Transfer of L1 Reading Ability to L2 Reading: An Elaboration of the Linguistic Threshold

Junko Yamashita

Abstract

Research studies into the relationship between L1 and L2 reading have generally agreed that there is a certain kind of linguistic threshold that strongly affects the transfer of L1 reading ability to L2 reading. This paper attempts to elaborate the concept of this linguistic threshold. First the general framework of the research is explained, then main findings from different studies are summarised. These findings are reexamined to show how the contribution of L2 language ability to L2 reading changes. By considering both the results of this examination and the increasing transfer of L1 reading ability to L2 reading at higher levels of L2 proficiency, which has been widely accepted, a three-level model of the threshold is proposed. This model, however, still needs refinement. Areas for future research are suggested in order to improve the model and further our understanding of the nature of the threshold.

Introduction

There are two widely known hypotheses concerning the relationship between L1 and L2 reading abilities: the linguistic interdependence hypothesis and the linguistic threshold hypothesis[1]. The linguistic interdependence hypothesis, in its simple form, proposes that L1 reading ability transfers to L2. It assumes that there is a common underlying cognitive ability between L1 and L2, and it implies that we do not need to learn reading in L2 if we have a certain level of L1 reading ability. According to this hypothesis, transfer happens automatically. The linguistic threshold hypothesis proposes, on the other hand, that a threshold level of L2 language ability is necessary before L1 reading ability transfers to L2. This implies that L2 learners need to acquire some basic linguistic knowledge before they are able to read in L2.

As will be shown below, accumulated research findings generally support the linguistic threshold hypothesis. In spite of this, however, the concept of the linguistic threshold has not been elaborated enough. In this paper I attempt to summarise the research results in order to see how the contribution of L2 language ability changes according to the level of readers' L2 proficiency, and propose a model of the linguistic threshold.

Research into the relationship between L1 reading and L2 reading

Alderson (1984) integrated the two hypotheses mentioned above into a question: "Reading in a foreign language: a reading problem or a language problem?" Here "language problem" refers to a weakness in the knowledge and skills required for processing L2 linguistic properties, i.e. orthographic, phonological, lexical, syntactic, and discoursal knowledge specific to L2, while "reading problem" refers to a weakness in what is called higher level mental operations such as predicting, analysing, synthesising, inferencing, and retrieving relevant background knowledge, which are assumed to operate universally across languages.

Alderson (1984) broadly reviewed research which contained implications for this question and proposed a tentative conclusion: The difficulties in L2 reading derive both from a language problem and a reading problem; L2 reading is more like a language problem at the lower levels of L2 proficiency and is more a reading problem at the higher levels of L2 proficiency. Thus the evidence generally supported the linguistic threshold hypothesis. However, more research was called for before a final conclusion could be reached, since almost no studies had been designed to answer this question directly. That is, very few studies had provided enough information about the three major variables (the levels of L1 and L2 reading abilities and the level of L2 linguistic proficiency) from the same individuals. The formulation of this question has since contributed to research into the relationship between L1 and L2 reading.

After the publication of Alderson (1984), several studies have been reported that were more carefully planned to examine this topic (Perkins et al. 1989, Carrell 1991, Bossers 1991, 1992, Bernhardt and Kamil 1995, Brisbois 1995, Taillefer 1996, Lee and Schallert 1997, Yamashita 1999). These research studies share the same basic design, with varying operationalisations of each variable and subject groups. A within-subjects design has been used so that data from the same individuals have been collected on all the three variables. The dependent variable has been L2 read-

ing ability and the independent or predictor variables have been L1 reading ability and L2 language ability. In order to see the relationships between the variables developmentally, readers were sometimes divided into groups on the basis of their L2 proficiency. The relationships between the three variables were tested out through correlations and multiple regression. The values of correlation coefficients and/or the amount of variance of L2 reading ability explained by the independent variables were taken as the indicators of the strength of the relationships. If the linguistic threshold hypothesis is to be supported, a stronger relationship (i.e. a higher correlation and a larger amount of variance of L2 reading explained by L1 reading ability) should be observed between L1 and L2 reading in the group of higher L2 proficiency, and conversely a weaker or even zero relationship should be observed in the group with lower L2 proficiency.

Table 1 summarises studies which dealt with this topic. In spite of the huge differences in the subject group, in test methods, and in statistical figures, accumulated evidence supports the conclusion that both L1 reading ability and L2 language ability are important constructs of L2 reading ability (i.e. generally both explained some percentage of the variance of L2 reading ability), and that the problem of L2 reading is more attributable to weakness in L2 language ability than in L1 reading ability (i.e. L2 language ability explained more of the variance of L2 reading ability than L1 reading ability did). An important finding to help decide which of the two hypotheses is more tenable is that the relationship between L1 and L2 reading ability becomes stronger (i.e. the contribution of L1 reading ability to L2 reading ability increases) when the learners' L2 proficiency becomes higher. Based on this result, the linguistic threshold hypothesis has been supported.

The change of the contribution of "L1 reading ability" has thus been paid close attention to by researchers, due probably to the direct implications for testing the two hypotheses. However, the change of the contribution of "L2 language ability" has somehow been overlooked in spite of the finding that L2 language ability makes a greater contribution than L1 reading ability. The paucity of investigations into L2 language ability is partly shown by the fact that some studies did not even measure it (e.g. Bernhardt and Kamil 1995, Carrell 1991). Therefore, it has not been made clear how the contribution of L2 language ability changes according to the level of readers' L2 proficiency. Does it become smaller at the higher level with the increase of the contribution of L1 reading ability, as can be inferred from the linguistic threshold hypothesis?

Table 1 Summary of the research findings on the contribution of L1 reading ability and L2 language ability to L2 reading ability

Study	Readers	Estimates of L2RA	Estimates of L1RA	Estimates of L2LA	Results
Perkins et al. (1989)	158 Japanese learners of English 1) 32 High level 2) 106 Middle level 3) 20 Low level	Reading comprehension test	Reading comprehension test	TOEFL	Higher correlation between L1 and L2 reading at the higher levels 1) r = 0.64** 2) r = 0.24* 3) N.S.
Carrell (1991)	1) 45 Spanish learners of English 2) 75 English learners of Spanish [1) was supposed to be at a higher level in their L2 proficiency than 2).]	Multiple choice test	Multiple choice test	Instruction level	Total: L2LA** > L1RA** (combined contribution of 40%)[i)] 1) L1RA** > L2LA** (combined contribution of 35%) 2) L2LA** > L1RA** (combined contribution of 53%)
Bossers (1991)	50 Turkish learners of Dutch 1) 15 Higher level 2) 35 Lower level	Multiple choice test	Multiple choice test	Grammar (G) & Vocabulary (V)	Total: L2LA** > L1RA** (combined contribution of 73%) 1) L1RA** 2) L2LA**
Bossers (1992)	50 Turkish learners of Dutch	Multiple choice test	Multiple choice test	Grammar (G) & Vocabulary (V)	Total: V (Beta = 0.41)** > G (Beta = 0.36)* > L1RA (Beta = 0.19)*
Bernhardt& Kamil (1995)	187 American Learners of Spanish	Multiple choice test (Translated ABLE[ii)])	Multiple choice test (Nelson-Deny& ABLE)	Instruction level	Total: L2LA (30–38%)** > L1RA (10–16%)**
Brisbois (1995)	122 American learners of French 1) 38 Higher level 2) 84 Lower level[iii)]	Recall	a)Multiple choice test (Nelson-Deny) b) Recall	Grammar (G) & Vocabulary (V)	<u>a) L1RA=MC test</u> 1) N.S. 2) V (10.1%)** > L1RA (5.7%)** > G (0.5%)** <u>b) L1RA=Recall</u> 1) L1RA (20.5%)** > V (7.6%)** > G (1.4%)* 2) L1RA (11.1%)** > V (9.3%)** > G (1.1%)*

Study	Readers	Estimates of L2RA	Estimates of L1RA	Estimates of L2LA	Results
Taillefer (1996)	53 French learners of English 1) 28 Higher level 2) 25 Lower level	a) Scanning task b) Comprehension test	a) Scanning task b) Comprehension test	Grammar (G) & Vocabulary (V)	a) Scanning Total: L1RA (11%)** 1) L1RA (42%)** 2) N.S. b) Comprehension Total: L2LA (32%)** > L1RA (less than 1%)* 1) L2LA (19%)** 2) N.S.
Lee&Schallert (1997)	809 Korean learners of English (divided into 5 groups according to their proficiency: N = 83,156,219,268,83 from the top to the bottom)[iv]	Multiple choice test	Multiple choice test	Grammar (G) & Vocabulary (V)	Total:L1LA** > L1RA** Significant difference in the correlation coefficients between the 2nd and 3rd groups (r = 0.22*, 0.17*, 0.38**, 0.43**, 0.47** from the top to the bottom)
Yamashita (1999)	241 Japanese learners of English[v] 1) 93 High level 2) 70 Middle level 3) 78 Low level	a) Multiple choice test b) Gap-filling test	a) Multiple choice test b) Gap-filling test	Grammar (G) & Vocabulary (V)	Total: V(34%)** > G (7%)** > L1RA (4%)** 1) V (19%)** > L1RA(5%)** > G (3%)** 2) V (4%)** 3) G (10%)**

* p < .05, ** p < .01
L1RA: L1 reading ability; L2RA: L2 reading ability; L2LA: L2 language ability (or in some cases general L2 proficiency, e.g. TOEFL and instruction level).
Unless noted otherwise, reported R^2 indicating the amount of variance of L2 reading ability explained by each independent variable is shown in parentheses.
Numbers such as 1), 2), 3) in the column of "Results" correspond to the numbers showing groups in the column of "Readers".
">" means that the variable on the left made a larger contribution to L2 reading ability than the one on the right.

Notes in Table 1
i) 40 % of the variance of L2 reading ability which was explained by L2 language ability and L1 reading ability together.
ii) Adult Basic Learning Examination
iii) Brisbois (1995) reported the number of readers as 131, 43, 88 (the whole, the upper level, the beginning level), but I quote the actual numbers entered into the analyses.
iv) The result when the readers were divided into 10 groups is not cited here.
v) Yamashita (1999) used three different criteria to divide the readers. There were not many differences in the results obtained by using different criteria. The result cited here is the one obtained when the readers were divided according to their levels of L2 reading ability.

The concept of the linguistic threshold seems rather vague. Alderson (1984) states that it is the level which is necessary before L1 reading ability "can be brought to bear upon the task of reading in a foreign language" (p.19). Does this refer to the minimum level of L2 language ability at which L1 reading ability *starts* to transfer? Or does it refer to the level at which L1 reading ability becomes *more important* than L2 language ability? Or does it even refer to the level at which *only* L1 reading ability explains L2 reading ability? The operational definitions of previous studies are different from one study to another. Probably this reflects the conceptual vagueness. For example, Perkins et al. (1989) took threshold to be the level at which L1 reading ability starts to transfer, while Lee and Schallert (1997) saw it as the level at which the relationship between L1 and L2 reading ability increases drastically (a statistically significant difference in correlation coefficients).

That we have not yet paid enough attention to the change of the contribution of L2 language ability seems to show a stage of the research development in this field. That is, we have reached a general consensus that there is some kind of linguistic threshold which restricts transfer, and what is needed from now on are attempts to elaborate this concept. The model I propose in this paper is one such attempt.

Change of the contribution of L2 language ability

Not all the studies in Table 1 used a suitable design to investigate the change of the contribution of L2 language ability. Some did not measure L2 language ability and some did not report the contribution of L2 language ability according to the readers' L2 proficiency. Therefore only three studies remain (Brisbois 1995, Taillefer 1996, Yamashita 1999).

In the case of Brisbois (1995), the contribution of L1 reading ability nearly doubled from 11.1% for lower level readers to 20.5%[2] for higher level readers. The contribution of L2 language ability, however, decreased only very little, from 10.4% (the sum of the contribution of grammar 1.1% and vocabulary 9.3%) for lower level readers to 9.0% (the sum of the contribution of grammar 1.4% and vocabulary 7.6%) for higher level readers. In the case of Taillefer (1996), L1 reading ability did not play a role either for higher or lower level students. L2 language ability explained 19% of the variance of L2 reading ability for higher level students but did not explain any significant amount for lower level students[3]. This shows that the contribution of L2 language ability increased at the higher level. This study also showed that it is not always the case that L2 language ability explains L2 reading ability at

lower levels of L2 proficiency. That is, for the lower level group in this study, not only L1 reading ability but also even L2 language ability did not explain L2 reading ability. In the case of Yamashita (1999), the contribution of L1 reading ability increased from zero (Low and Middle groups) to 5% (High group). The contribution of L2 language ability first decreased from the low level (grammar 10%) to the middle level (vocabulary 4%), but it showed the largest contribution at the high level (22%: grammar 3% and vocabulary 19%). It must be noted that the only component of L2 language ability that showed a significant contribution at the low level was grammar, while that at the middle level was vocabulary. Therefore, the decrease of the contribution of L2 language ability from the low to the middle levels seems to indicate that different components of L2 language ability became important at different levels rather than that the contribution of L2 language ability decreased.

As these three studies suggest, it is not possible simply to say that the contribution of L2 language ability decreases according to the increase of the contribution of L1 reading ability. The effect of L2 language ability either makes little change or tends to increase at the higher levels. Although we must bear in mind that the level of the readers in these studies might not have been sufficiently high for the expected decrease in the contribution of L2 language ability to happen, the research results available to date suggest that L2 language ability tends to continue explaining the variance of L2 reading ability even at higher levels.

Pursuing the change of the contribution of L2 language ability further, let me examine the contribution of different components of L2 language ability. For this purpose, three studies can be considered (Bossers 1992, Brisbois 1995, Yamashita 1999) because these studies reported separate contribution of different L2 language ability components (grammar and vocabulary). In the case of Bossers (ibid.), Betas of 0.41 and 0.36 were reported for the contribution of L2 vocabulary and grammar respectively (for all the readers), showing the greater importance of vocabulary. In the case of Brisbois (ibid.), the percentage of variance of L2 reading ability explained was 9.3% (vocabulary) vs. 1.1% (grammar) for lower level readers and 7.6% vs. 1.4% for higher level readers[4]. In Yamashita (ibid.), the contribution of vocabulary was 34% and that of grammar was 7% (for all the readers). As clearly shown, vocabulary makes a larger contribution to L2 reading ability than grammar does. In other words, the L2 language ability that is necessary for L2 reading achievement is more lexical than grammatical.

As for the effect of L2 proficiency on the change of the contribution of different components of L2 language ability, only Brisbois (1995) and Yamashita (1999) offer relevant results. However, it is difficult to reach a conclusion on this issue. In Brisbois (ibid.), there was very little change in the contribution of grammar and vocabulary according to the levels of L2 proficiency (see above). In Yamashita (ibid.), it somehow looked that grammar was more important for the lower level readers and vocabulary more important for the higher level readers (see above). However, the result was not clear enough to support this conclusion. Therefore the best that we can say at this moment is that both vocabulary and grammar are significant predictors of L2 reading ability for learners at all levels, with a heavier weight on vocabulary.

Towards the model of the linguistic threshold

From the change in the contribution of L2 language ability that was observed through these different studies, it seems appropriate to hypothesise three levels of the linguistic threshold in order to explain the contribution of both L1 reading ability and L2 language ability: the fundamental level, the minimum level, and the maximum level (from the lowest to the highest). Before readers reach the fundamental level, L2 language ability is very low and cannot contribute to explaining the variation of L2 reading. That is, although readers may have some L2 linguistic knowledge and they may sometimes successfully use that knowledge to comprehend L2 texts, there is no systematic relationship between their L2 language ability and their L2 reading comprehension. Any success is probably a matter of luck. The low level readers in Taillefer (1996), whose L2 reading ability was not explained either by their L1 reading ability or L2 language ability, would fall below this fundamental threshold level.

When the readers' L2 language ability has reached the fundamental level, L2 language ability starts to make a contribution to L2 reading, but L1 reading ability cannot be transferred yet. The variation in L2 reading ability of the readers between the fundamental and the minimum levels is explained by L2 language ability only. The low level groups (Middle and Low) in Yamashita (1999) who showed no relationship between L1 and L2 reading would come under this category. The contribution of L2 language ability increases when readers' L2 proficiency becomes higher towards the minimum level.

When readers have reached the minimum level, L1 reading ability starts to trans-

fer. When the readers' L2 proficiency develops towards the maximum level, the contribution of L1 reading ability increases and L2 language ability loses its power in explaining the variation of L2 reading ability. This decrease of the contribution of L2 language ability seems to be gradual as shown by the small change in the result of Brisbois (1995), i.e. from 10.4% to 9.4%, while the increase of L1 reading ability was from 11.1% to 20.5%. When the readers' L2 language ability is slightly above the minimum level, the contribution of L2 language ability is larger than that of L1 reading ability. However, at some point between the minimum and the maximum levels, there should be a point where the contribution of L1 reading ability becomes larger than that of L2 language ability.

When readers have reached the maximum level, the L2 language ability has developed so fully that it does not cause problems for L2 reading. Therefore, variation of L2 reading comprehension is explained solely by L1 reading ability. In other words, L2 readers read in L2 as well as in L1. This maximum threshold level must be high, probably so high that readers are able to process L2 linguistic elements such as vocabulary and syntax as automatically as native speakers. The fact that the majority of the studies did not find a group of readers whose L2 reading ability was explained solely by L1 reading ability shows that it is quite difficult for L2 readers to reach the maximum threshold level. Even the top level group in any study (i.e. Brisbois 1995, Taillefer 1996, and Yamashita 1999) must be said to be far below the maximum threshold level. It is, however, not impossible, as shown by the top 30% of readers (N=15) in Bossers (1991).

A caution should be added to the model discussed above. As some researchers have already pointed out (e.g. Alderson 1984, Urquhart and Weir 1998), the level of the linguistic threshold is not absolute, i.e. depending on the reading tasks and readers' L1 reading ability, the level of the threshold changes. The same applies to the level of the three threshold levels proposed above. In this sense, the linguistic threshold still remains a vague notion. However, it is an important concept in order to understand the relationship between L1 and L2 reading ability, and this three-level model seems to accommodate findings from different studies reported to date.

It is not yet possible to integrate the findings on the different contributions of different components of L2 language ability. Although it has been shown that vocabulary makes a larger contribution to L2 reading than grammar does, not enough evidence is available to draw a conclusion on how the contribution of grammar and vocabulary changes according to the readers' L2 proficiency. We need more

research in this field, and I would like to raise a few points that future research should bear in mind. Firstly, so far only grammar and vocabulary have been included as the components of L2 language ability. Other components such as word recognition skills, knowledge of cohesive devices or rhetorical organisations of L2 texts should be examined as well. Secondly, since the threshold level is not absolute, possibly the contributions of different components of L2 language ability may not be consistent. That is, the language knowledge and skills required may change according to the kind of reading task and the kind of texts. It would be interesting to know whether the contributions of different L2 language ability components do indeed change depending on the task, and if so, how. Thirdly, although the contribution of grammar has been found relatively small, it is not known whether the grammatical knowledge measured in the three studies cited above was relevant to reading comprehension. If it was not, then the small contribution of grammar should have been attributed to the inappropriate ways of measuring relevant grammatical ability. As Urquhart and Weir (1998) discuss, a distinction between receptive and productive grammar knowledge would be useful for considering the role of grammar for reading comprehension. As examples of this distinction, Urquhart and Weir (ibid.) suggest that, in grammar instruction for reading comprehension, priority should be given to prepositions over articles, declaratives over interrogatives, and simple over continuous verb forms (p.268). Although whether and how the suggested grammatical items influence reading comprehension is a future research issue, the proposal that we should distinguish different aspects of grammar when we consider the relationship between grammar and reading is important.

Conclusion

Research into the relationship between L1 and L2 reading ability has made progress since Alderson (1984) when he first formulated the research question. As discussed above, researchers have tended to focus on how the contribution of L1 reading ability to L2 reading ability changes according to the level of readers' L2 proficiency in order to decide which of the two hypotheses is correct. In this paper, I focused on the other side of L2 reading ability (i.e. L2 language ability), examined how the contribution of L2 language ability changes, and presented a model of the linguistic threshold so that findings from different studies can be integrated.

However, this model is only tentative and still needs refinement. I gave suggestions for future research and hope that accumulation of further research will produce a more elaborated model that explains the transfer of L1 reading ability to L2 reading.

Notes

[1] These hypotheses may be alternatively called the "reading universal hypothesis" (Alderson 1984) and the "short-circuit hypothesis" (Clarke 1988) respectively.

[2] This is the result when L1 reading ability was measured by the "recall task". The result when L1 reading ability was measured by the multiple choice test is not cited because L1 and L2 reading abilities were measured by different tests.

[3] This result comes from the "comprehension task". The result from the "scanning" task is not cited because that is very different from the one included in other studies.

[4] Again this is the result when L1 reading ability was measured by the recall task, see Note 2.

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