The effect of second language proficiency on second language reading comprehension as measured by questions from different cognitive levels

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Data from a first-language reading test, a second-language reading comprehension test with questions from different cognitive levels, and from the TOEFL were submitted to partial correlation analysis to determine whether there was a significant effect of second-language proficiency on second-language reading comprehension when the influence of first-language reading comprehension was held constant. The results indicated that for factual and inference questions second-language reading comprehension may be more closely related to second-language proficiency than to first-language reading comprehension. The lack of a similar relationship for the generalization questions may be due to a substantial variation in the second-language readers' formal and content background knowledge which is necessary for the processing and comprehension of generalization questions.

Data van 'n eerste taal-leestoets, 'n tweede taal-leesbegripstoets met vrae op verskillende kognitiewe vlakke en van die TOEFL is aan gedeeltelike korrelasie-ontleding onderworpe om vas te stel of daar 'n beduidende beïnvloeding van tweede taal-vaardigheid op tweede taal-leesbegrip was terwyl die invloed van eerste taal-leesbegrip konstant gebly het. Die resultate het aangedui dat wat feitelike en gevolgtrekkingsvrae betref, tweede taal-leesbegrip moontlik nader verwant is aan tweede taal-vaardigheid as aan eerste taal-leesbegrip. Die afwesigheid van 'n soortgelyke verhouding betreffende die veralgemeningsvrae is moontlik te wyte aan 'n aansienlike variasie in die tweede taal lesers se formele en inhoudelike agtergrondkennis wat nodig is vir die verwerking en begrip van veralgemeningsvrae.

1 INTRODUCTION

The issues of whether success in second-language reading ability depends upon first-language reading ability, or whether success in second-language reading ability depends upon second-language proficiency, not upon first-language reading ability, has been a principal concern in the second-language reading community for the last twenty years. Coady (1979), Clarke (1979), Cummins (1979), and Goodman (1973), among others, have advocated the first hypothesis, while Alderson, Bastien, and Madrazo (1977), Aron (1978), and Yorio (1971), including others, have advocated the second hypothesis.

Coady (1979) believes that difficulties in second-language reading are due to difficulties in first-language reading. Coady's psycholinguistic perspective is that reading can be characterized as a complex interaction of various skills and knowledge. Although Coady emphasizes the readers' inventory of textually relevant content and text structure background knowledge, and first-language proficiency, he does concede that second-language readers may lack attained competence in "process strategies which involve substantial knowledge of the target language" (1979:8). He went on to note that "many

students have very poor reading habits to transfer from their first language, and thus, in many cases, we must teach reading skills which should have been learnt in first-language instruction" (1979:12). In a related point Alderson (1984) notes that good first-language readers may be poor second-language readers simply because they have not attained enough second language competence to transfer their first-language reading ability to the second language.

Goodman (1973) proposed the reading universals hypothesis which Clarke's (1979) research substantiates, which showed that a group of good first-language readers were better second-language readers than a group of poor first-language readers.

Cummins' (1979) notion of cognitive/academic language proficiencies which are said to underlie first- and second-language proficiencies has also been employed to explain the relationship between first- and second-language reading comprehension. In the Cummins framework second-language development partially depends upon first-language attainment when second-language exposure and use begin. Alderson (1984) stated that an extension of this hypothesis could be that if "reading ability is related to or indeed part of the cognitive/academic language proficiency dimension", then "students who are proficient readers in their first language are more likely to become good readers in the second language than are poor first-language readers" (1984:8).

Yorio's (1971) position is perhaps the most definitive for the hypothesis that success in second-language reading ability depends upon second-language proficiency. Yorio contends that second-language readers' difficulties can be explained by their lack of adequate second-language competence and by a first-language interference.

> The reader's knowledge of the foreign language is not like that of the native speaker; the guessing or predicting ability necessary to pick up the correct cues is hindered by the imperfect knowledge of the language; the wrong choice of cues or the uncertainty of the choice makes associations more difficult; due to unfamiliarity with the material and the lack of training, the memory span in a foreign language in the early stages of its acquisition is usually shorter than in our native language: recollection of previous cues then is more difficult in a foreign language than in the mother tongue; and at all levels, and at all times, there is interference of the native language (1971:108).

Alderson, Bastien, and Madrazo (1977) administered a second-language proficiency test and first- and second-language reading comprehension tests to Mexican university students. Alderson *et al.* conclude that second-language proficiency was a better predictor of second-language reading comprehension than first-language reading comprehension.

Aron (1978) administered first- and second-language reading comprehension tests to Spanish-speaking EFL students. Low correlations were obtained between the skills assessed by the two measures. Alderson (1984) speculated that Aron's finding of a "lack of relationship between the reading abilities in the two languages was due to inadequate language knowledge" (1984:14).

In a survey of a large corpus of published research on the question of whether reading difficulties in a second language were due to reading difficulties in the first-language, Alderson (1984) reported that in the bilingual studies examined there was "some evidence of transfer of reading ability from one language to another", although "only moderate to low correlations have so far been established between reading ability in the foreign language when the same individuals are studied in both languages" and that "some evidence, however tentative, suggests that proficiency in the foreign language may be more clearly associated with foreign-language reading ability" (1984:20).

2 THE PRESENT STUDY

The present study was designed to determine whether there is a significant effect of second-language proficiency on second-language reading comprehension when the influence of first-language reading comprehension is held constant. The results of the study will be used to confirm to disconfirm the hypothesis that success in second-language reading ability significantly depends upon second-language proficiency, not upon first-language reading ability.

3 METHOD

3.1 Subjects

The subjects for this study were 161 Japanese students enrolled in an intensive English program. At the time when these data were collected, the students had received five hours of weekly reading instruction over a period of 27 weeks.

3.2 Instrumentation

Two fifty-item reading comprehension tests were constructed as the elicitation instruments for this study. One of the tests was translated into Japanese and is referred to as the L1 (= first-language) test. The L1 test's instructions, reading passages, questions, and responses were in Japanese. (The L1 test was translated back into English by an independent translator as a check on the accuracy of the English-to-Japanese translation). The other test, the L2 measure, was totally in English.

The content of the passages in both tests reflected similar subject matter; the same skills were assessed by both tests - facts, generalizations, and inferences; and finally, any bias in content and in text structural properties of the reading passages was held constant in both tests. That is, any bias - positive or negative for Japanese readers - in subject matter and text properties remained constant in both texts.

The L1 test contained 18 factual items; 16 generalization items; and 16 inference items; the L2 test contained 15 factual items; 20 generalization items; and 15 inference items.

The sample passage (Appendix A) presents a representative reading passage and three example probes. All items were multiple-choice with three distractors and a keyed response. Each correct response eas accorded one point, and for each subject the total number of correct responses for each type of question - factual, generalization, and inference - was converted to a percentage correct and entered for analysis.

The factual items required the subjects to recognize verbatim factual details; the generalization items required the subjects to evaluate the reading passages and to generalize from them; the inference items entailed the inferring and interpretation of underlying relationships. The factual questions asked *who?*, *what?*, *when?*, and *where?* The generalization questions involved evaluative meaning. The inference questions were *why?* questions.

Different questions types - facts, generalizations, and inferences - were employed in the investigation because of the research that has been conducted on the types of cognitive processing which readers engage while they read for meaning and answer comprehension questions. Research by Anderson (1972) and Ausubel (1963) has shown that factual

questions require less cognitive processing than questions which require more than direct memory.

Andre (1979) noted that "factual questions typically ask the reader to supply or recognize some item of information given in the passage. Factual questions are typically primarily verbatim. Types of information requested have included names, numbers, dates definitions, terms, etc. "On the other hand, Andre stated that an inference question "requires a reader to state a relationship between elements of the passage that is implied but not explicitly stated in the passage" (1979:282).

Anderson (1972) argued that a reader could correctly answer a verbatim factual question without a modicum of comprehension "by matching its elements with the surface orthographic or phonological features of the original communication" (1972:150). It is hypothesized that questions which must be processed at a deeper level than at the direct memory level require that the reader attend to more of the passage and to recall more of the passage. Most of the research reported to date has compared readers' performance on factual knowledge questions with their performance on various combinations of deeper (than verbatim factual knowledge) level questions. Different question types were included in the study to determine if the second-language reading comprehension test scores were affected by the choice of question type.

An institutional TOEFL test was used as the second-language proficiency measure in the study. The TOEFL, L1, and the L2 tests were counterbalanced in order to preclude response set.

4   ANALYSIS

Partial correlational analysis was used to partial out of the effect of first-language ability on the correlation between second-language reading ability and second-language proficiency from the single sample of Japanese students from a single population who participated in the study. Partial correlation derives a single measure of association describing the relationship between the independent variable (TOEFL, the second-language proficiency measure) and the dependent variable (the second-language reading comprehension test) and removes the effect of the control variable (the first-language reading comprehension test) from the relationship between the independent and dependent variables.

5   RESULTS

Table 1 (p.53) presents the means, standard deviations, and ranges for the measures employed in the study.

TABEL 1

MEANS, STANDARD DEVIATIONS, AND RANGES OF THE MEASURES

N = 161 SUBJECTS

VARIABLE	MEAN	STANDARD DEVIATION	MIN	MAX
L1 FACT QUESTIONS Percentage Correct	75.55	11.915	39.00	96.00
L1 INFERENCE QUESTIONS Percentage Correct	85.12	10.257	50.00	100.00
L1 GENERALIZATION QUESTIONS Percentage Correct	79.19	12.631	38.00	100.00
L1 TOTAL Percentage Correct	80.27	12.731	46.00	86.00
L2 FACT QUESTIONS Percentage Correct	49.20	14.796	6.00	80.00
L2 INFERENCE QUESTIONS Percentage Correct	32.59	13.324	6.00	67.00
L2 GENERALIZATION QUESTIONS Percentage Correct	27.83	12.006	5.00	60.00
L2 TOTAL Percentage Correct	35.49	9.579	12.00	62.00
TOEFL	396.37	27.678	327	457

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The Pearson correlation coefficients for the three measures are presented in Table 2.

TABLE 2

CORRELATION COEFFICIENTS

		L2 FACT	L2 INF	L2 GEN	L2 TOTAL	TOEFL
L1 FACT	r	.3121				.2658
	p	.0001				.0008
L1 INF	r		.2424			.2253
	p		.0019			.0047
L1 GEN	r			.1841		.2867
	p			.0194		.0003
L1 TOTAL	r				.2822	.2258
	p				.0003	.0046
L2 FACT	r					.3784
	p					.0001
L2 INF	r					.2413
L2 GEN	r					.1575
	p					.0495
L2 TOTAL	r					.3461
	p					.0001

The partial correlation coefficients and their associated levels of significance are found in Table 3.

TABLE 3

PARTIAL CORRELATION COEFFICIENTS

rL2FACT,TOEFL.L1FACT	=	.3226, P < .05
rL2INF,TOEFL.L1INF	=	.2090, p < .05
rL2GEN,TOEFL.L1GEN	=	.1112, p > .05
rL2TOTAL,TOEFL.L1TOTAL	=	.3022, p < .05

6   DISCUSSION

As Table 2 indicates, the correlations between the L1 reading measures and TOEFL were all significant indicating that higher L1 reading comprehension scores covaried with higher L2 proficiency scores, suggesting that students who can read better in their own language will probably learn a second language better as well. The correlation between the L2 reading measures, except for generalization and the TOEFL, was significant.

The data were submitted to partial correlational analysis to remove the effect of the correlation between first-language reading and second-language proficiency from the principal correlation between second-language reading and second-language proficiency. As Table 3 indicates, the partial correlation coefficients between the second-language proficiency measures and L2 fact, L2 inference, and L2 total were significant when the effect of first-language reading ability is partialled out. The partial correlation coefficient between L2 generalization and the second-language proficiency measures failed to reach significance.

The results suggest that for the L2 fact, L2 inference, and L2 total measures, second-language reading comprehension may be more clearly associated with second-language proficiency than with first-language reading comprehension. The L2 generalization measure may have behaved differently from the other measures, exhibiting less systematicity than the other measures, because it depends heavily on formal and content background knowledge.

Readers may vary in both the quality and quantity of background knowledge and in their ability to activate it. For example, some readers may lack background knowledge; some may underutilize what they have, while others may overutilize it. There may be a lack of fit between the nature of a text and a reader's background knowledge, and the lack of background knowledge may cause a memory overload as the reader attempts to keep the stimulus in mind while processing the alternatives. Differences in background knowledge could cause readers to draw different conclusions on very rational and valid bases.

An examination of the example generalization question from the appendix illustrates not only the deep processing involved but also the extent to which background knowledge plays a role. A reader must use approximately the following strategy to answer the question, "What is the best title for this essay?":

(1)   store the relevance test: the best title;

(2)   search the long-term memory for a retrieval cue;

(3)   determine where the answer to the question is located;

(4)   ascertain that the question-answer relationship is scriptally-implicit;

(5)   determine that a generalization must be drawn from the stated facts from which a generalization must be drawn;

(7)   using formal background knowledge of how essays are titled, state a generalization from particular stated instances in the text;

(8)   produce a response/answer to the question. Variability amongst the subjects on step 7 could have led to a loss of systematicity which could explain why the partial correlation for the generalization measure did not achieve significance.

In summary, we elicited data using three measures: first-language reading comprehension, second-language reading comprehension; and second-language proficiency. The data were submitted to partial correlational analysis to partial out the effect of first-language reading ability on the correlation between second-language

reading comprehension and second-language proficiency. The partial correlations for L2 fact, L2 inference, and L2 total were significant. The finding that the L2 generalization partial correlation failed to reach significance was attributed to variability of background knowledge.

In general this research suggests that second-language reading comprehension may be more clearly associated with second-language proficiency than with first-language reading comprehension, a finding which is consonant with previous research reported by Alderson (1984); Cummins (1979); Alderson, Bastien, and Madrazo (1977); Aron (1978); and Yorio (1971).

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APPENDIX A

Sample passage and reading probes

This is what you will see (or not see) if you travel far below the surface of the ocean in a bathyscaph, which is a deep-sea diving apparatus for reaching great ocean depths without a cable. Basically you will notice that colours change as you descend deeper into the ocean.

While you are near the surface, the colours will appear normal, much as they appear on the surface. As you dive deeper in the bathyscaph, the warm colours will begin to disappear because you are no longer able to see any reds, oranges, and yellows.

As you travel downward to even greater depths, you will see only the blues and the purples, but even these colours will begin to disappear as you plunge to greater depths.

After the blues and the purples have disappeared at greater depths, you will see only gray because the enormous depth of the water between you and the surface has filtered out the rainbow assortment of colours associated with the sun.

Below the gray level, you will see only black because you will be so deep that no light can penetrate the depths to reach you. By now you will be most anxious and eager to return to the surface again where you can enjoy a constantly changing kaleidoscope of colours and patterns.

What colour will you see as you dive below the gray line?

(1)   Green
(2)   Red
(3)   Black
(4)   Yellow
(Fact)

What is the best title for this essay?

(1)   "Colourful Deep Sea Plants"
(2)   "Diving in the Ocean"
(3)   "Ocean Colours: Changes in the Deep"
(4)   "Terror in the Ocean"
(Generalization)

What is the most important factor that accounts for colour changes in the ocean as you dive deeper and deeper?

(1)   The current of the water
(2)   The depth of the water
(3)   The direction of the water
(4)   The temperature of the water
(Inference)