of 30 ungrammatical sentences. Participants were given one point if they were able to correct an error and one point for the correct statement of the rule. Therefore, the maximum possible score of the test was 60. A Japanese university teacher of English and a Japanese graduate student majoring in applied linguistics marked both tests independently. When there were discrepancies between them, they discussed them and reached an agreement. The test was devised to cover English grammatical rules that were different from the Japanese equivalent to shed light on the difference between L1 and L2. They included articles, noun (countable/uncountable and singular/plural), verbs (causative verb, tense, and aspect), the subjunctive mood, adjectives/adverbs,

Table 1

Research design

	N Year of Entry		BSA		ASA
Group 1	32	2008	PT	GJT	GJT, GPA
Group 2	18	2009	PT	TOEIC IP, GJT	TOEIC IP, GPA
Group 3	24	2010, 2011	PT	TOEIC IP, TOEFL iBT, GJT	TOEIC IP, TOEFL iBT, GJT, GPA

Note. PT=Placement Test, GJT=The Grammaticality Judgment Test, GPA=Grade Point Average

relative pronouns, and auxiliary verbs. Items were mainly based on sentences in a book for EFL learners, *English Grammar in Use* (Murphy, 2004), including errors that were considered to be relatively easily identifiable (See Appendix).

For research question 2, I employed the TOEFL ITP and TOEFL iBT tests, the GJT, and students' accumulated GPA. Since the GPA is the average of a student's course grades over four years, it is an indicator of a student's scholastic achievement, her motivation, and attitude toward learning. According to the university, the maximum score of the GPA was 4.5.

Data Analysis

First, students' TOEIC IP and TOEFL iBT scores before study abroad (Table 1) were compared with those after study abroad by employing a *t*-test to find differences between these periods. In this analysis I set the significance level of the TOEIC and TOEFL iBT at .025, .0167, and .0125, respectively, because I conducted two, three, and four components of these tests, respectively (Dancey & Reidy, 2004). Next, both quantitative and qualitative analyses were adopted. The amount of participants' MK scores before study abroad was first compared with that after study abroad by using a *t*-test to find differences. For the first qualitative analysis, the grammatical items that participants were able to correct and state the rule for the correction in the GJT before study abroad were compared with those after study abroad to find which score of a grammatical item increases or decreases. When a student gained more MK scores of a grammatical item after study abroad than before study abroad, she got positive scores.

On the other hand, when she got less MK scores after study abroad than before study abroad, she got negative scores. Both positive and negative scores were categorized into seven groups based on the number of participants of the GJT. I set up an interval of ten points between groups: Group A (over +31), Group B (between +21 and +30), Group C (between +20 and +11), Group D (between +10 and 0), Group E (between -1 and -10), and Group F (between -11 and -20). Because this was a longitudinal study, ten participants were absent either pre-test or post-test of the GJT. There were sixty-four participants of this test. On the basis of this categorization, I inquired into common characteristics of grammatical items during study abroad. As a second qualitative analysis, the patterns of grammatical descriptions before study abroad were analyzed with those after study abroad. The description of an error in the justification section in the GJT was examined if there were differences in description of a grammatical rule before and after study abroad.

For research question 2, Pearson's product moment correlations were used to compare the relationship between L2P tests, MK, and the GPA before study abroad with that after study abroad.

Results

First, I checked whether there were differences in L2 proficiency among these groups. Although these groups enrolled in different years, the same placement test was administered to them. The TOEFL Practice tests workbook (ETS, 1997) was employed as the placement test. It had listening, structure and written expression (structure), and

Table 2

Placement scores

	Group 1	Group 2	Group 3
N	25	23	26
M	60.1	64.7	64.7
S.D.	9.5	13.8	11.4

reading sections. There were no significant differences in total scores among the three groupsⁱⁱ ($F(2, 71)=1.169, p=.317$). It can be regarded that the three groups in this study were homogeneous.

Table 3 shows Groups 2 and 3'sⁱⁱⁱ students' TOEIC scores before and after study abroad. Both listening and reading scores rose significantly: listening: $t(45)=10.232, p<.001$, reading: $t(45)=7.179, p<.001$. Also, it is interesting to compare SD before study abroad with the one after study abroad. Both listening (BSA: 71.6, ASA: 51.5) and reading SD scores (BSA: 70.8, ASA: 64.2) were reduced. This might be one typical features of study abroad compared with the English proficiency of students who study at home, as far as general English skills are concerned.

Let us look at the four academic skills in the TOEFL iBT test individually. Table 3 shows that listening, speaking, and writing scores rose

significantly after study abroad^{iv}: (listening, $t(21)=4.068, p<.001$; speaking, $t(21)=4.953, p<.001$, writing: $t(21)=4.446, p<.001$) but reading scores did not: $t(21)=.744, p=.465$). Unlike the TOEIC reading, the TOEFL iBT reading scores did not improve after study abroad.

Research question 1 investigated quantitative and qualitative aspects of MK before and after study abroad. Table 5 illustrates the means of MK and SD before and after study abroad. Since the maximum score was 60, these scores did not reach even a half score. Although the scores were normally distributed, they were not high. This suggests that students' MK is not highly developed even if they have experienced study abroad. The comparison of the means before study abroad and those after study abroad showed that the scores of MK increased after study abroad ($t(63)=6.451, p<.001$).

Next, students' MK scores after study abroad

Table 3

Descriptive statistics of TOEIC IP before study abroad and after study abroad (N=46)

		BSA	ASA
Listening	M	329.8	409.0
	S.D.	71.6	51.5
Reading	M	268.3	327.8
	S.D.	70.8	64.2

Table 4

Descriptive statistics of TOEFL iBT before study abroad and after study abroad (N=22)

		BSA	ASA
Reading	M	13.3	13.9
	SD	3.4	5.0
Listening	M	12.7	16.3
	SD	4.5	3.4
Speaking	M	15.9	18.3
	SD	2.9	3.3
Writing	M	16.1	19.0
	SD	3.4	2.8

Table 5

MK scores before and after study abroad (N=64)

		BSA	ASA
MK	M	17.5	23.1
	SD	7.4	7.5

were compared with those before study abroad. Table 6 shows categorizations of MK scores before and after study abroad. The MK scores after study abroad were subtracted from those before study abroad, which were shown in Scores in the Table 6. Six categories were made and each sentence was sorted out from high scores to low scores. Groups A, B, C, and D show that students' MK increased after study abroad except for Question No. 11, for which Groups D and F display a decrease in MK scores after study abroad. As can be seen, errors

in the sentences in Groups A, B, and C may be relatively easy to correct and state the rule for students who have studied overseas. On the other hand, Groups D, E, and F might be relatively difficult to correct and write the rule even for those who have studied abroad. Although Group D shows positive scores, the actual scores in the group were not so high as Groups A, B, and C. The same statement can be applied to Groups E and F.

The gained MK suggests two important points

Table 6

Comparison of MK scores in the GJT before and after study abroad

No	Grammatica Items	Scores	Group
23	*Let me know if you need more informations.	55	Group A over +31
25	*Two hundred people employed by the company	45	
10	*This is the office on which Bill works.	38	
12	*How long are they married?	37	
17	*A shoplifter is someone which steals from a shop.	37	
8	*Can you hear a music?	36	
19	*Was the weather good when you are on holiday?	36	
20	*We were good friends. We were knowing each other well.	28	Group B +30--21
30	*If Ellen had joined at the time, our team will be a better one.	27	
7	*If I were rich, I will buy a yacht.	26	
18	(At the party) Hello, Jane. *Do you enjoy the party?	25	
28	*Sara has lived in London since ten years.	24	
24	*Did you have those curtains make?	20	
14	*Hanako and Kenji are very happy married.	19	Group C +20--11
26	*Although rained a lot, we enjoyed the party.	19	
13	*We saw some people which car had broken down.	18	
21	*We discussed about a lot of things at the meeting.	18	
16	*When have your friends arrived ?	16	
1	*If I had three million yen, I will buy that car.	15	
15	*The water boils. Can you turn it off?	11	Group D +10--0
29	Mr. Smith: *Have you walked dog. Mrs. Smith: Yes, I have.	6	
27	*Not have a car, she finds it difficult to get around.	5	
11	*English people I know drink a lot of tea.	0	Group E 0-- -10
6	It's a beautiful day. *Let's sit in a garden.	-2	
3	*I'm afraid of the dogs.	-5	
22	*I refused answering any more questions.	-5	
2	Look at those clouds. *It will rain.	-6	
5	*I demanded that he would apologise.	-6	
9	*The restaurant that we had dinner was near the airport.	-8	
4	*She has been waiting for an hour before I met her.	-11	Group F -11 over

* shows sentences are not grammatically correct.

about change of MK after study abroad. First, students after study abroad tended to be able to correct and state an error of relatively explicit grammatical rules, although the same grammatical categories were not always in the same group such as tense and aspect in Group A (No. 19) and Group C (No. 15). The unchanged and lost MK indicates that implicit or complex rules were difficult for students who experienced overseas study to correct and state the rule. The definite and indefinite articles in the sentences (Nos. 6 & 3) might have seemed a little strange to students, but they did not make a correction or justify it, because these rules are not always clear to them. Errors in infinitive (No. 22), subjunctive mood (No. 5), and relative clause (No. 9) seem to be not so difficult for participants, but they might have lost them or were not aware of them because these rules are a little more complicated than other rules. In particular, an error in a relative clause (No. 9) is more complicated than other relative pronouns because students might have confused the relative pronoun with a relative adverb. With respect to No. 2, the sentence, *it will rain* itself is not ungrammatical, but *will* should be replaced with *be going to*, because *will* cannot be used when something that can be seen is about to happen. Students might have learned it when they were high school students, but they could not correct or justify it. One thing we should keep in mind is that these are not grammar questions but MK questions. The other important finding from this analysis is that students seemed to become more aware of grammatical rules while they were exposed to the actual usage of English. This finding is particularly shown in Group A. Students might have learned basic rules of nouns, relative pronoun, tense and aspect, passive, and subjunctive mood shown Group A in secondary school English class. These rules are explicit basic rules usually learned in high school before study abroad, not newly learned during study abroad. However, they were not able to correct nor justify them before

study abroad, but they were able to do after study abroad. This suggests that they might have become more aware of the rule while they were exposed to the actual usage of English usage.

For the second research question, I compared correlations between MK and L2 proficiency before study abroad and ones between MK and L2 proficiency after study abroad. Tables 7 and 8 show correlations between MK and the TOEIC IP and those between MK and the TOEFL iBT, respectively. Overall, it can be said that correlations between MK and academic English tests become stronger after study abroad. The correlation between total scores of the TOEFL iBT and MK became slightly stronger after study abroad while the correlation between the TOEIC and MK become weaker after study abroad. The relationship between the reading score of the TOEIC IP and MK becomes weaker, but it has still a moderate correlation with MK after sojourn. Regarding TOEFL iBT, there is no significant correlation among MK and four skills before study abroad. However, after study abroad a moderate correlation can be found between MK and the reading section and between MK and the total scores of TOEFL iBT. Also, the correlations between MK and three skills of TOEFL iBT become stronger, although they were not significant. The total scores of TOEFL iBT become moderately correlated with MK. Usually MK is related to literacy (reading and writing), but the results show that the relationship between MK and writing in TOEFL iBT is not correlated significantly. A moderate correlation between MK and reading suggests that students use MK when they read academic reading materials.

Next, let us look at relationships between L2 proficiency and the GPA. As mentioned earlier, the GPA scores were accumulated, representing all grades of academic studies at university. It includes students' efforts to study at university, the amount of studies of all subjects, and the ability to understand the subjects. Overall the GPA

Table 7*Correlations between TOEIC IP and MK*

	Before Study Abroad	After Study Abroad
TOEIC Listening & MK	.23	.14
TOEIC Reading & MK	.48**	.41*
TOEIC Total & MK	.39*	.32*

Note: N=42, *= $p<.05$, **= $p<.01$

Table 8*Correlations between TOEFL iBT and MK*

	Before Study Abroad	After Study Abroad
TOEFL iBT Reading & MK	.06	.52**
TOEFL iBT Listening & MK	-.04	.27
TOEFL iBT Speaking & MK	-.1	.27
TOEFL iBT Writing & MK	.24	.35
TOEFL iBT Total & MK	.06	.50*

Note: N=23, *= $p<.05$, **= $p<.01$

Table 9*Correlations between TOEIC IP and GPA*

	Before Study Abroad	After Study Abroad
TOEIC Listening & GPA	.39**	.29*
TOEIC Reading & GPA	.60**	.49**
TOEIC Total & GPA	.54**	.45**

Note: N=48, *= $p<.05$, **= $p<.01$

Table 10*Correlations between TOEFL iBT and GPA*

	Before Study Abroad	After Study Abroad
TOEFL iBT Reading & GPA	.44*	.48**
TOEFL iBT Listening & GPA	.37	.24
TOEFL iBT Speaking & GPA	.16	.17
TOEFL iBT Writing & GPA	.24	.35
TOEFL iBT Total & GPA	.35	.42*

Note: N=24, *= $p<.05$, **= $p<.01$

can represent students' cognitive ability at university.

When we look at Table 9, which shows the relationship between the GPA and TOEIC IP, we can understand all the relationships become weaker after study abroad, which is a little different from those of TOEFL iBT (Table 10). Table 10 shows the relationships between the GPA scores and four academic skills. The results will become much clearer when dividing the four skills into literacy skills and spontaneous responses.

Literacy skills refer to reading and writing while spontaneous responses mean listening and speaking. In general, literacy skills have more or less moderate relationships with the GPA while spontaneous responses have weaker relationships with the GPA. These results can be supported by the fact that most GPA at university is produced mainly by literacy skills. Although there are some courses that evaluate students' oral skills in English such as "Public Speaking" and "Pronunciation and Presentations" in this

department, almost all courses at this university are evaluated by literacy skills, written papers, or written examinations. Such differences in relationships between MK and standardized tests can be mainly caused by differences in L2 proficiency tests. The TOEFL iBT can be categorized as an academic English test while the TOEIC IP is a general English test.

Finally, Table 11 illustrates correlations between MK and the GPA, suggesting that the relationship become stronger after study abroad.

Discussion

One of the aims of this paper is to examine whether MK is changeable itself. The results of research question 1 showed an increase in the amount of MK after significant exposure to the target language. The fact that more number of explicit grammatical rules are likely to be corrected and with justification after study abroad suggests that MK does not interfere with the development of L2 proficiency. It rather suggests that MK contributes to the development of L2 literacy, which is supported by Iida (2010) by means of regression analyses. These results suggest that MK based on L1 is dynamic itself. The amount of MK increases after exposure to the target language. However, since students did not learn new grammatical items during study abroad, it might be argued that the amount of MK increases because of significant exposure to the target language. In particular, explicit rules of MK tend to become more noticeable for students because of the exposure. For example, students might have learned when they were in high school a rule that

abstract noun is not countable. They know the rule itself, but their knowledge of the rule might have not reached the level of becoming aware of correcting and explaining an error. Due to exposure to the target language during study abroad, they might have encountered actual usage of abstract nouns and become more aware of the rule than when they had studied it in the classroom.

The other aim of this study is to investigate the correlation of MK with cognitive abilities; it was found that MK has a stronger correlation with the GPA and L2 reading skill after study abroad. The fact that MK has a moderate correlation with both the reading section of the TOEIC and TOEFL suggests that students might have used an ability similar to MK when they were reading in the target language. The decline of the correlation between the TOEIC reading and MK might have been caused by the fact that they do not have to pay extra attention to MK while reading TOEIC materials because of the development of their L2 proficiency. In other words, they might have automatized reading skills of the TOEIC to some extent, but their reading skill has not reached the TOEFL's level of academic. Also, correlations and change of correlations among MK, L2 reading proficiency, and the GPA indicate that MK has a role of analytic ability as shown by Roeher (2008). These relationships suggest that MK belongs to cognition. Also, because MK is based on L1 not L2, it can be said that MK based on L1 has moderate correlations with L2 reading and GPA. These relationships become stronger after exposure to the target language. Such relationships show the relationship between cognition and two languages, confirming the idea that two (or more) languages

Table 11

Correlations between MK and GPA

	Before Study Abroad	After Study Abroad
MK & GPA	.30**	.40**

Note: N=68, *= $p < .05$, **= $p < .01$

have collaborative influence on each other (de Bot, 1992; Kroll & Sunderman, 2003), which implies the use of L1 in English classrooms in secondary school. The New Course of Study published by MEXT (2017, 2018) stipulated that English language teaching in junior and senior school should be carried out via English. There have been a large number of discussions on English-through-English technique to date. However, as discussed above, since L1 and L2 have a collaborative influence on each other in one's mind, it might be important to have collaborative language use in the classroom.

Conclusion

This study has shown that MK is not static but dynamic in that it can quantitatively and qualitatively increase after significant exposure to the target language. The study also found that MK has moderate correlations with L2 reading, relating to them more strongly after significant exposure to the target language. The results suggest that L2 proficiency seems to be based on L1 MK and that L1 MK might be related to cognition.

Regarding the pedagogical implication, although teaching only English grammar based on L1 in the classroom does not lead to develop L2 proficiency, grammatical knowledge based on L1 with significant exposure to the target language appears to be important to develop L2 proficiency.

However, the present research has some limitations. Being a longitudinal study, it happened that some participants did not complete all the tests. Also, the number of participants was not sufficient to reach definite conclusions. Further studies on the relationships among L2 proficiency, MK and cognition might be necessary.

Notes

- i There were a few students who did not take some tests during the four years. Therefore, the number of students varied during four

years. However, all participants took the placement test and obtained the GPA.

- ii Raw scores were used in this test.
- iii Four students did not take the TOEIC IP test, so the number of students who took the test was 46.
- iv Four students did not take the TOEFL iBT test, so the number of students who took the test was 22.

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Appendix

Read the sentences from 1 to 30 and judge whether each sentence is grammatically right or wrong.

If a sentence is grammatically right, mark with ○, if it is uncertain, mark with △ on the answer sheet. If a sentence is grammatically wrong, first of all, mark with ×, write a word or phrase including an error, correct it, and finally state a grammatical rule for explaining the error.

1. If I had three million yen, I will buy that car.
* million 百万
2. Look at those clouds. It will rain.
3. I'm afraid of the dogs.
4. She has been waiting for an hour before I met her.
5. I demanded that he would apologise.
* apologise 謝る
6. It's a beautiful day. Let's sit in a garden.
7. If I were rich, I will buy a yacht.
* yacht ヨット
8. Can you hear a music?
9. The restaurant that we had dinner was near the airport.
10. This is the office on which Bill works.
11. English people I know drink a lot of tea.
12. How long are they married?
13. We saw some people which car had broken down.
14. Hanako and Kenji are very happy married.
15. The water boils. Can you turn it off?
16. When have your friends arrived?
17. A shoplifter is someone which steals from a shop.
18. (At the party) Hello, Jane. Do you enjoy the party?
19. Was the weather good when you are on holiday?
20. We were good friends. We were knowing each other well.
21. We discussed about a lot of things at the

meeting.

22. I refused answering any more questions.
23. Let me know if you need more informations.
24. Did you have those curtains make?
25. Two hundred people employed by the company.
26. Although rained a lot, we enjoyed the party.
27. Not have a car, she finds it difficult to get around. * get around あちこち行く
28. Sara has lived in London since ten years.
29. Mr. Smith: Have you walked a dog.
* walk ～を（散歩に）連れて行く
Mrs. Smith: Yes, I have.
30. If Ellen had joined at the time, our team will be a better one.