Mutual compensation between L1 reading ability and L2 language proficiency in L2 reading comprehension

Junko Yamashita
Nagoya University, Japan

The present study investigates the contribution of first language (L1) reading ability and second or foreign language (L2) proficiency to L2 reading comprehension, by focusing on the compensation between L1 reading ability and L2 proficiency. Two research questions were addressed: (1) does high L1 reading ability compensate for low L2 language proficiency? (2) does high L2 language proficiency compensate for low L1 reading ability? Participants were 241 Japanese university students learning English as a foreign language. They were divided into three levels (high, middle, low) according to the levels of their L1 reading ability and L2 language proficiency. Effects of these two factors on L2 reading ability were analysed by analysis of variance. A multiple regression analysis to estimate a compensation model was also applied. Results provided positive answers to both research questions. The present study thus demonstrates the mutual compensation between L1 reading ability and L2 proficiency, which works in order to achieve the highest possible level of L2 reading comprehension for readers with different ability backgrounds in L1 reading and L2 proficiency.

The issue of the relationship between L1 and L2 reading has been discussed under the frameworks of two hypotheses: the linguistic interdependence hypothesis and the linguistic threshold hypothesis. The former, in its simple form, states that L1 reading ability transfers to L2 reading. We can anticipate that skilled L1 readers read well in L2 (e.g. Goodman, 1973; Coady, 1979; Cummins, 1979, 1991). The linguistic threshold hypothesis proposes that a certain threshold level of L2 language proficiency is necessary before L1 reading ability transfers to L2 reading. According to this hypothesis, even skilled L1 readers cannot read well in L2 until their L2 language proficiency has reached the threshold level (e.g. Clark, 1978; Cummins, 1979, 1991; Cziko, 1980).

Alderson (1984) presented a broad review of relevant studies, comparing work on these two hypotheses. He concluded that both L1 reading ability and L2 language proficiency affect L2 reading comprehension, but that L2 language proficiency has
a stronger influence at lower levels of L2 proficiency. However, this conclusion was regarded as tentative because the majority of available studies were not designed to examine this topic, and further studies were called for. This article raised researchers' awareness of the need for more rigorous research designs and many questions to be examined to understand the relationship of reading ability between two languages.

Several research studies have been reported which are more carefully designed to elucidate this topic (e.g. Perkins et al, 1989; Bossers, 1991, 1992; Carrell, 1991; Bernhardt & Kamil, 1995; Brisbois, 1995; Taillefer, 1996; Lee & Schallert, 1997). These studies obtained information on three variables (L1 reading, L2 reading and L2 language proficiency) from the same individuals and examined the relationships between them. For example, Carrell (1991) examined English L1 speakers studying Spanish and Spanish L1 speakers studying English in the USA. The L1 and L2 reading abilities of the two groups were measured by multiple-choice reading comprehension tests in each language. The L2 proficiency levels were estimated according to course levels in each language. By positing a model that L2 reading ability consists of the sum of L1 reading ability and L2 proficiency, Carrell analysed the relative contribution of the predictor variables by multiple regression analysis for each group. The results showed that the contribution of both L1 reading ability and L2 language proficiency was significant. However, relative weights of the predictor variables were different for different groups. L2 language proficiency was a stronger predictor for English L1 speakers, while L1 reading ability was a stronger predictor for Spanish L1 speakers. Several possible causes of this group difference were discussed, including differences in the learning environment, learning direction, L2 proficiency levels or possible statistical problems. This study involved several factors which could not be sufficiently controlled, and which made it difficult for the author to draw firmer conclusions. However, it has made a valuable contribution to this field because it is one of the first attempts to approach this research topic in a statistically testable form. Many studies have followed this study in the way of analysing their data, and relative contribution of the two predictor variables were often estimated by multiple regression analysis.

Results of such research studies, conducted in various sociocultural contexts with L2 learners of various L1 backgrounds, supported Alderson’s (1984) tentative conclusion. Moreover, it has been reported that the contribution of L1 reading ability increases when learners’ L2 proficiency levels become higher (Perkins et al, 1989; Brisbois, 1995; Lee & Schallert, 1997; Taillefer, 1996). Lower-level L2 readers are either not able to transfer their L1 reading ability (Perkins et al, 1989; Taillefer, 1996), or even if they do, the degree of transfer is smaller in comparison with higher-level learners (Brisbois, 1995; Lee & Shalleart, 1997). In addition to these points, which many of the studies have dealt with because of direct implications for testing the linguistic interdependence hypotheses and the linguistic threshold hypothesis, some researchers took up certain specific aspects of the relationship and expanded the scope of research. For example, Bossers (1992) and Brisbois (1995) looked at contributions of different components of L2 language proficiency, and Taillefer (1996) examined effects of reading tasks on the relative contribution of L2 proficiency and L1 reading ability. These studies have shown that vocabulary makes a larger contribution to L2 reading than grammar does, and that L1 reading ability is more likely to be transferred when the reading task is less demanding. In spite of the gradual
accumulation of research in this field, however, there are still many questions remaining to be explored. Since research in this line has to take a multi-factor approach by operationalising conceptually complex variables, each study can add evidence for only a small part of the relationship. The present study attempts to build upon the previous studies and further expand the research by focusing on the mutual compensation between L1 reading ability and L2 language proficiency.

L2 language proficiency

The previous studies have found that L2 language proficiency plays an important role in determining the transfer of L1 reading ability to L2 reading. In order to test the linguistic threshold hypothesis and the linguistic interdependence hypothesis, some researchers divided their readers into groups according to the levels of L2 language proficiency and examined the relationships between the variables for each group. However, the construct of L2 language proficiency is not simple. It relates to knowledge of language and ability to use the language in different modes (speaking, listening, reading, writing) in contextually appropriate ways. Various models of L2 language proficiency have been proposed, but we have not yet reached a clear agreement on its construct. L2 researchers have used different terms to refer to various aspects of L2 language proficiency. For example, Canale (1983) identified four categories of communicative competence: linguistic, discourses, sociolinguistic, strategic competence. Bachman (1990) proposed three components in his framework of communicative language ability: language competence, strategic competence and psycholinguistic mechanisms.

It is probably not surprising if we consider many debates and points of view on the construct of L2 language proficiency, that researchers used different kinds of operationalisation when they divided their readers into different levels according to L2 language proficiency; for example, general L2 proficiency such as instruction level (Carrell, 1991; Brisbois, 1995) and scores on the Test of English as a Foreign Language (TOEFL) (Perkins et al, 1989), L2 reading ability (Bossers, 1991, 1992), or L2 vocabulary and grammar knowledge (Lee & Shallert, 1997).

The present study refers to L2 language proficiency as knowledge of vocabulary and grammatical structure. This is because these two linguistic components seem to be the clearest examples to represent language proficiency. Lexical and syntactic knowledge is included in many models of L2 language proficiency, although there are differences in terminologies and categorisations of these types of knowledge (see Bachman, 1990). Moreover, reading researchers are aware that these types of linguistic knowledge are related to reading comprehension (e.g. Anderson & Freebody, 1981; Nation & Coady, 1988 for vocabulary; Flores d’Arcais, 1990; Berman, 1984; Barnett, 1986 for grammatical structure). Although it is also true that we do not know precisely how vocabulary knowledge influences reading (e.g. Mezynski, 1983; Ruddell, 1994) and there are some researchers who question the importance of syntactic processing for reading comprehension (e.g. Davison & Green, 1988; Strother & Ulijn, 1987; Ulijn & Strother, 1990), the ambiguity in the contribution of these linguistic knowledge sources to reading achievement should be taken as reflecting our lack of understanding of the relationship between these components and reading rather than the lack of the relationship itself. Therefore,
even if the debate has not been settled with regard to whether and how knowledge of vocabulary and grammatical structure relate to reading comprehension, these two linguistic knowledge sources are regarded as reasonable conceptualisation of L2 language proficiency for the present study.

**Compensation between different components of reading**

In the current development of reading models, it would be rare to assert strict bottom-up or top-down models. The majority of researchers, both in L1 and L2 fields, support interactive models of reading (e.g. McClelland & Rumelhart, 1981; Rumelhart, 1994; Carrell et al, 1988). The interactive models admit mutual influence of various components of reading. Although the nature of the mutual influence or interaction is not thoroughly understood, a concept which seems to capture at least part of the nature of the interaction and which is relevant to this study is ‘compensation’. This concept is traced back to the interactive-compensatory model proposed by Stanovich (1980). This model was developed on the basis of his extensive review of word recognition research, focusing on the interactive effect of orthographic structure and contextual information on word recognition. Stanovich found that, although the facilitation effect of context on word recognition was widely recognised, the effect was larger for less-skilled readers than skilled readers. He explained this finding by proposing the concept of interactive compensation: if one component is weak, other reading processes work harder in order to compensate for the weak one. According to this model, less-skilled readers have to compensate for their weak word recognition skills by using contextual information, while the word-recognition of skilled readers is good enough so that they do not need to rely on context. After the idea of compensation was advanced, some research was conducted to examine the compensatory mechanism at different levels of reading. Aspects of this research included compensation between vocabulary and background knowledge (Stahl et al, 1989, 1991) and between reading ability and background knowledge (Adams et al, 1995). The research has shown that there is a compensation mechanism within our comprehension processes with stronger components trying to make up for the weaker ones.

Alderson (1984) raised questions concerning this compensatory mechanism with regard to the relationship of L1 and L2 reading comprehension: ‘Is it conceivable that good first-language readers will require a lower threshold before being in a position to utilize their good reading strategies? Will the attainment of a higher level of competence compensate a good first-language reader?’ (p. 21). Part of this mutual compensation between L1 reading and L2 proficiency was examined by Zwaan and Brown (1996) with a relatively small number of readers (n = 12) by looking at reading strategies. In this study, skilled and less-skilled L1 readers who were equally at a ‘non-fluent’ level in L2 proficiency read texts both in L1 and L2, and reading strategies extracted by a think-aloud task were compared between the languages and between the groups. The effect of language was much stronger than L1 reading ability (i.e. both groups performed much better in L1 than in L2 and the effect of L1 reading ability was much clearer in L1 than in L2). However, one of the findings suggested compensatory facilitation by high L1 reading ability: skilled L1 readers were more accurate in their L2 paraphrases than less-skilled L1 readers.
The present study examines the effect of L1 reading ability as Zwaan and Brown (1996) did, while further taking into account L2 language proficiency and investigating the mutual compensation of these two factors towards L2 reading comprehension. To this end, the following research questions are addressed:

1) Does high L1 reading ability compensate for low L2 language proficiency?
2) Does high L2 language proficiency compensate for low L1 reading ability?

Method

Participants

The participants were Japanese students learning English as a foreign language (students at four universities participated). Tests were given to more than 300 students, but the number of cases finally submitted to the analyses was 241. Data from students who did not complete the tests were omitted.

Materials

Two kinds of tests (or test tasks in the case of a grammar test) were used in order to represent each variable. This was so that an effect of a particular test method is avoided as much as possible and also that different aspects of each variable (i.e. L1 reading ability, L2 language proficiency and L2 reading ability) measured by different test methods could be integrated. Efforts were made to make the L1 and L2 reading tests as parallel as possible. The TOEFL was given and subsections, except for the listening section, were used as one of the tests which represents relevant variables. One of the considerations in developing the tests was the time limitation. Since a considerably large number of tests were planned to be administered during a regular class period, it was necessary to make the time limit as short as possible. All the tests, except for the TOEFL which has a prescribed time limit, were pilot tested and the time limit (and accordingly the number of items in some cases) was decided based on results of the pilot-testing.

L2 reading ability

English gap-filling test. A gap-filling test is similar to a cloze test, but instead of deleting words at a fixed ratio, it deleted words which were judged to require global-level understanding for restoration, such as cohesive devices and key content words relating to the coherence of the passage. The reason for adopting the gap-filling test was that there is still a continuing debate about the validity of the cloze test as a measure of reading comprehension (e.g. Alderson, 1979, 1980; Chihara et al, 1977; Bachman, 1985; Jonz, 1990).

The test consisted of two passages (332 and 314 words each). Both were taken from English textbooks published in Japan for Japanese students, but slightly adjusted for length. The topics of both passages were comparisons between Japanese and Western culture. Twenty-nine words were deleted altogether. The number of items seemed somewhat small, but this test achieved a high reliability (Cronbach’s alpha, 0.88) with the mean 13.3 (45.9%) when it was given in 25 minutes in a pilot administration.
The time was about the maximum that could be spared for this test considering the time allocation to each test. Therefore, this 29-item gap-filling test was adopted.

*English multiple-choice test.* This formed the latter part of Section 3 of the TOEFL (Reading Comprehension). There were 30 items, based on five expository passages.

*L1 reading ability*

*Japanese gap-filling test.* A Japanese gap-filling test was constructed in the same way as the English one. The test consisted of two passages. Both were taken from passages used in entrance examinations to Japanese universities. As in the English gap-filling test, the topics were comparisons of Japanese and Western culture. Thus the English and Japanese gap-filling tests were parallel in topic and similar in rhetorical organisation in order to avoid undue effects from possible differences. A similar number of words to the English gap-filling test was deleted (31 items). Although the number of items was small as a L1 test, this test was given in a shorter time limit (10 minutes). When the test was pilot-tested under this condition, it achieved a high reliability (Cronbach’s alpha, 0.80) with the mean 19.8 (63.9%), so this test was adopted.

*Japanese multiple-choice test.* The test consisted of three expository passages with 27 questions altogether. The passages were taken from older versions of the National Centre Test. This is the test given to students who want to enter public universities in Japan, and more and more private universities are also using this test. The original questions included not only items to test reading comprehension but also items to test knowledge of Chinese characters. The latter type of questions were not used, and instead one or two questions for each passage were written by the author in order to make the number of questions as similar to the English multiple-choice test as possible. The additional questions were all checked by several graduate students who had knowledge and experience in language testing and by a teacher of Japanese at an upper secondary school. The appropriateness of the questions was approved.

*L2 language proficiency*

*Grammar.* The grammar test consisted of the TOEFL Section 2 (Structure and Written Expression). There were two types of test task in this section (15 and 25 items each).

1. Sentence completion task – the first part of 15 items was choosing an appropriate structure for a blank in a sentence.
2. Error recognition task – the latter part of 25 items was choosing a word/phrase which was grammatically wrong in a sentence.

*Vocabulary*

1. Synonym task – the first half of Section 3 in the TOEFL was used. The task was to choose a synonym for an underlined word in a sentence. There were 30 items.
2. Nation’s Vocabulary Levels Test – Test A of Nation’s Vocabulary Levels Test (Nation, 1990) was used. This test employs the task of choosing an item which best fits the definition given in the test. There are three definitions and a pool of

© United Kingdom Reading Association 2002
six words from which the testees choose an answer for each definition. There are five levels in this test, but the bottom three levels (2000 words, 3000 words, 5000 words levels) were used because these seemed to be appropriate levels for the students in the present study. There were 54 items with 18 items on each level.

Procedure

The data were collected in English language classes at the beginning of the academic year. At all four universities classes were held once a week (for 90 minutes). Because of this time limit, all the tests were divided into three groups, and each group of tests was given during one class period. The first set of tests was Nation’s Vocabulary Levels Test, the English gap-filling test and the TOEFL Section 1 (Listening Comprehension). The second set included the TOEFL Section 2 (Structure & Written Expression) and Section 3 (Vocabulary & Reading Comprehension). The third set was the Japanese gap-filling test and the Japanese multiple-choice test.

At three universities, the tests were administered over three consecutive weeks. At one university, the teacher preferred to give the tests in alternating weeks, so the data collection took five weeks (the number of the students was 23, which was the smallest population in the four universities). The possible improvement of the students’ English ability during this period is considered to be negligible because the English class hours were spent for the tests. Although 23 students received a lesson between the two test administrations, it is unlikely that they could improve their English ability to a great extent in only a week or so. It is also not very likely that the possible improvement of the students’ L1 reading ability during this period was so large as to considerably affect the test results. Different from small children who are developing their L1 reading ability through school instruction, university students have already acquired a certain level of L1 literacy. This general core of their L1 reading ability seems rather stable. There are no longer classes to develop their L1 reading ability per se at university level, and the students are expected to develop their ability to read and comprehend texts in their specified fields based on the core of their L1 reading ability. They can develop their field-specific reading ability rather quickly because they can acquire background knowledge by reading materials in their field, which then helps their comprehension of further readings in the field. However, because the test materials in this study dealt with general and neutral contents, the students’ ability to read and understand such materials was not expected to change during the data-collection period.

Analysis

Scoring and reliability estimates. All the tests, except the gap-filling tests, were objective tests. Each correct answer scored one point. The gap-filling tests were scored using a semantically-acceptable word method. Acceptability was judged in consultation with a native speaker of each language and a list of the acceptable words was made in each language. The scoring was carried out based on these lists. The English gap-filling test was scored entirely by the author. The author and a Japanese graduate student working as an assistant scored the Japanese gap-filling test. The inter-rater reliability of the scoring (point-biserial correlation) was 0.99. Reliability of each test (Cronbach’s alpha) ranged from 0.74 to 0.90.
Composite scores. Since reliability of each test was satisfactory, composite scores were made using the tests described above in order to obtain more comprehensive representation of the variables used in this study. The composite scores used for the analysis were as follows:

L1 reading: Maximum score of 58 (sum of scores on two reading tests in Japanese)
L2 reading: Maximum score of 59 (sum of scores on two reading tests in English)
L2 language proficiency: Maximum score of 124 (sum of scores on two vocabulary tests and a grammar test in English)

Subgroups and analysis of variance. The compensation effects were examined by analysis of variance. The participants were divided into three levels (high, middle, low) according to their L1 reading ability and L2 language proficiency, and by combining the three levels for each of these two independent variables, nine groups were formed: for example, a group of students whose L1 reading ability was low and whose L2 language proficiency was also low (L1L/L2L group) or a group of students whose L1 reading ability was low and whose L2 language proficiency was at the middle level (L1L/L2M group) (see Table 1). When dividing the participants into three levels, z-scores of the composite tests were used. Readers whose z-scores were more than 0.5 were regarded as members of the high group (i.e. approximately top 30%), those with z-scores less than −0.5 were regarded as members of the low group (i.e. approximately bottom 30%), and those with z-scores between −0.5 and 0.5 were regarded as members of the middle group. A 3 × 3 two-way Anova with L2 reading ability as the dependent variable and L1 reading ability and L2 language proficiency as the independent variables was conducted.

Multiple regression analysis. A multiple regression analysis on logarithmically transformed data was applied, with L2 reading ability as the dependent variable and L1 reading ability and L2 language proficiency as independent variables.3 This

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>L1 reading (Max. score = 58)</th>
<th>L2 proficiency (Max. score = 124)</th>
<th>L2 reading (Max. score = 59)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean (sd)</td>
<td>Mean (sd)</td>
<td>Mean (sd)</td>
</tr>
<tr>
<td>L1L/L2L</td>
<td>37</td>
<td>24.68 (3.66)</td>
<td>55.73 (6.59)</td>
<td>20.24 (5.15)</td>
</tr>
<tr>
<td>L1M/L2L</td>
<td>20</td>
<td>31.80 (2.50)</td>
<td>58.55 (4.85)</td>
<td>19.15 (6.47)</td>
</tr>
<tr>
<td>L1H/L2L</td>
<td>11</td>
<td>42.82 (4.69)</td>
<td>57.73 (4.45)</td>
<td>23.45 (8.09)</td>
</tr>
<tr>
<td>L1L/L2M</td>
<td>30</td>
<td>23.23 (3.75)</td>
<td>72.37 (4.10)</td>
<td>24.93 (5.92)</td>
</tr>
<tr>
<td>L1M/L2M</td>
<td>38</td>
<td>32.11 (2.37)</td>
<td>71.68 (3.63)</td>
<td>26.92 (6.79)</td>
</tr>
<tr>
<td>L1H/L2M</td>
<td>28</td>
<td>42.43 (3.29)</td>
<td>71.21 (3.28)</td>
<td>28.39 (7.34)</td>
</tr>
<tr>
<td>L1L/L2H</td>
<td>15</td>
<td>23.13 (3.58)</td>
<td>86.40 (7.14)</td>
<td>29.67 (9.12)</td>
</tr>
<tr>
<td>L1M/L2H</td>
<td>26</td>
<td>32.96 (2.36)</td>
<td>86.73 (7.18)</td>
<td>31.88 (7.00)</td>
</tr>
<tr>
<td>L1H/L2H</td>
<td>36</td>
<td>43.06 (4.35)</td>
<td>86.31 (6.63)</td>
<td>35.44 (6.45)</td>
</tr>
</tbody>
</table>

Notes: L = low, M = middle, H = high
For instance, L1L/L2L means a group whose L1 reading ability is low and L2 proficiency is low.

© United Kingdom Reading Association 2002
analysis estimates the equation referred to as the double-log functional form, which represents various combinations of the levels of independent variables to achieve a level of the dependent variable (Studenmund, 2001). If the model fits the data, it suggests that there is compensation between L1 reading ability and L2 language proficiency. There are at least two advantages in adopting this analysis. First, it provides a direct estimate of the size of each independent variable’s effect on L2 reading ability because, in the double-log functional form, regression coefficients describe the percentage change in the dependent variable per 1% change in the corresponding independent variable. Second, it eliminates possible problems in Anova, for example possible distortions in the effect of independent variables on the dependent variable due to artificial grouping criteria or different units of measurement for the reading tests and the language proficiency test, and provides strong support in testing the existence of compensation.

**Results**

Means and standard deviations of the three tests of each group are presented in Table 1. Results of Anova revealed a main effect of L1 reading ability, \(F(2, 232) = 6.51, p < .01\), and a main effect of L2 language proficiency, \(F(2, 232) = 43.31, p < .001\). There was no significant interaction, \(F(4, 232) = 0.73\) n.s. Post hoc analysis\(^5\) of group differences showed that the nine groups of readers were grouped into four levels according to the differences in the scores on the L2 reading test (from the lowest Level 1 to the highest Level 4). Table 2 summarises the group differences (or groups consisting of each level). Some groups whose scores appeared in two levels means that their scores were not significantly different from either of the two consecutive levels. For example, the L1H / L2L group (readers whose L1 reading ability was high and whose L2 language proficiency was low) did not show a significant difference either from Level 1 (the lowest) and from Level 2 (the second lowest).

The multiple regression analysis obtained that a compensation model fitted the data, \(F(2, 238) = 78.51, p < .001\). The double-log functional form was:

\[
\ln (\text{L2 reading}) = -2.06 + 1.07 \ln (\text{L2 proficiency}) + 0.22 \ln (\text{L1 reading}).
\]

The squared multiple correlation coefficient \((R^2)\) was 0.40, and the \(t\) values of regression coefficients were: \(t = 3.27, p < .01\) (L1 reading ability) and \(t = 10.80, p < .001\) (L2 language proficiency). The values of the regression coefficients show that L2 language proficiency has a stronger effect than L1 reading on L2 reading ability: a 1% increase in L2 proficiency is associated with a 1.07% increase in L2 reading ability, while a 1% increase in L1 reading ability is associated with only a 0.22% increase in L2 reading ability. In terms of the compensation effect, this suggests that a small increase in L2 language proficiency can compensate for a large decline in L1 reading ability in order to reach the same level of L2 reading ability.

**Discussion**

The result of multiple regression analysis indicates that both L1 reading ability and L2 language proficiency contribute to L2 reading comprehension, but that the effect of L2 language proficiency is much stronger than that of L1 reading ability. This
result agrees with the general findings from previous studies. Furthermore, the present result demonstrates the existence of mutual compensation between L1 reading ability and L2 proficiency.

The Anova result supports this mutual compensation in terms of group differences. The strong effect of L2 language proficiency can be seen in the way in which the four levels were identified in the nine groups of readers. The identified levels according to the differences in the scores on the L2 reading test corresponded well with the grouping based on the scores on the L2 language proficiency test. For example, all three groups in Level 1 (the one with the lowest L2 reading ability) are low groups according to L2 language proficiency, and three out of four groups in Level 2 (the second lowest group) are middle groups according to L2 language proficiency (see Table 2). This means that, whether the dividing criterion is L2 language proficiency or L2 reading ability, we obtain a similar result in grouping the readers into different levels. This confirms the close connection between L2 reading ability and L2 language proficiency. Because of such a strong effect, L2 language proficiency compensates for weak L1 reading ability. For example, the L1L/L2L group belonged to Level 3 (the second highest) in spite of their low L1 reading ability.

Although its effect is weaker than that of L2 language proficiency, high L1 reading ability also compensates for low L2 language proficiency. For example, scores on the L2 reading test of the L1H/L2L group (23.45) belonged both to Level 1 and Level 2. This suggests that the high L1 reading ability of this group compensated for their low L2 language proficiency and helped raise the scores on the L2 reading test to some extent (i.e. to the extent that their L2 reading comprehension reached Level 2). We cannot see such facilitation when L1 reading ability was not high (i.e. L1L/L2L (20.24) and L1M/L2L (19.15) groups). Similar facilitation is observed on the L1M/L2M (26.92) and L1H/L2M (28.39) groups, which belonged to Level 2 and Level 3, as well. We can also observe that, by comparing L1H/L2M (28.39) and L1L/L2H (29.67) for example, readers with higher L1 reading ability (high versus low) need lower L2 language proficiency (middle versus high) than readers with lower L1 reading ability in order to achieve the same level of L2 reading ability (Level 3).

Table 2. Means of the L2 reading test listed according to four identified levels.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1L/L2L</td>
<td>37</td>
<td>20.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1M/L2L</td>
<td>20</td>
<td>19.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1H/L2L</td>
<td>11</td>
<td>23.45</td>
<td>23.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1L/L2M</td>
<td>30</td>
<td>24.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1M/L2M</td>
<td>38</td>
<td>26.92</td>
<td>26.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1H/L2M</td>
<td>28</td>
<td>28.39</td>
<td>28.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1L/L2H</td>
<td>15</td>
<td>29.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1M/L2H</td>
<td>26</td>
<td>31.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1H/L2H</td>
<td>36</td>
<td>35.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: L = low, M = middle, H = high
For instance, L1L/L2L means a group whose L1 reading ability is low and L2 proficiency is low.
Because of such mutual compensation with different strengths in the effect of L1 reading ability and L2 proficiency, some interesting and complex interactions between the two factors appear. First, as the regression model indicates, a large decline in L1 reading ability is compensated for by a relatively smaller increase in L2 proficiency. For example, the comparison between L1H/L2L (23.45) and L1L/L2M (24.93) suggests that, even if L1 reading ability decreased from the high to the low level, an increase of L2 proficiency from the low to the middle level helped the readers to achieve the same level of L2 reading comprehension (Level 2). Second, the comparison between L1M/L2M (26.92) and L1H/L2L (23.45) suggests that, when L2 language proficiency is at a higher level (middle versus low), even a lower L1 reading ability (middle versus high) facilitates L2 reading comprehension. Finally, even if the compensation mechanism works to help L2 readers, they cannot achieve the highest possible level of comprehension in L2 when one of the two factors is weak. The readers need both high L1 reading ability and high L2 language proficiency. This is shown by the difference between L1H/L2H group (35.44) and two other groups with high L2 language proficiency whose L1 reading abilities were low and middle (i.e. L1L/L2H (29.67) and L1M/L2H (31.88) groups).

As the above instances suggest, L1 reading ability and L2 language proficiency work together by compensating each other to achieve the highest possible level of L2 reading comprehension for readers with different ability backgrounds in their L1 reading and L2 language proficiency. Therefore, the answers to the two research questions concerning the mutual compensation between L1 reading ability and L2 language proficiency are both positive: (1) high L1 reading ability compensates for low L2 language proficiency, and (2) high L2 language proficiency compensates for low L1 reading ability. However, as repeatedly shown, the compensatory facilitation by L1 reading ability is much smaller than L2 language proficiency. Even if high L1 reading ability facilitated L2 reading comprehension of readers with low L2 language proficiency, their L2 reading achievement was still towards the lower end. This confirms that L2 language proficiency is the primary factor for high achievement of L2 reading comprehension, suggesting that, as the linguistic threshold hypothesis proposes, without a firm basis of L2 language proficiency achieving high levels of L2 reading comprehension is very difficult. However, the result that readers with high L1 reading ability benefited from it at least to some extent even if their L2 language proficiency was low suggests that the transfer of L1 reading ability happens in spite of low L2 language proficiency, supporting the linguistic interdependence hypothesis. The present study, therefore, has obtained evidence to lend support to both hypotheses.

The present study has identified a compensation mechanism between L1 reading ability and L2 language proficiency. The theoretical importance of this finding is that it offers an explanation why the level of the linguistic threshold cannot be determined in absolute terms, which has been recognised by some L2 researchers (e.g. Alderson, 1984; Urquhart & Weir, 1998). As a result of this compensatory mechanism, the level of the linguistic threshold changes according the level of readers’ L1 reading ability, for example, readers with higher L1 reading ability are likely to need lower L2 language proficiency than readers with lower L1 reading ability in order to achieve the same level of L2 reading comprehension.

Pedagogically, the present study stresses the importance of acquiring high L2 language proficiency to read well in L2, as many previous studies did. However, this study also proposes that L2 readers should be encouraged to use their L1 resources
such as good reading strategies or relevant background knowledge acquired through reading in L1 as much as possible. This is particularly the case of adult L2 readers who have achieved a certain level of L1 literacy, as those involved in the present study. They do not have to wait until they have acquired high L2 language proficiency before they benefit from their L1 reading ability. Even if the compensation is relatively small, there may be some facilitative effects if their L1 reading ability is high enough. Therefore, L2 readers should be encouraged to try to develop their cognitive resources, for example by reading large amounts of texts both in L1 and L2, as well as trying to develop their L2 language proficiency.

There are several limitations in the present study. First, the L2 language proficiency was rather narrowly conceptualised. Other linguistic components which may relate to reading comprehension such as knowledge of rhetorical organisation and cohesive devices should also be included. Second, reading ability was also rather narrowly operationalised by only two kinds of reading tests. As Taillefer (1996) has shown, different demands of reading tasks are likely to affect the relationship between the variables. Thus different types of reading tasks should be included in future investigation. Third, cognitive levels of questions in the multiple-choice tests in the present study were different between the two languages. These tests were ready-made standardised tests and they satisfactorily discriminated the reading ability of the participants. However, the author noticed that the L2 multiple-choice test contained more surface-level questions than the L1 test. The cognitive demand of the L1 test was heavier. It is, therefore, doubtful whether readers with low L1 reading ability and with high L2 proficiency (L1L/L2H) would have been able to achieve L2 reading comprehension at the level as high as they did in the present study, if the L2 reading task had been more cognitively demanding. How to maintain equivalence in the reading materials in different languages is an important issue that researchers need to address.

Conclusion

The present study examined a compensatory mechanism between L1 reading and L2 language proficiency for the purpose of adding empirical evidence to the understanding of the relationship between L1 and L2 reading comprehension. Although researchers tend to emphasise the importance of L2 language proficiency, and the present study is no exception in this sense, this attitude should not lead to ignoring the contribution of L1 reading ability. It is natural for L2 learners, particularly adults, to bring their L1 resources into L2 processing. Therefore, there must be a complex interaction between cognitive factors (L1 reading ability) and linguistic factors (L2 proficiency). The present study demonstrated one of the mechanisms, i.e. compensation, consisting of such interaction. Future studies should further explore the interaction of various components relating to L2 reading comprehension.

Notes

1. The TOEFL version used in this study was taken from a workbook published by the Educational Testing Service (TOEFL Test 1 in Reading for TOEFL, 1991). This was an actual test which had been

© United Kingdom Reading Association 2002
used previously. This TOEFL had three sections: Section 1: Listening Comprehension, 2: Structure and Written Expression, 3: Vocabulary and Reading Comprehension.

2. The amount of English input that the students might have received from content classes during the data-collection period is expected to be very small, if any, because classes are usually taught in Japanese using Japanese books. Information on the individual student’s exposure to English outside the classes is not available. However, the students are likely to receive very little input, unless they are highly motivated, because English is not normally used in their daily life.

3. The author thanks one of the anonymous reviewers for suggesting this analysis.

4. A graphic representation of the double-log function, or the model of compensation between L1 reading ability and L2 language proficiency, can be as follows. A level of L2 reading ability can be achieved with various combinations of L1 reading ability and L2 language proficiency (for example, a, b, and c) with more of one making up for less of the other. Depending on the values of the regression coefficients, the double-log functional form can take a number of different shapes.

5. Some post hoc tests which do not necessarily require an equal sample size in each group were used (LSD, Bonferroni, Gabriel, Hochberg). Although these tests showed slightly different results in a few minor points (e.g. whether a certain group belonged to only one level or two consecutive levels), the results were more or less the same. In this article, the result of LSD (least square distance, p < .05) is presented, because it obtained the simplest result to discuss the same points.

References


**Address for correspondence:** Junko Yamashita, Faculty of Language and Culture, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8601, Japan. Email: m46998a@nucc.cc.nagoya-u.ac.jp