Implicit and Explicit Grammatical Knowledge of L2 English: Identification, Correction, and Provision of Rules

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Abstract

This study investigated the degree to which L2 learners of English possess implicit and explicit knowledge. Two types of tests, one without hints and one with hints, contained the same 12 erroneous sentences. Twenty-eight Japanese university students were first provided with tests without hints, directed to underline the erroneous parts of the 12 sentences and asked to correct the errors. Then, the participants were given tests with hints (i.e., underlining of errors) and asked to correct the errors. They were also asked to write relevant rules upon which they had based their corrections. The results showed that the participants corrected errors significantly better than they provided correct rules, indicating that they possessed implicit knowledge of the targeted rules. However, it was also revealed that Japanese learners of English seem to have less implicit knowledge than German learners of English (Green & Hecht, 1992). Another finding was that the participants corrected more errors in a test with hints than in a test without hints. In other words, underlining of errors in a test affected the participants' performance. Furthermore, I argue that tests with underlined errors may overestimate levels of implicit knowledge.

1. Introduction

In most classrooms of English as a second language (L2) in Japan, learners receive one-way grammar explanation provided by their teachers and through their textbooks. Then, they engage in exercises which are called “communicative activities," but which, in fact, focus on the manipulation of particular grammar rules. As a result, many learners will possess explicit knowledge of English. However, it has been pointed out that explicit knowledge of English may be insufficient to allow learners to use the language for communicative purposes. Thus, recently, the focus of English teaching in Japan has been directed toward the development of learners’ communicative competence, that is to say, the ability to use the rules of English with or without knowing them explicitly after years of learners having had grammatical knowledge crammed into their minds. This study examines to what degree Japanese learners of English possess L2 explicit knowledge and whether they can apply the grammar rules of English without knowing those rules...
explicitly.

According to Ellis’s (1994) theory of instructed L2 acquisition, L2 knowledge is divided into two types: explicit and implicit. The former refers to analyzed, abstract, and explanatory knowledge of which L2 learners are aware. Thus, learners can report their knowledge, that is to say, what they know. On the other hand, the latter refers to intuitive knowledge. Thus, L2 learners can produce novel sentences and judge the grammaticality of sentences without being able to explain the rules. Following Ellis (1994), for the present study, explicit knowledge is operationally defined as knowledge which the learner can verbalize whereas implicit knowledge is defined as knowledge which the learner cannot state and yet which leads to correct performance such as accurate judgment of grammaticality.

Previous studies (Green & Hecht, 1992; Kubota, Itagaki, & Sugiyama, 1999; Sakai, 2004) have provided empirical evidence that L2 learners do indeed possess implicit grammatical knowledge. Green and Hecht (1992) examined the explicit and implicit knowledge of 300 German learners of English and of 50 English native speakers. The grammar test included 12 sentences each of which contained one error that was underlined. Participants were asked to read the sentences and to correct the erroneous parts, and to provide the rules pertaining to the errors. Although the researchers did not state so clearly, it seems that explicit knowledge was measured as a score of correct rule statement, and that implicit knowledge was measured as the difference between the score of error correction and that of correct rule statement. The main results showed that the German learners of English corrected 78% of the errors and provided the right rules for 46% of them. Thus, 32% of the errors were corrected on the basis of implicit knowledge. English native speakers corrected 96% of the errors and wrote correct rules for 42% of the errors. This suggests that native speakers may rely on implicit knowledge more than non-native speakers.

Kubota, Itagaki, and Sugiyama (1999) replicated the study of Green and Hecht (1992) and examined the explicit and implicit knowledge of 80 private junior college students and 80 university students who were all Japanese learners of English. Their majors varied and included English-majors. They divided the junior college students and university students into two groups. One group was given the test used by Green and Hecht (1992), and the other group was given a test in which the errors were not underlined. The results of the test without underlining or hints showed that junior college students corrected 14% of the errors and gave right rules for 10% of them, whereas university students corrected 40% of the errors and provided correct rules for 35% of them. The results of the test with hints showed that junior college students corrected 36% of the errors and provided correct rules for 27%; on the other hand, university students corrected 66% of the errors and stated correct rules for 72%. In other words, Japanese students who took the test with hints performed better than those who took the test without hints. Kubota, Itagaki, and Sugiyama (1999) suggested that Japanese learners of English may not have developed as much implicit knowledge as German learners of English mainly based on the fact that the Japanese learners’ difference between the percentage of error correction and the percentage of rule
explanation (54% and 46.5% on average of results obtained from the two types of test) was smaller than that of the German learners (78% and 46.2% on average).

As to these two studies, I would like to point out two methodological issues. First, neither of the two studies analyzed their data statistically. Thus, the differences found in their results might be due to chance. To examine whether the scores for correction will be greater than the scores for rule statement or not, it is necessary to perform statistical analyses.

Second, the underlining of errors in the test used by Green and Hecht (1992) might cause researchers to overestimate implicit knowledge. According to Ellis (2004), one frequently-used method to measure L2 explicit knowledge is the grammaticality judgment task. He pointed out that these tasks involve three elements: (a) identification of ungrammaticality, (b) correction of errors, and (c) provision of rules. The test used by Green and Hecht (1992) contained only the last two elements. That is, all the errors in the test were underlined, and learners did not have to identify ungrammaticality. On the other hand, one of the two tests used by Kubota, Itagaki, and Sugiyama (1999) contained all three elements. Below are some examples from among the test items.

Example 1: Outside he was arrested by an policeman.
Example 2: Outside he was arrested by an policeman.

Example 2 makes it easier for learners to correct the error than Example 1. In the second example, learners only have to supply the correct form to correct the error, whereas in the first, learners need to identify the error and supply the correct form as well. Therefore, it is probable that even if learners cannot state the relevant rule explicitly, sentences in which the error has been identified, as in Example 2, elicit the right correction more easily than those which have not been identified for the test-takers. Kubota, Itagaki, and Sugiyama’s (1999) findings suggest that the data obtained through a test with hints (as in Example 2) and a test without hints (as in Example 1) may lead researchers to make different conjectures about the relationship between explicit knowledge and implicit knowledge.

Sakai (2004) administered two types of tests (one with hints and one without hints) containing the same 12 sentences as Green and Hecht (1992) to 32 Japanese university students learning English in the Faculty of Education of a national university. Of the 32 students, there were 14 English education majors and 5 English education minors. The students were asked to identify erroneous parts and correct the errors in the test type without hints and then were asked to correct errors and provide the relevant rules in the test with hints. The results of this within-subject design study showed that there were statistically significant differences among the means: correction without hints ($M = 2.75, SD = 1.72$) < identification of errors without hints ($M = 3.88, SD = 1.50$) < rule statement with hints ($M = 7.41, SD = 2.35$) < correction with hints ($M = 8.47, SD = 1.95$). In other words, when erroneous parts were indicated to the students, the number of corrections was greater than the number of rule statements. The results suggest that Japanese learners of English may have developed and possess some implicit knowledge of English.
However, at the same time, when errors were not underlined, it was quite difficult for them to identify and correct errors on their own. In addition, Sakai (2004) provided percentages of correction and statement of pertinent rules for the two types of test, as shown in Green and Hecht (1992) and Kubota, Itagaki, and Sugiyama (1999). In the test without hints, the students identified 32.3% of the errors and corrected 22.9% of the errors; on the other hand, in the test with hints, they corrected 70.6% of the errors and wrote correct rules for 61.7% of the errors. Thus, the results of Sakai (2004) confirmed the findings of Kubota, Itagaki, and Sugiyama (1999), to wit: Japanese students may possess greater ability to explain the relevant rules and less ability to correct errors on the basis of implicit knowledge than German learners of English.

Both of the studies, Kubota, Itagaki, and Sugiyama (1999) and Sakai (2004), included English major students in their studies. Compared to students of other majors, English majors may have different levels of awareness of English grammar and may have developed English grammatical knowledge more explicitly. Thus, this study attempted to replicate Sakai (2004) by administering the two types of test to Japanese learners of English who did not major in English education. Two research questions were posited: (a) What is the relationship between explicit and implicit knowledge of non-English-major university students? and (b) Does underlining influence performance? Two hypotheses related to the research questions were made on the basis of previous studies as follows:

Hypothesis 1: In the test with hints, non-English-major university students will correct errors statistically better than they will provide correct rules.

Hypothesis 2: Non-English-major university students will correct more errors in a test with hints than in a test without hints.

Hypothesis 1 is concerned with the question of whether Japanese students have developed and possess implicit knowledge of English grammar. Hypothesis 2 focuses on the question of whether hints influence the performance of correction.

2. Method

2.1 Participants

The tests for this study were administered to 32 Japanese learners of English in two Japanese universities. Of the 32, two students who majored in English education were excluded. Three students did not sign the consent form nor completed all the tests and were therefore excluded. Thus, the performance of 28 students was analyzed.

2.2 Design and Procedures

This study is a within-subject design with four dependent variables (identification of errors without hints, correction without hints, rule statement with hints, and correction with hints). The participants were given a test without hints and asked to underline the erroneous parts and correct
them. After collecting the test sheets, I administered a test with hints and asked the participants to correct the errors underlined in the test and write relevant rules for correction. The two tests took about 30 minutes in total.

2.3 Materials
I used the 12 sentences used in Green and Hecht (1992) with slight changes and made two forms of the test (one without hints and one with hints). The original test stated that the English test sentences on the test had been produced by German pupils; however, for the present study, the test takers were told that a Japanese student who is learning English had produced the sentences. I also changed a German place name and British spellings in the original test to a Japanese place name and American spellings which are more familiar to Japanese learners of English. Each of the 12 sentences contained one error (see Appendix).

2.4 Scoring and Analyses
I scored all the responses by the participants. For identification and correction of errors in both the test without hints and that with hints, one point was given to correct underlining of errors and another for accurate correction of them. Spelling mistakes were not considered.

Table 1.
Scoring for Rule Statements

<table>
<thead>
<tr>
<th>Code</th>
<th>Criterion</th>
<th>Technical language</th>
<th>Rule</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>The participant states a completely correct rule using appropriate technical language.</td>
<td>appropriate</td>
<td>completely correct</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>The participant states an almost correct rule and uses some technical language.</td>
<td>some</td>
<td>almost correct</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>The participant states a partly correct or incomplete rule and uses some technical language.</td>
<td>some</td>
<td>partly correct</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>The participants states some rule which is incorrect and uses some technical language.</td>
<td>some</td>
<td>incorrect</td>
<td>0</td>
</tr>
<tr>
<td>2a</td>
<td>The participant states a relatively correct rule and does not use even very simple technical language.</td>
<td>none</td>
<td>relatively correct</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>The participant states an incorrect rule and does not use even very simple technical language.</td>
<td>none</td>
<td>incorrect</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>The participant does not show awareness of the target rule or is unable to explain the rule.</td>
<td>---</td>
<td>---</td>
<td>0</td>
</tr>
</tbody>
</table>

*aThis code was created for this study.*
For rule statement, I revised Han and Ellis's (1998) rating scale of metalingual comments (see Table 1). Han and Ellis (1998) used a six-point scale in terms of (a) the use of technical language and (b) correctness of the rules. Based on their two viewpoints, I modified their scale into a seven-point scale from 0 to 6. Based on Green and Hecht (1992) who supposed that explicit knowledge does not always entail technical language, I considered the codes of 2, 4, 5, and 6 to indicate the possession of explicit knowledge and decided that these codes would be allotted one point each (see the Score column of Table 1).

The scoring of rule statement is naturally subjective. Therefore, to assess interrater reliability for the coding, I asked another person, a second rater, to code the rule statements. Agreement reached 90.5% (304 out of 336).

Because of the violation of the normal distribution assumption, non-parametric statistical analyses which do not assume the normal distribution of scores were used instead of parametrical statistical analyses. After checking the assumptions for the test (Green & Salkind, 2005, p. 399), six Wilcoxon matched-pairs signed-ranks tests were performed to examine whether the participants performed differently on identification of errors, correction without hints, rule statement, and correction with hints. To avoid Type I error, the alpha level was set at .008 by using the Bonferroni adjustment. The eta squared was calculated to show the strength of association (Hatch & Lazaraton, 1991, p. 300).

3. Results

Table 2 displays the descriptive statistics for identification of errors without hints, correction without hints, correction with hints, and rule statement with hints. As expected, the score of correction with hints was the highest ($M = 8.68$, or 72.3% of the 12 items), followed by the score of rule statement ($M = 7.39$, or 61.6% of the 12 items) and the score of identification ($M = 4.61$, or 38.4% of the 12 items); on the other hand, the score of correction without hints was the lowest ($M = 3.64$, or 30.3% of the 12 items).

The results for non-English-major students in this study were almost the same as those of Sakai (2004) who examined Japanese students, most of whom were English-education majors or minors, although the performance of the participants in this study in the test without hints was slightly better than that of Sakai (2004). In the test with hints, on average, the participants corrected 72.3% of the errors and provided correct rules for 61.6% of the errors. Like Kubota, Itagaki, and Sugiyama (1998) and Sakai (2004), the difference between these percentages is smaller than that for German learners of English in Green and Hecht (1992). However, at the same time, this difference indicates that the participants possibly made correction based on the implicit knowledge.
Table 2.

Descriptive Statistics for Identification of Errors and Correction in the Test Without Hints, and Rule Statement and Correction in the Test with Hints

<table>
<thead>
<tr>
<th></th>
<th>Identification without hints</th>
<th>Correction without hints</th>
<th>Correction with hints</th>
<th>Rule statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>4.61</td>
<td>3.64</td>
<td>8.68</td>
<td>7.39</td>
</tr>
<tr>
<td>% of the 12 items</td>
<td>38.4%</td>
<td>30.3%</td>
<td>72.3%</td>
<td>61.6%</td>
</tr>
<tr>
<td>SD</td>
<td>2.30</td>
<td>2.86</td>
<td>2.29</td>
<td>2.35</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.40</td>
<td>0.55</td>
<td>-1.06</td>
<td>-0.88</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>0.04</td>
<td>-0.54</td>
<td>1.11</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Note. The standard error for skewness is 0.44; The standard error for kurtosis is 0.86.

The six Wilcoxon tests showed that there were statistically significant differences between any combination of the four variables ($Z = -4.37$, $p < .001$, $\eta^2 = .71$ between identification without hints and correction with hints; $Z = -3.52$, $p < .001$, $\eta^2 = .46$ between identification without hints and rule statement; $Z = -4.55$, $p < .001$, $\eta^2 = .77$ between correction without hints and correction with hints; $Z = -4.06$, $p < .001$, $\eta^2 = .61$ between correction without hints and rule statement; and $Z = -3.36$, $p < .001$, $\eta^2 = .42$ between correction with hints and rule statement) except for between identification without hints and correction without hints ($Z = -2.10$, $p = .034$, $\eta^2 = .16$).

Thus, the first hypothesis stating that in the test with hints, non-English-major university students will correct errors statistically better than they will provide correct rules was confirmed. The second hypothesis stating that non-English-major university students will correct more errors in the test with hints than in the test without hints was supported, as well.

Table 3 shows the relationship between rule statement and correction in the test with hints. Overall, participants wrote correct rules for 207 instances of the 336 items. Of the 207, participants corrected 197 instances (95.2%) and made 10 wrong corrections (4.8%). Participants wrote incorrect rules for 44 instances of the 336 items. Of the 44, there were 18 instances of right corrections (40.9%), 25 instances of wrong corrections (56.8%), and one instance of no response (2.3%). Therefore, it can be stated that when participants wrote correct rules, they were able to make right corrections. On the other hand, when participants wrote incorrect rules, they tended to make mistakes in the correction of the errors. However, it is noteworthy that 40.9% of the instances of incorrect rule statement were right correction. This rate is greater than the rate (18.4%, 7 out of the 38) for English-major students in Sakai (2004). In addition, even when participants were not able to write the rules, 28 of the 85 items (32.9%) were right corrections. To look at the same table from a different angle, of the 243 instances of right correction, 197 (81.1%) were correct rules, 18 (7.4%) were wrong rules, and 28 (11.5%) were no provision of responses.
Table 3.

Relationship Between Rule Statement and Correction in the Test with Hints

<table>
<thead>
<tr>
<th>Rule</th>
<th>CC</th>
<th>WC</th>
<th>NC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>197 (95.2%) [81.1%]</td>
<td>10 (4.8%) [22.7%]</td>
<td>0 (0.0%) [0.0%]</td>
<td>207 (100%)</td>
</tr>
<tr>
<td>WR</td>
<td>18 (40.9%) [7.4%]</td>
<td>25 (56.8%) [57.8%]</td>
<td>1 (2.3%) [2.0%]</td>
<td>44 (100%)</td>
</tr>
<tr>
<td>NR</td>
<td>28 (32.9%) [11.5%]</td>
<td>9 (10.6%) [20.5%]</td>
<td>48 (56.5%) [98.0%]</td>
<td>85 (100%)</td>
</tr>
<tr>
<td>Total</td>
<td>243 [100%]</td>
<td>44 [100%]</td>
<td>49 [100%]</td>
<td>336</td>
</tr>
</tbody>
</table>

Notes: CR = correct rule statement, WR = wrong rule statement, NR = no rule statement, CC = correct correction, WC = wrong correction, and NC = no correction.

4. Discussion

First, the results as to Hypothesis 1 lent support to the findings of Green and Hecht (1992), Kubota, Itagaki, and Sugiyama (1999), and Sakai (2004): L2 learners of English can correct errors even if they cannot state the rules. This point is supported by the results shown in Table 3: 32.9% of the 85 cases of no rule statement and 40.9% of the cases of incorrect rule statements were associated with right corrections. In other words, L2 learners in these studies who were German students, Japanese university students including both English-education major and non-English-major students, and Japanese junior college students, had developed and possessed implicit knowledge, that is to say the ability to use rules without being able to state what those rules are.

At the same time, this study showed that Japanese learners of English may have less ability to correct errors based on the implicit knowledge than German learners of English. This point was made judging from the difference between rule statement and correction in the test with hints. Green and Hecht (1992) showed that German learners of English corrected 97% of the instances in which they wrote correct rule statements and corrected 55% of the instances in which they did not write rules. In Kubota, Itagaki, and Sugiyama (1999), Japanese junior college students and university students corrected 88% and 96% respectively of the instances in which they provided correct rules, while the two groups corrected 18% and 30% respectively of the instances in which they did not write rules. Sakai (2004) reported that English-major Japanese students corrected 93.7% of the instances in which they stated correct rules and corrected 38.5% of the instances in which they did not write any rules. The results of the present study were similar to those of Kubota, Itagaki, and Sugiyama (1999) and Sakai (2004). In other words, it is suggested that, in comparison with German learners of English, there may be a stronger relationship between rule statement and correction in Japanese learners of English.

Second, the results as to Hypothesis 2 showing statistically significant differences between
corrections without hints and with hints suggest that underlining of errors may have made correction much easier. Thus, in the test with hints, it is possible that implicit knowledge is overestimated. This may raise one question about the definition of implicit knowledge: Should implicit knowledge be measured by means of a test without hints or one with hints? If a test without hints should be used, the interpretation for Hypothesis 1 will be wrong. Rather, it would be necessary to compare correction without hints (assumed to rely on implicit knowledge) with rule statements with hints (assumed to rely on explicit knowledge). If so, because this study found a statistically significant difference between correction without hints ($M = 3.64$) and rule statements ($M = 7.39$), it could be interpreted to suggest that Japanese students possess statistically less implicit knowledge than explicit knowledge.

Underlining may have another effect on the performance. Han and Ellis (1998) stated that “implicit knowledge is amenable to conscious examination .... [and] can serve as a basis for the construction of explicit knowledge” (p. 5). It is possible that underlining in the test would enhance participants’ awareness of the targeted rules so that the participants would become more focused on the rules and construct explicit knowledge of them.

As Han and Ellis (1998) pointed out, definition of implicit and explicit knowledge and measurement of these types of knowledge may be somewhat controversial issues. Based on empirical data, Han and Ellis (1998) argued that imposing a time constraint will influence the type of knowledge that will be relied upon: Learners may utilize implicit knowledge in a timed grammatical judgment test, whereas they may also make use of explicit knowledge in a delayed grammatical judgment test (see also Ellis, 2005). As in previous studies (Green & Hecht, 1992; Kubota, Itagaki, & Sugiyama, 1998; Sakai, 2004), this study did not set a time constraint in either of the two tests. Thus, it may not be clear whether implicit knowledge was tapped or not by use of this instrument.

In summary, the findings of this study are as follows: First, the participants corrected errors statistically better than they provided correct rules. This suggests that they possessed and used implicit knowledge of the targeted rules. However, comparison with previous studies indicated that Japanese learners of English may have less implicit knowledge than German learners of English. Second, the participants corrected more errors in a test with hints than in a test without them. That is, underlining of errors affected the participants’ performance. This suggests that underlining of errors may decrease the cognitive load of the learners to detect the errors and make it easier for them to supply correct forms. Furthermore, this finding may caution that implicit knowledge may be overestimated under such conditions. The relationship between implicit and explicit knowledge is an interesting and important issue in L2 acquisition and instruction. As the findings of this study suggest, to clarify the relationship it will be necessary to examine the theoretical constructs of implicit and explicit knowledge in more detail and to ascertain how the two types of knowledge can be accurately measured.
References


Appendix. Twelve Test Sentences

A. The following English sentences (Numbers 1 to 8) are a part of a letter which a Japanese senior high school student wrote to his British pen pal: (1) As you know lives my aunt on a farm. (2) If you come to Nagano next year, I show you the new sports center. (3) I spent last summer with my aunt. Most of the time I’ve played tennis. (4) It takes not very long to get there. (5) There is a farm near us. Do you like to ride horses? (6) Of course, we won’t have to pay something for the ride. (7) If you do, there’ll be no problem, because I know the farmer for a long time. (8) Have I told you that my brother has got a new car? He drives more careful now than before.

B. The following English sentences (Numbers 9 to 12) are a part of a statement made by a Japanese senior high school student who witnessed a man stealing an MD player at an electrics shop in Tokyo: (9) About half an hour ago a man was coming into the shop. (10) He had a very big nose and smoked a cigarette. (11) While the shop-keeper was fetching a portable cassette-recorder from the backroom, the man, which was a thief, snatched a little MD player from the counter and ran out of the shop. (12) Outside he was arrested by an policeman.

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