Influence of L1 Reading on L2 Reading: Different Perspectives from the Process and Product of Reading

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1. Introduction

The 1990s experienced an accumulation of research studies investigating the relationships between L1 and L2 reading. Many studies included readers' L2 linguistic proficiency as a predicting variable and attempted to identify its effect on the relationship between reading ability in two languages. This design seems to have been motivated by Alderson's (1984) review article in which he examined a broad range of research relevant to this topic and suggested future research directions. Alderson articulated two sources of difficulties in L2 reading: L1 reading ability and L2 linguistic proficiency, and he raised a question concerning which of the two factors causes problems in L2 reading. In dealing with this question, two hypotheses were introduced: the linguistic interdependence hypothesis (or reading-universal hypothesis) and the linguistic threshold hypothesis (or short-circuit hypothesis). The former, in its simplest form, proposes that L1 reading ability transfers to L2 reading, while the latter states that a threshold level of L2 linguistic ability is necessary before L1 reading ability transfers to L2 reading. Since then, these two hypotheses have often been considered conflicting, and researchers have attempted to determine which of the two gives the better explanation of the relationship between L1 and L2 reading. The research studies conducted after Alderson (ibid.) have identified a strong influence of L2 linguistic proficiency on the transfer of L1 reading ability to L2 reading: Higher level readers transfer their L1 reading ability more successfully than lower level readers (sometimes lower level readers did not show any evidence of transfer). Thus, generally speaking, the linguistic threshold hypothesis has been largely supported.

However, the linguistic threshold hypothesis does not seem to explain all aspects

of the relationship between L1 and L2 reading. Depending on which aspect we focus on, the influence of L1 reading on L2 reading varies. The interdependence of reading ability in two languages seems to be revealed more in the “process” of reading than in the “product” of reading. This paper attempts to discuss this difference by comparing the findings of two types of studies (process-oriented and product-oriented) and considers implications for future research.

2. Process-oriented and product-oriented studies

A distinction is often made in the literature, explicitly or implicitly, between the process and the product of reading. Process refers to various mental activities that readers are engaged in during interaction with a text for the purpose of constructing meaning. The product of reading refers to both quality and quantity of meaning representation that readers have constructed as a result of various mental interactions with the text.

Research into the relationship between L1 and L2 reading is divided into two types according to this distinction: product-oriented studies (Bernhardt and Kamil 1995, Bossers, 1991, 1992, Brisbois 1995, Carrell, 1991, Lee and Shallert 1997, Perkins et al. 1989, Schoonen et al. 1998, Taillefer 1996, Yamashita 1999) and process-oriented studies (Davis and Bistodeau 1993, Sarig 1987, Taillefer and Pugh 1998, Yamashita 1999, Zwaan and Brown 1996). Product-oriented studies are test-based quantitative research. They use test scores as representations of the abilities that researchers intend to investigate. The relationships among the three major variables (L2 reading ability, L1 reading ability and L2 linguistic proficiency) have been mainly examined by correlation and/or multiple regression analysis[1]. Process-oriented studies, on the other hand, are qualitative in nature. Most of these studies use reading strategies inferred from verbal protocols obtained by the think-aloud method (concurrent verbalisation of mental activities) as representations of mental operations that readers use during reading[2]. Although they also quantify data, researchers first study the verbal protocols and identify strategies according to the qualitative differences in the content of the verbal protocols. Thus, researchers’ interpretations and participants’ perspectives are reflected in the results (Bogdan and Biklen 1998). Various strategies, each of which reflects such different aspects of reading as local-level understanding, global-level

understanding and metacognitive operations are identified in each study. The relationships between L1 and L2 reading strategies have been analysed by correlational analysis and/or analysis of variance.

There are both similarities and differences in these two types of studies. Both have adopted a within-subjects design and collected various information from the same individuals. Readers have often been divided into groups according to their levels of L2 proficiency, and the strength of the relationships between L1 and L2 reading was compared between the groups in order to test the linguistic threshold hypothesis and the linguistic interdependence hypothesis. Sometimes, depending on the purpose and the design of each study, L1 and/or L2 reading ability was used as a dividing criterion.

The differences include the quality of data, data analysis methods, and the size of the reader population. The product-oriented studies have used tens of or hundreds of participants, while the process-oriented studies have included only a small number of readers (usually around ten). Obviously such small scale studies contain problems in the generalisability of their results. However, this is largely due to inevitable practical constraints. Conducting a process-oriented study is much more time-consuming. In product-oriented studies, tests can be administered to a large number of subjects at one time, while a think-aloud task is normally used on a one by one basis. Scoring tests can be done in a relatively short time if the tests are objective, which is the case in most studies. On the other hand, protocol analysis generally takes a much longer time. The researchers have to first transcribe verbal data, and then carefully read through the protocols a number of times in order to code them. After coding, they have to check the reliability of their analysis with a different coder(s). Partly due to such a laborious research process and also partly due to the relatively later start in the investigation of the process than of the product of reading in the field of L2 reading research itself, we have accumulated fewer insights from the process-oriented studies to date.

3. Comparison between process-oriented and product-oriented studies

In this section, results of the two types of study are compared in order to show the differing influences of L1 reading on L2 reading between the process and

product of reading. However, results of these two types of study demonstrate different aspects of reading, and it is not always so simple to make a direct comparison. Efforts are made to carefully choose the results which are comparable.

3.1 Correlation between L1 and L2 reading performance

Correlation analysis is the only method of data analysis applied in both types of studies[3]. In product-oriented studies, scores on L1 and L2 reading comprehension tests have been correlated. Only low to moderate correlations have been obtained: with the range of 0.20 to 0.53 (Bernhardt and Kamil 1995), 0.59 (Bossers 1992), 0.24 to 0.57 (Brisbois 1995), 0.17 to 0.47[4] (Lee and Shallert 1997), 0.24 to 0.64 (Perkins et al. 1989), 0.23 to 0.37 (Yamashita 1999). The variation of the figures in each study is due to different ways of analysing data. For example, in some studies readers were divided into groups and correlations were computed for each group, or in other studies researchers used more than one test to measure one trait and entered each test separately for analysis.

In process-oriented studies, frequencies of corresponding L1 and L2 reading strategies have been correlated. Different from the product-oriented studies, moderate to high correlations have been observed: 0.54 to 0.91 (Sarig, 1987), and 0.68 to 0.88 (Yamashita, 1999). These correlations were obtained only from a whole group of readers in each study, because the number of participants was small and it was not appropriate to divide the participants into even smaller groups to calculate correlations. The variation in the figures reflects strategy differences (i.e., correlations were computed for different strategies separately). Among these figures, the ones obtained by correlating the strategy that reflected successful text-level understanding were 0.84 and 0.86 in Sarig and Yamashita respectively[5]; thus the correlations are high. The reason for citing the last two figures in particular is to make a more rigid comparison with the results of product-oriented studies. We assume that overall test scores represent ability to understand overall text meaning[6]. Therefore, the results of the strategies which reflect text-level understanding can be considered the ones best mirrored in test scores.

A simple comparison of this range of correlation coefficients suggests that the relationship between L1 and L2 reading is stronger in process than in product of reading. When the correlations from the strategy which deals with the overall meaning representation of a text are compared with those from test scores, the difference is even clearer.

3.2 The relationship between L1 and L2 reading shown by lower level readers

The linguistic threshold hypothesis predicts that lower level readers show little evidence of transfer of L1 reading ability/strategies to L2 reading. Both product and process-oriented studies have supported this, but the research results have identified some evidence of transfer of L1 reading ability/strategies in the process even at lower levels of L2 proficiency.

The product-oriented studies have generally shown a gradual decrease in the strength of the relationship between L1 and L2 reading when readers' L2 proficiency becomes lower. Correlation coefficients are again cited (from high to low level groups): 0.45, 0.33 (Brisbois 1995), 0.47, 0.43, 0.38, 0.17, 0.22 (Lee and Shallert 1997), 0.64, 0.24, N.S. (Perkins et al. 1989), 0.37, 0.28, N.S. (Yamashita 1999). The low level readers in Perkins et al. (ibid.) and Yamashita (ibid.) are regarded as being below the level of the linguistic threshold, so they cannot transfer their L1 reading ability. The correlations in the low level groups in Brisbois (ibid.) and Lee and Shallert (ibid.) were still significant, but we can infer that if these studies had included readers with even lower levels of L2 proficiency, correlations would have been non-significant.

We cannot obtain the same kind of correlational results from process-oriented studies due to the small number of participants. There are, however, two kinds of evidence to indicate that some L1 reading strategies transfer even at lower levels of L2 proficiency. First, there was no difference between L1 and L2 reading in the proportion of some strategies. In Davis and Bistodeau (1993), although low level readers used "top-down" and "bottom-up" strategies differently in L1 and L2, there was not a significant difference in the proportion of "metacognitive" strategy use[7]. That is, low level readers transferred their metacognitive strategies and used them similarly in L1 and L2. In Yamashita (1999), although "local strategies" and "global strategies" were used differently between L1 and L2, four other strategies identified ("compromising", "monitoring", "repetition", "test taking strategies") did not reveal a significant difference between L1 and L2 reading[8]. This means that the transfer of these four strategies succeeded in spite of the readers' low L2 proficiency.

The second evidence of transfer of L1 reading strategies is the facilitative effect of high L1 reading ability shown by readers with low L2 proficiency. In Zwaan and Brown (1996), readers with high L1 reading ability tended to be more accurate in

their “paraphrasing” than those with low L1 reading ability. In Yamashita (1999), readers with high L1 reading ability showed a significantly higher proportion of successful rather than unsuccessful “local strategies”, while readers with low L1 reading ability did not show any such facilitative effect. These two strategies for which the facilitation of high L1 reading ability was identified represent only sentence-level understanding, therefore the findings suggest that successful use of these strategies does not necessarily guarantee overall text-level comprehension. However, these two studies have shown that readers with high L1 reading ability can transfer their L1 ability and facilitate their L2 reading comprehension at least to a certain extent[9].

4. Discussion

The different degrees of influence of L1 reading on L2 reading observed in the process- and product-oriented studies is probably attributed to the scope of the mental operations and status that each type of research has available for investigation. In the process of reading, various kinds of mental activities are included, not only cognitive and linguistic processes that we often associate with reading (e.g. recognising words, parsing, constructing propositions, predicting, inferencing) but also metacognitive processes and those which reflect affective and personality factors. The process changes from time to time according to various factors such as difficulties that the reader has felt or temporal changes of a goal even during a relatively short length of time when a think-aloud task is performed. We can see in the process how readers try to approach a text and how they succeed and/or fail at each step of their meaning construction. The product of reading, on the other hand, is what we mean by “comprehension” or “levels of understanding”. It only shows the results of various internal operations made by readers in the process. Although the product of reading can change over time if readers reflect on their understanding and deepen their thoughts, researchers can only see a rather static status of comprehension at the time when a test is given.

Furthermore, product-oriented studies can restrict the contexts in which readers show their levels of understanding more than process-oriented studies do. The scope of mental status that is to be investigated is inevitably affected (or narrowed) by the kinds of tests included, because readers can demonstrate their understanding

only by answering given test items. The facilitative effect of L1 reading ability at local-level understanding identified in the process-oriented studies cited above (Yamashita 1999, Zwaan and Brown 1996) is not likely to be easily revealed by the product-oriented studies unless test items measure the understanding of nearly every part of a text in which such facilitation occurred. The process-oriented studies, on the other hand, seem to impose little control on the context in which readers show their strategies because readers are asked to say whatever is happening in their mind while reading[10].

Therefore, the difference in the influence of L1 reading between process and product means that when we see the entire (or at least much wider scope of) mental activities involved in reading, we can see a stronger impact of L1 reading on L2 reading. This suggests that readers tend to transfer and use their L1 strategies in the process of L2 reading. However, because of their weak L2 linguistic proficiency, these L1 strategies are not always fully successful in helping them construct an appropriate meaning representation for the product. Thus the linguistic threshold hypothesis and the linguistic interdependence hypothesis both contribute to explaining the relationship between L1 and L2 reading. Although the linguistic threshold hypothesis should still be given priority because of the strong influence of L2 linguistic proficiency on the transfer of L1 reading ability to L2 reading, we cannot fully explain the relationship of reading in two languages without integrating the linguistic interdependence hypothesis. We should bear in mind that the entire process of reading can be much more similar in L1 and L2 reading than the linguistic threshold hypothesis suggests.

5. Implications

Differences between the process and product of reading generate new considerations for future research in both theoretical and pedagogical issues. First, there is an implication for the L2 reading model construction. Whether this is explicitly stated or not, research into the relationship between L1 and L2 reading has assumed a two-component model of L2 reading: L2 reading ability comprises the sum of L1 reading ability and L2 linguistic ability. Although this model itself cannot be considered entirely adequate as a general model of L2 reading ability because only half of the variance of L2 reading ability has been explained in most

of the studies (see discussion by Bernhardt and Kamil 1995), this model admits "L1 reading ability" as a component of L2 reading ability.

However, not all L2 reading researchers seem to think that L1 reading ability is a necessary component. For example, L1 reading ability is not a component in the models of Coady (1979) and Bernhardt (1991). Both posit a three-component model of L2 reading: higher-level conceptual abilities, background knowledge, and process strategies (Coady ibid.); linguistic variables, literacy variables, and knowledge variables (Bernhardt ibid.). These models include an equivalent for the L2 linguistic ability component ("process strategies"[11] and "linguistic variables" respectively). This would not be surprising considering the strong influence of L2 linguistic ability on L2 reading. L1 reading ability, however, is not considered as an important factor affecting L2 reading.

Models are usually constructed based on the results of product-oriented studies, but the different impact of L1 reading ability between the process and product of reading suggests that we should consider results from process-oriented studies as well. We should seek a way to integrate implications from these two types of studies. In the models of Coady and Bernhardt, L2 non-linguistic components (i.e. higher-level conceptual abilities, background knowledge, literacy variables, and knowledge variables) seem to be related to L1 reading ability. If such L2 comprehension components absorb the effect of L1 reading ability and the contribution of L1 reading ability becomes negligible when those components are included, it would be appropriate not to consider L1 reading ability as a component of L2 reading. Yet, we do not know what makes a better model of L2 reading ability: by postulating the L1 reading ability component, general L2 comprehension components such as listed above, or both of these components. This question remains for future research to answer[12]. The interdependence between L1 and L2 reading found in the process-oriented studies implies that this is a question worth asking to improve L2 reading models.

However, it would be fair to add a small caution to the process-oriented studies. Just as the test-based method is likely to restrict the context where we can see the influence of L1 reading, so might the think-aloud method cause an opposite bias to the research outcomes. The similarities between L1 and L2 reading strategies found in the process-oriented studies might, at least to some extent, be attributed to the think-aloud task effect. A think-aloud method has a strong theoretical background (Ericsson and Simon 1984, 1993) and provides a rich source of data on

reading processes which are otherwise quite difficult to observe from the outside (e.g. Pressley and Afflerbach 1995). However, the method contains several limitations as well, for example, it can only extract information which readers can consciously attend to. Another limitation relevant here is that the variation of think-aloud protocols can be caused by two factors: reading strategies and the task effect (individual differences in performing a think-aloud task). Although this does not create a serious problem for the research itself as long as a within-subjects design is used and the same individual or the same group of readers is compared over different conditions (see Yamashita 1999, for more discussion), this task effect might lead the researchers to overestimate the similarity between L1 and L2 reading processes because readers not only read similarly but also report similarly in two languages. Therefore, future process-oriented studies should attempt to use various methods such as immediate retrospection, interview, reading time, or possibly eye movement analysis in place of or in combination with a think-aloud task. (see Alderson 2000, for discussion of different kinds of such methods.)

The second implication is for strategy instruction. From the linguistic threshold hypothesis, we tend to infer that we must help readers acquire L2 linguistic abilities. While this is an important aspect of teaching, teachers should also be aware that L2 readers draw on their L1 reading strategies. Although the effectiveness of reading-strategy instruction has not been fully understood and somewhat conflicting results have been reported (e.g. Barnet 1988a, 1988b, Carrell 1985, Kern 1989, Kimura et al. 1993), the closeness of L1 reading processes to L2 reading suggests that reading-strategy instruction might be effective if it is devised so that L2 readers can benefit from their strategies developed in L1. How we can devise such programmes and how (or whether) such programmes are helpful are questions for future studies.

Research that attempts to address these issues should take a longitudinal stance because taught strategies may or may not be readily available to every reader. Those with low L2 proficiency probably cannot use certain strategies due to limited language ability. Moreover, there might be readers who think that a taught strategy is not very helpful since the same strategy does not always work in a different context. However, explanation or demonstration of reading strategies in various contexts might contribute to increasing the repertoire of strategies that readers can use in the future. Even if they cannot use a certain strategy at a certain time, they might try it when they have acquired enough language ability. Or even if they do

not think a particular strategy is useful in one context, they might find it useful in another.

6. Conclusion

Research studies accumulated to date have consistently found the importance of L2 linguistic ability for L2 reading. On the other hand, the interdependence of reading ability in two languages has been less acknowledged. This is partly because the influence of L2 linguistic ability is so strong that the influence of L1 reading ability becomes a secondary factor, but it is also because a much smaller number of process-oriented studies has been conducted to date. How L2 readers draw on their L1 reading ability and how important it is will be further revealed when more process-oriented studies are carried out, because process-oriented studies are likely to shed more light on the effect of L1 reading on L2 reading than product-oriented studies.

Notes

[1] The research design of Schoonen et al. (1998) is different from other cited studies, although there are still many similarities. Schoonen et al. did not use L1 reading ability as a measure of general reading ability, but rather treated it as one of two (i.e. L1 and L2) instances of reading comprehension. Instead, they measured metacognitive knowledge as a representation of general reading ability which was hypothesised to be a common component in L1 and L2 reading. Another major difference is that Schoonen et al. measured not only L2 but also L1 language factor (L1 vocabulary knowledge), and regressed both L1 and L2 reading ability on their respective vocabulary knowledge and on metacognitive knowledge.

[2] Taillefer and Pugh (1998) employed a different method than other studies. Taillefer and Pugh used a questionnaire (or a check-list) and asked readers whether they did things listed in the questionnaire while reading (after having read a text and finished a recall task). Thus, Taillefer and Pugh adopted an off-line method (readers' retrospection about their own reading processes) rather than an on-line method such as the think-aloud task.

[3] Not all the studies, however, used correlation analysis or reported the result.

[4] This is the result when Lee and Shallert divided their readers into five groups.

[5] These correlations were obtained from "overall message synthesis" in Sarig (1987) and "global strategies" in Yamashita (1999).

[6] Even if some test items measure local-level understanding (e.g. lexical and sentence level understanding), the underlying assumption is that a total test score shows the level of "text

comprehension" of an individual reader.

[7] Davis and Bistodeau (1993) identified 13 strategy categories and grouped them into the following three strategies. Since the authors did not give precise definitions/descriptions of the three strategies, some examples are cited (p.462).

Top-down: prediction, inferences.

Bottom-up: individual word focus, comments on intrasentential features.

Metacognitive:comments on task itself, comments on own behaviour.

[8] The description of each strategy is as follows (Yamashita 1999, p.170).

Local: The reader tries to understand the sentence level meaning.

Global: The reader tries to understand inter-sentential and text meaning.

Compromising: The reader accepts ambiguity.

Monitoring: The reader monitors his/her reading processes.

Repetition: The reader tries to increase redundancy by repeating a text.

Test: The reader uses test taking strategies irrelevant to comprehension.

The last category appeared because this study investigated processes of taking reading comprehension tests.

[9] Taillefer and Pugh (1998) also reported a result that supports the positive effect of high L1 reading ability: Readers with high L1 reading ability used more positive "general" strategies than readers with low L1 reading ability. What was included in their strategies, however, is different from those of Zwaan and Brown (1996) and Yamashita (1999). Taillefer and Pugh (ibid.) included "readers' state of mind while reading" and their "task perception" in what they termed "general strategies". Therefore, it is difficult to compare their result with those of Zwaan and Brown (ibid.) and Yamashita (ibid.). Also it should be noted that their methodology in investigating reading processes was different from the other studies (cf. note 2).

[10] Not all the studies that use the think-aloud method ask readers to report everything that is happening in their mind. As Pressley and Afflerbach (1995) observe, there is huge variation among the instructions for the think-aloud method in different studies according to research purposes. Some researchers impose more specific controls by asking readers to report only those things relevant to the research project.

[11] Coady's "process strategies" includes not only linguistic processing but also cognitive processing.

[12] Probably, Schoonen et al. (1998) have made a good first step towards such research.

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