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THE RELATIONSHIP BETWEEN PRIOR KNOWLEDGE AND TOPIC INTEREST IN SECOND LANGUAGE READING

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The relationship between prior knowledge of and interest in a topic is complex. Although knowledge and interest may often go hand in hand, they do not necessarily correlate. The purpose of this study was to separate the effects of prior knowledge and topic interest on second language reading comprehension. Participants in the study were 104 students of English as a second language in an English-for-academic-purposes program at a large American university. On the basis of a prior-knowledge test and a topic-interest inventory, each student read passages and took multiple-choice comprehension tests on topics for which they had all four possible combinations of high and low topic interest and high and low prior knowledge. Results on the reading comprehension measure for the two main effects of prior knowledge and topic interest, although in the expected direction, did not reach significance, possibly because of a significant interaction between those two variables. There was also a significant effect for English proficiency level, as well as a significant interaction between interest and gender, with males more influenced by high topic interest than females. Our results are compared to those of other first and second language studies that have explicitly investigated the interrelationships among topic interest, prior knowledge, and gender.

Two previously distinct streams of research in reading as a native language and reading as a foreign or second language are beginning to converge. The

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first is research on the relationship between topic interest and reading comprehension; the second is research on the relationship between prior knowledge and reading comprehension. In each of these distinct research streams, it seems clear that both topic interest and prior knowledge affect reading comprehension such that both first and foreign or second language readers may have better comprehension when they read material on topics in which they are particularly interested or when they read material on topics for which they have appropriate prior background knowledge. Although topic interest and prior knowledge may be correlated, this is not necessarily so. Thus, we are interested in what happens when both interest and knowledge are separate and distinct factors in reading.

Research on first language reading by native speakers of English has clearly shown that topic interest is a major factor in reading comprehension (Asher, Hymel, & Wigfield, 1978; Belloni & Jongsma, 1978; Bernstein, 1955; Cecil, 1984; Stevens, 1980). However, what is not clear in much of this research is the confounding of prior knowledge with interest. Do native readers comprehend high-interest material better because they have more prior knowledge about the topics in which they express interest? Some, for example Guthrie (1981), have concluded that native English-speaking children comprehend high-interest material better because they know more about the topic. He thus assumes that knowledge and interest are highly correlated and that interest is caused by knowledge. Others, for example Pearson and Johnson (1978), have concluded that interest is a significant variable in reading comprehension, independent of knowledge. Because of the important consequences for material selection and instruction, L1 reading researchers have attempted to tease apart the relative contributions of prior knowledge and topic interest.

Two early first language studies, Weber (1980) and Entin (1981), which used college students as participants, concluded that interest and prior knowledge were correlated and that the two factors had an additive effect on comprehension. In another study, with ninth graders, Osako and Anders (1983) obtained ambiguous results, with interest significantly contributing to prediction of comprehension scores for only two of four passages and prior knowledge significantly contributing for only one passage.

However, in a tightly controlled and well-designed study, Baldwin, Peleg-Bruckner, and McClintock (1985) clearly demonstrated the distinctive and additive contributions of both prior knowledge and topic interest to reading comprehension for high-achieving seventh- and eighth-grade students. Citing recent research that indicates that children comprehend better when they read materials on high-interest topics, Baldwin et al. commented that the causes of this interest effect are unclear. They questioned whether the apparent impact of topic interest on reading comprehension is in reality a result of the fact that people tend to have more prior knowledge about topics in which they are interested. The purpose of their study was to methodologically separate and to clearly demonstrate the independent, additive effects of both prior knowledge and topic interest on reading comprehension. Based on measures

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of prior knowledge and topic interest on ten different topics, their results also showed a gender effect, with males scoring higher than females, as well as a second-order interaction among gender, prior knowledge, and topic interest. This triple interaction revealed that males were more affected by topic interest than were females, whereas females were more affected by prior knowledge than were males. Prior knowledge and topic interest for their participants and topics were not highly correlated, ranging from –.49 to +.74 for each participant across 10 topics, with a mean of +.09.

In second or foreign language reading, previous research has shown the effects of prior or background knowledge on reading comprehension (Carrell, 1981, 1983a, 1983b, 1983c, 1987; Carrell & Eisterhold, 1983; Carrell & Wallace, 1983; Johnson, 1981, 1982; Steffensen, Joag-dev, & Anderson, 1979).[1] Some of this research has demonstrated these effects not only for culturally based background knowledge but also for discipline-specific prior knowledge (Alderson & Urquhart, 1983, 1985, 1988). However, some of this research, even some fairly recent research, has also tended to confound prior knowledge and topic interest, often under the label of "topic familiarity" (Hammadou, 1991; Peretz & Shoham, 1990).

Bügel and Buunk (1996) report a recent study of the relationships among prior knowledge, interest, and gender. Prompted by the fact that scores obtained by female students on the national foreign language examinations in the Netherlands (of English, French, and German) have been "slightly but consistently" below those of male students, these researchers tested the hypothesis that gender differences in prior knowledge and interest lead to differential performance on texts of different topics, thus making text topics and topic interest an important factor. In this study, which involved almost 3,000 high-school students of English as a foreign language in the Netherlands, topic interest and prior knowledge were assessed via multiple methods and conflated to arrive at two sets of texts—one set with "male" topics and one with "female" topics. The expected gender-based differences in reading comprehension were found. The study concludes that "differences between the sexes in prior knowledge contribute to sex differences in foreign language reading comprehension" (Bügel & Buunk, 1996, p. 15). Yet, the conflating of prior knowledge and topic interest in this study leaves it unclear how their results can be generalized to situations in which prior knowledge and topic interest are not conflated.

In a more rigorous second language research design that differentiated prior knowledge and topic interest, Leloup (1993) undertook to assess the separate and distinct contributions of prior knowledge and topic interest in a study of foreign language reading. Using native speakers of English in four levels of high-school Spanish-as-a-foreign-language classes in the U.S., she sought to measure the effects of topic interest and gender on reading comprehension over and above the effects of background knowledge and proficiency level or ability in the foreign language (measured by a test of Spanish). Participants ranked five topics (fashion models, cooking, music, sports, and rural vaca-

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tions in Spain) in order of their interest and then read one high-interest and one low-interest authentic text. (It is not clear whether participants read their highest and lowest interest texts.) Prior knowledge was measured by Langer's (1980, 1981, 1982) one-minute free-association method, which has the drawback of yielding a very limited four-point scale (0–3), with little variability.

Covarying out the effects of second language ability and prior knowledge, Leloup (1993) found significant main effects for topic interest and gender, with females outperforming males. Leloup reported the results for the effects of prior knowledge and foreign language proficiency by level of interest (high vs. low) by gender. Each of these two covariates, treated as main effects, and their interactions contributed differently in each of the four conditions (male/high interest, male/low interest, female/high interest, female/low interest). Thus, one cannot determine an overall effect for prior knowledge and foreign language proficiency from Leloup's data. (Presumably, the two covariates met the prerequisites for being treated as covariates, although these prerequisite tests are not reported directly.) Leloup also does not report correlations between students' prior knowledge and interest in the topics used in her study.

RESEARCH QUESTIONS AND DATA ANALYSIS

In a research design closely parallel to that of Baldwin et al. (1985) but incorporating second language proficiency level as a variable as Leloup did, this study addressed the following three research questions: (a) What is the relationship between prior knowledge and topic interest in reading in English as a second language? (b) How is this relationship affected by English proficiency level?[2] (c) How is this relationship affected by gender?

Data were analyzed using a four-way repeated measures ANOVA. The *p*-level set for significance was $p = .05$.

METHOD

Participants

All students in the eight reading classes in the ESL-EAP program at Georgia State University during the spring quarter of 1996 were solicited for their participation in the study. One hundred and twenty-three, virtually all, signed consent forms indicating a willingness to participate. Results are reported from the 104 students who completed all tasks. Students came from a wide variety of countries and native-language backgrounds, the largest identifiable groups being Vietnamese (28), Korean (14), and Russian (9). Other countries with multiple participants were: Japan (6), Thailand (5), Zaire (4), Taiwan (3), and India (2). One each participated from China, Venezuela, Somalia, Romania, Iran, France, Haiti, Peru, Colombia, and Ethiopia. Countries of origin were unreported for 23 participants. Ages ranged from 18 to 50 years, with an average

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Table 1. Participants by proficiency level

Proficiency Level		*n*-Size	Gender M	Gender F
1	High beginner	18	9	9
2	Low intermediate	17	5	12
3	High intermediate	35	22	13
4	Advanced	34	18	16
	Total	104	54	50

Note. High beginner = approximately 400–430 TOEFL, Low intermediate = approximately 430–460 TOEFL, High intermediate = approximately 460–490 TOEFL, Advanced = approximately 490–525 TOEFL.

age of 25 years. Participants consisted of both international students on J-1 visas as well as immigrants. Gender was approximately evenly distributed.

Second language proficiency of our participants was not tested directly. We relied on program levels in which the participants were enrolled at the time the study was conducted. Students were given a placement test at the time of their entrance into the ESL-EAP program, although we recognize that students who are placed in a program level by placement-test performance may differ somewhat in second language ability from students who have been promoted to that level. However, it should be noted that, although Leloup (1993) directly tested her students for second language ability, she also found that the naturally occurring division of levels of Spanish classes was an accurate reflection of the second language ability of her students. (Means of a test of general Spanish ability were statistically significantly different between all levels, and the correlation coefficient between level of Spanish class as indicated by enrollment and second language proficiency as measured by the test of general Spanish ability was $r = .76$, $p = .0001$.) Thus, although using intact English language classes can be problematic, we determined to use them as indicators of second language proficiency.

Table 1 provides the breakdown of participants by English proficiency levels and gender. Approximate TOEFL ranges for each proficiency level are also given in Table 1.

Materials

Topic Selection and Source of Texts. Because we were dealing with adult learners in an EAP program, with a wide variety of backgrounds and ages as well as a wide variety of interests and prior knowledge, we searched for potential topics in a CD-ROM encyclopedia (Funk & Wagnalls, 1994). Our goal was to identify topics that would represent a wide range of potential interests and prior knowledge of our students and to identify topics that would potentially vary in terms of their interest and knowledge for both genders—that is, to identify topics in which the students might have other than high interest and

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high prior knowledge. We were trying to identify potential topics in which our participants would have low interest and low prior knowledge, as well as high interest but low prior knowledge, and vice versa. The encyclopedia was chosen as the source for all texts so that passages would be appropriate for adult EAP students as well as comparable with respect to readability (i.e., linguistic complexity as measured quantitatively), style, and literary genre (i.e., expository texts). The 10 topics ultimately selected also had to comprise encyclopedia entries sufficiently lengthy to yield prior-knowledge questions (from parts of the text) as well as a reading passage of approximately 400 words and appropriate multiple-choice questions (from other parts of the text).

Based on these criteria, the following 10 topics were selected: computers, human evolution, Islamic art and architecture, missionary movements, natural disasters (earthquakes, hurricanes, typhoons), the Olympics, photography, soccer, space exploration, and financial securities and the stock exchange. Unlike Leloup (1993) and Baldwin et al. (1985), none of these topics were selected because they were assumed a priori to appeal more to males or to females. We were interested in assembling a broad range of topics varying widely with respect to both the presumed interest and prior knowledge that our participants, both males and females, would bring to them.

There were three sets of stimulus materials based upon the 10 selected topics: (a) a prior-knowledge multiple-choice test, (b) an interest inventory, and (c) a reading-comprehension test.

Prior-Knowledge Test. The Prior-Knowledge Test consisted of 100 items, with 10 multiple-choice questions on each of the 10 topics. Although the questions were based upon information in the encyclopedia entry on the topic, each item was designed to be answerable without reference to the passage by someone who knew the topic (i.e., students familiar with the topic should have been able to answer the factual questions without reference to the encyclopedia entry from which they were derived). Each multiple choice item had five choices, with distractors as well as correct choices often being complex (e.g., "all of the above," "none of the above," or "a and b above"). Items 85 and 90 are from the topic of space exploration:

(85). Among those who described space travel before it became reality were
a. Jules Verne (French author)
b. H. G. Wells (British author)
c. Johannes Kepler (German astronomer)
d. both a and b above
*e. a, b, and c above

(90). Sputnik was launched in
a. 1951
b. 1945
c. 1969
d. 1939
*e. 1957

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Table 2. Prior Knowledge Test by topics, ranges, and means

Topic	Ranges	Mean Scores
Computers	1–10	4.38
Human evolution	0–7	3.96
Islamic art and architecture	0–6	2.09
Missionary movements	0–7	3.12
Natural disasters	0–9	4.12
Olympics	0–9	4.66
Photography	0–9	4.95
Soccer	0–10	6.07
Space exploration	0–8	2.88
Stock exchange	0–8	2.80

Table 3. Ranking of topic interest, ranges, and means

Topic	Ranges	Mean Ranking
Computers	1–10	3.46
Human evolution	1–10	5.14
Islamic art and architecture	1–10	6.78
Missionary movements	1–10	7.69
Natural disasters	1–10	7.14
Olympics	1–10	4.67
Photography	1–10	4.16
Soccer	1–10	5.79
Space exploration	1–10	5.10
Stock exchange	1–10	6.14

Note. 1 = most interest, 10 = least interest.

Table 2 reports the ranges and mean scores of the prior-knowledge test by topics. Clearly, participants demonstrated a wide range of prior knowledge of these topics, and the topics yielded a variety of mean prior-knowledge scores from a low of 2.09 to a high of 6.07 (out of a maximum of 10). Reliability of the prior-knowledge test is demonstrated by the following reliability coefficients: Odd-Even $r = .8436$; Kuder-Richardson Formula 20, $r = .8008$.

Topic Interest Inventory. The interest inventory was a self-report form that listed the 10 topics. Students reported their interests in a rank-order scale, from 1 (most interest) to 10 (least interest). Students also had the opportunity of reporting the absolute level of their interest in the topic, from very high interest (1) through moderate interest (5) to no interest (10). However, because many students were not self-consistent in utilizing both scales, our data were analyzed using the rank-order scale only.[3] Table 3 reports the ranges and means of the topic interest ratings. See Appendix A for the Reading Interest Inventory.

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Table 4. Linguistic characteristics of reading passages

Topic	Words	Sentences	Paragraphs	Average Word Length	Average Words per Sentence	Maximum Words per Sentence
Computers	405	18	5	5	22	38
Human evolution	401	19	5	5	21	48
Islamic art and architecture	412	16	5	5	25	43
Missionary movements	400	25	6	5	16	34
Natural disasters	402	23	5	5	17	32
Olympics	411	25	5	5	16	38
Photography	409	19	6	5	21	51
Soccer	403	24	6	5	16	40
Space exploration	403	25	4	5	16	52
Stock exchange	404	20	5	5	20	39

Reading Comprehension Test. The ten 400-word passages were taken from the same encyclopedia entries as the prior-knowledge test but from different parts of the entry. These passages were comparable in terms of their linguistic complexity on a number of quantitative measures: number of words, number of sentences, number of paragraphs, average word length, average number of words per sentence, and maximum number of words per sentence. These statistics were calculated by the Document Information feature of WordPerfect 6.1, the word-processing program that was used to prepare the final printed copies of each text. See Table 4 for the exact statistics on each passage.

The 10 multiple-choice comprehension questions were designed to be passage-dependent measures composed of both textually explicit and textually implicit questions. As with the prior-knowledge multiple-choice questions, there were five choices for each item. See Appendix B for a sample of one of the 10 passages and its multiple-choice comprehension questions.

Procedures

Testing sessions on two different days were required to complete the experiment. Sessions were scheduled at the convenience of the classroom teacher, but in every class, session one occurred within the first four weeks of the quarter and session two occurred within the last four weeks of the quarter. Session one took approximately one and one-half hours to one hour and 45 minutes (the longer times for the lower proficiency-level classes); session two took approximately 45 minutes to one hour and 15 minutes (again, the longer times for the lower proficiency-level classes). In the first session, students were asked to participate in the study, having been told that the study was of topic interest and prior knowledge and that it would help ESL teachers and materials writers develop better instructional materials. Those who indicated a willingness to participate—and virtually all the students did so—signed an

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Table 5. Topic interest and prior knowledge scores of one participant

Topic	Topic Interest	Prior Knowledge	Condition
Computers	6	5	
Human evolution	5	4	
Islamic art and architecture	7	5	
Missionary movements	9	2	HL
Natural disasters	1	4	LL
Olympics	3	6	
Photography	10	7	HH
Soccer	2	8	LH
Space exploration	4	2	
Stock exchange	8	3	

Note. Topic Interest (rank-order-scale has been reversed to make it the same direction as Prior Knowledge): 1 = least interest, 10 = most interest. Prior Knowledge scale: 0 = least knowledge, 10 = most knowledge. Condition: HH = high interest, high knowledge; LL = low interest, low knowledge; HL = high interest, low knowledge; LH = low interest, high knowledge.

informed consent form, completed the interest inventory, and then took the prior-knowledge test. This concluded session one.

After the results of the topic-interest and prior-knowledge measures were tabulated, it was possible to identify for each participant the passages which best fit into each of the following conditions: High Topic Interest and High Prior Knowledge (HH), High Topic Interest and Low Prior Knowledge (HL), Low Topic Interest and High Prior Knowledge (LH), and Low Topic Interest and Low Prior Knowledge (LL). How this was determined is illustrated in Table 5 for one participant.

In session two, which was scheduled approximately two to three weeks after the first session, students read and were tested on their own unique combinations of four passages corresponding to the four experimental conditions: HH, HL, LH, and LL. Students were given previously prepared and unique folders containing their particular sets of four reading passages, each passage with a set of 10 multiple-choice reading-comprehension questions. Students could refer to the passage when answering the questions. Passage order was random.

Table 6 shows the distribution of topics by frequency of their utilization in each of the four experimental conditions.

RESULTS

A Pearson product correlation coefficient between Topic Interest rankings (from the Reading Interest Inventory) and Prior Knowledge scores (from the Prior Knowledge Test) was computed for each participant across the ten topics.[4] In other words, 104 separate correlation coefficients were calculated. These correlations ranged from −.68 to +.84, with a mean of +.19. Similarly,

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Table 6. Frequency distribution of topics by condition

Topic	HH	HL	LH	LL	Total
Computers	25	15	5	3	48
Human evolution	9	14	13	4	40
Islamic art and architecture	3	13	7	31	54
Missionary movements	2	4	10	31	47
Natural disasters	7	7	11	4	29
Olympics	9	7	6	1	23
Photography	19	5	12	4	40
Soccer	26	0	32	2	60
Space exploration	2	21	2	11	36
Stock exchange	3	19	7	14	43

Note. HH = high interest, high knowledge; LL = low interest, low knowledge; HL = high interest, low knowledge; LH = low interest, high knowledge.

Table 7. Correlations between topic interest (as measured by Interest Inventory) and prior knowledge (as measured by Prior Knowledge Test) by topic

Topic	Correlation
Computers	$r = .11$
Human evolution	$r = -.01$
Islamic art and architecture	$r = -.02$
Missionary movements	$r = .10$
Natural disasters	$r = .13$
Olympics	$r = .12$
Photography	$r = .05$
Soccer	$r = .29$
Space exploration	$r = .18$
Stock exchange	$r = .03$

Pearson product correlation coefficients between Topic Interest rankings and Prior Knowledge scores were computed for each topic across the 104 participants. These 10 correlation coefficients are reported in Table 7. These results all demonstrate that, although prior knowledge and topic interest may be correlated, they are not necessarily so. Further, they also demonstrate that we were successful in selecting topics for this study in which the relationship between topic interest and prior knowledge varied widely for our students.

Descriptive statistics are reported in Tables 8 and 9. Specifically, means and standard deviations of the reading comprehension scores for males and females are reported in Table 8, and means and standard deviations of the reading comprehension scores for all participants are reported in Table 9.

The reading comprehension results were analyzed in a $4 \times 2 \times 2 \times 2$ (Proficiency Level × Gender × Prior Knowledge × Topic Interest) analysis of variance (ANOVA) with repeated measures on Prior Knowledge and Topic Interest. See

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Table 8. Descriptive statistics: Means and standard deviations of comprehension scores for males and females in four conditions

	Topic Interest for Males ($n = 54$)		Topic Interest for Females ($n = 50$)	
	High	Low	High	Low
High prior knowledge				
M	6.48	6.19	5.82	6.42
(*SD*)	(1.77)	(2.06)	(2.02)	(1.62)
Low prior knowledge				
M	6.22	5.65	6.04	6.02
(*SD*)	(1.73)	(2.20)	(1.73)	(2.22)
Overall prior knowledge				
M	6.14		6.08	
(*SD*)	(1.47)		(1.35)	

Table 9. Descriptive statistics: Means and standard deviations of comprehension scores; all participants in four conditions

	High Topic Interest	Low Topic Interest	Overall Topic Interest
High prior knowledge			
M	6.16	6.30	6.23
(*SD*)	(1.91)	(1.85)	(1.58)
Low prior knowledge			
M	6.13	5.83	5.98
(*SD*)	(1.81)	(2.21)	(1.65)
Overall prior knowledge			
M	6.15	6.07	
(*SD*)	(1.56)	(1.72)	

Table 10. Results of the ANOVA showed that there was only one significant main effect, for L2 Proficiency Level, $F(3, 99) = 5.53$, $p = .0015$. A post hoc analysis with Tukey's test showed that the significant distinctions lay between the high-beginner and high-intermediate groups, and between the high-beginner and advanced groups; other pairwise comparisons were not statistically significant.[5] The main effect for Prior Knowledge did not reach significance, $F(1, 99) = 3.25$, $p = .0744$. However, as seen in Table 9, the distinction was in the expected direction, with participants scoring higher on passages about which students had high prior knowledge ($M = 6.23$) than on those about which they had low prior knowledge ($M = 5.98$). The main effect for Topic Interest also did not reach significance, $F(1, 99) = .25$, $p = .6194$. We note from the descriptive statistics in Table 9 that comprehension of passages on which students had

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Table 10. Effects of prior knowledge, topic interest, second language proficiency, and gender on second language reading comprehension; analysis of variance summary table

Effect	Mean Squares	*df*	*F*	*p*
Between subjects				
LP	39.1178	3	5.53	.0015*
G	0.8481	1	0.12	.7298
Within subjects				
TI	0.6328	1	0.25	.6194
PK	7.6509	1	3.25	.0744
TI × LP	2.2432	3	0.88	.4542
TI × G	13.7359	1	5.39	.0224*
PK × LP	2.5261	3	1.07	.3639
PK × G	4.3215	1	1.84	.1784
TI × PK	8.10887	1	3.71	.0568*
TI × PK × LP	1.4957	3	0.68	.5633
TI × PK × G	0.2589	1	0.12	.7313

Note. LP = Second Language Proficiency, G = Gender, TI = Topic Interest, PK = Prior Knowledge; * = statistically significant.

high topic interest ($M = 6.15$) only moderately surpassed low topic interest ($M = 6.07$), although again the difference is in the expected direction. The main effect for Gender also did not reach significance, $F(1, 99) = .12$, $p = .7298$, although, as can be seen in Table 8, in our sample males modestly outperformed females.

A possible reason for the lack of significance in the other single main effects is that we had two significant first-order interactions. There was a significant first-order interaction between Prior Knowledge and Topic Interest, $F(1, 99) = 3.72$, $p = .0568$. This relationship is seen in the mean scores reported in Table 9. In three of the four cells, if either prior knowledge or topic interest is high, then approximately the same mean scores are obtained; only if both prior knowledge and topic interest are low is a significantly lower mean score obtained. Furthermore, Topic Interest and Gender are significantly interrelated, $F(1, 99) = 5.39$, $p = .0224$. Table 11 illustrates the complexities of the interaction between gender and topic interest. Males were affected by topic interest in the expected direction, performing significantly better on passages in which they had high topic interest. On the other hand, females actually performed better on the passages in which they had low topic interest. Figure 1 graphically displays this interaction. No other first-order interactions and no second-order interactions were significant.

Because of the significant main effect for second language proficiency, post hoc three-way ANOVAs were run for each of the four proficiency levels. These analyses revealed differences among the roles of Prior Knowledge, Topic Interest, and Gender at the different proficiency levels. However, because we did

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Table 11. Interest by gender interaction: Mean scores and standard deviations

	Topic Interest	
Gender	High	Low
Male		
M	6.35	5.92
(*SD*)	(1.49)	(1.84)
Female		
M	5.93	6.22
(*SD*)	(1.60)	(1.57)

not directly test for second language proficiency levels but used the intact classes, the results of these analyses are reported in note 6 and should be interpreted cautiously.[6]

DISCUSSION

This study set out to address three research questions: (a) What is the relationship between prior knowledge and topic interest in reading in English as a second language? (b) How is this relationship affected by English proficiency level? and (c) How is this relationship affected by gender?

The results suggest that, for the topics utilized in this study, students' prior knowledge of the topics (as measured by the prior-knowledge test) and topic interest (as measured by the interest inventory) are essentially uncorrelated. In fact, the correlations between the two in this study were extremely low, on average, for these students and these topics. On the surface, this may seem counterintuitive, and it certainly conflicts with the common-sense notion (Guthrie, 1981) that prior knowledge and topic interest should be highly correlated. Although we may tend to think that people should know the most about the things in which they are interested, or should be interested in the things they know the most about, this did not hold in this study of adult ESL learners. It also did not hold in the Baldwin et al. (1985) study of L1 junior high school students. Baldwin et al. speculated that the reason it did not hold for their participants is that:

> this is an adult perception which probably evolves from adult prerogatives in education. As people get older and increasingly specialized, interest and knowledge may come to correspond closely. The situation is different for school children who are forced to study a variety of topics whether they like them or not. It should not be surprising then to find that a group of above average students could be fairly knowledgeable about space exploration and American Indians, for example, without having any real enthusiasm for those subjects. (p. 502)

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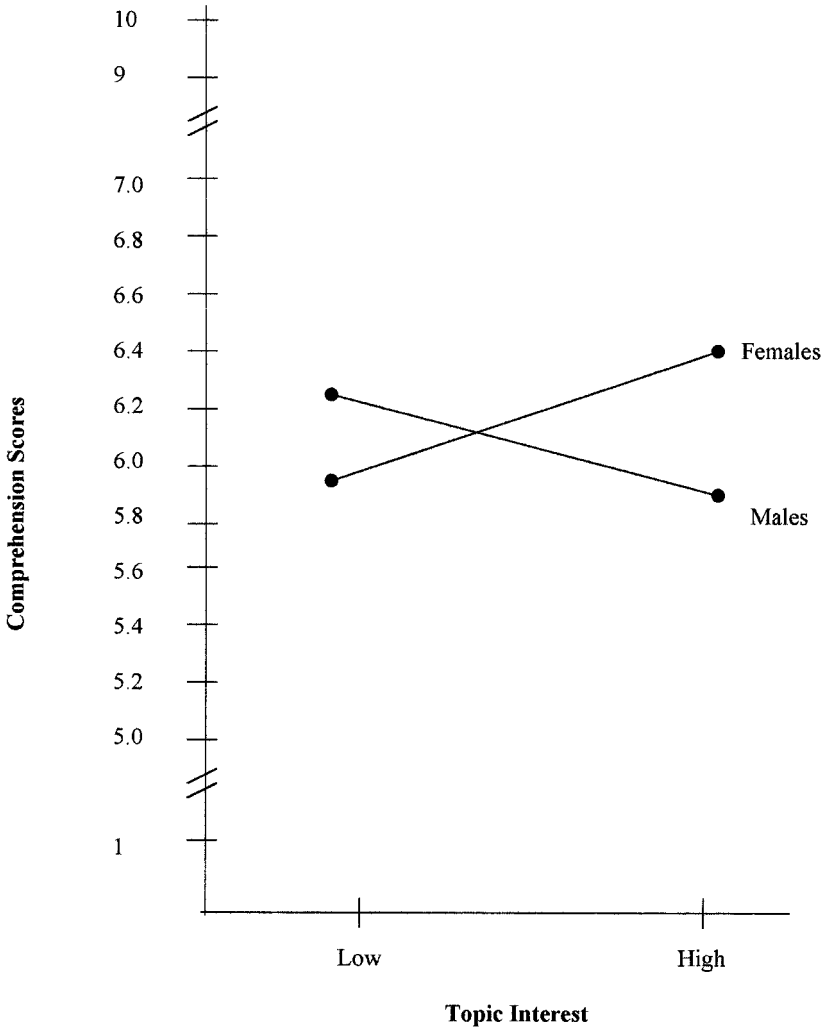


Figure 1. Graphic representation of gender by topic interest interaction.

Because we are also dealing with students in an academic setting—in this case, adult learners—it should not be surprising that our participants could express low interest in topics in which they have a fair amount of knowledge and, conversely, that they could indicate high interest in topics but yet not have a great deal of knowledge about those topics (i.e., be interested in learning more about such topics). Thus, one should not assume that topic interest and prior knowledge will necessarily be correlated for any group of readers;

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they may or they may not, depending upon the particular readers and the particular topics.[7]

The results also indicate that prior knowledge and topic interest are not highly significant nor additive factors in reading comprehension (as measured by multiple-choice questions) for these students on these topics. Prior knowledge did not reach statistical significance, and neither did topic interest. The difference between high and low prior knowledge was only .25 (the difference between $M = 6.23$ and $M = 5.98$) on an 11-point scale (0–10), whereas the difference between high and low topic interest was even smaller, only .08 (the difference between $M = 6.15$ and $M = 6.07$) on a 10-point scale (1–10). In fact, the results reported in Table 9, taken together with the inferential results showing the significant interaction between prior knowledge and topic interest, tend to suggest that when either prior knowledge or topic knowledge is high, reading comprehension is slightly facilitated; reading comprehension may suffer most when both prior knowledge and topic interest are low.

Although our overall descriptive results for prior knowledge and topic interest were patterned like those of Baldwin et al. (1985), our inferential results differed from theirs. For their L1 students, both prior knowledge and topic interest were significant single effects in reading comprehension, with differences between the HH and LL conditions of almost one standard deviation. In our results, neither single effect was significant. Baldwin et al. concluded that their results support the conclusions of Weber (1980) and Entin (1981) that the effects of prior knowledge and topic interest are additive.

Our results for the single effects of prior knowledge and topic interest on reading comprehension also differ from those of Leloup's (1993) L2 students learning Spanish. She found statistically significant but not substantial effects of background knowledge on reading comprehension. Whereas prior knowledge has frequently been shown to be a significant factor in both first and second language reading comprehension (see references from the introduction), it has also been shown that second language readers do not necessarily or always activate the background knowledge that they may have to facilitate second language reading comprehension (Carrell, 1983a; Carrell & Wallace, 1983).

Leloup's results showing apparent strong effects of topic interest on reading comprehension among high school Spanish students—in her results, topic interest accounted for 9% of the variance in L2 reading-comprehension scores—were not replicated in our results for ESL-EAP students. In none of our analyses did topic interest emerge as a significant main effect. Although the male students modestly outperformed the female students in our study, there was no significant gender effect overall. Our results also yielded an interesting interaction between topic interest and gender. Males performed better on texts in which they had high topic interest. On the other hand, females actually performed better on texts in which they had low topic interest. These results also differ from those of Baldwin et al. (1985) and Leloup (1993). Bald-

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win et al. found that their L1 boys had significantly higher comprehension scores than their girls. In Leloup's study, female participants scored significantly higher than male participants, with gender accounting for 6% of the variance in second language reading comprehension. Baldwin et al. also found a significant triple interaction among gender, prior knowledge, and topic interest. Further analyses by Baldwin et al. showed that topic interest was significant for boys but not girls, whereas the impact of prior knowledge, which had a significant effect for both boys and girls, was greater for girls. Leloup did not find a significant interaction between gender and interest, which suggests that for her students the gender differences were more similar across levels of interest.

The differences between the results of this study and the previous results for other L1 and L2 studies may be explained, we believe, by differences in the learners participating in the studies. Leloup's high school L2 Spanish students, although encompassing a range of second language ability, were predominantly at the "low end of the L2 ability range" (Leloup, 1993, p. 104). Indeed, more than half of her students (105 out of 206) were in beginning levels of Spanish and had what Leloup described as "depressed L2 ability" (p. 67). Indeed, the scores on the recall protocols of her students were at the low end (e.g., mean scores of 16.98% for high-interest texts, and of 14.34% for low-interest texts, out of a possible high score of 100%). Clearly, our L2 university ESL students were at much higher levels of second language ability, as well as being older (mean age 25) and more cognitively mature. Our students were also older and more cognitively mature than Baldwin et al.'s junior-high school native speakers of English. Further, our students were coping with reading in a second or foreign language, not their native language as Baldwin et al.'s students were. Finally, Baldwin et al.'s students were clearly identified as "high achieving" junior-high school students, "middle class, above average students, and fluent readers" (1985, p. 499). Thus, they were not only native speakers but were clearly good L1 readers. In fact, many of the differences between our results and those of Leloup and Baldwin et al. may be related to an earlier L1 study by Walker, Noland, and Greenshields (1979). They found that high interest content affected males more than females and that high interest content, although it had a negligible effect on above-average readers, had a greater effect on average and below-average readers.

All of this suggests that it is important to conduct further research with additional samples of these populations—L1 readers of different maturity or ages and reading abilities, and L2 learners of different ages and L2 proficiency levels. Similarly, because neither this study nor Leloup's (1993) independently measured reading ability (neither first language reading ability nor second language reading ability), it would seem important to factor such consideration into future studies. The significance as well as the importance of each main factor—prior knowledge, topic interest, and gender—may be expected to differ with different populations and will certainly differ for different proficiency levels of second language.

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LIMITATIONS OF THE STUDY

Before discussing the pedagogical implications of this study, it is important to recognize some of the limitations of the study. First, because level of second language proficiency was indeed a statistically significant factor and because there were differences in the roles of prior knowledge, topic interest, and gender at the different proficiency levels (see note 6), a direct measure of this variable would have provided additional support for the distinct levels defined by the intact classes. Future research should test this variable concurrently with the measurement of topic interest, prior knowledge, and gender variables.

Second, this study involved heterogeneous groups of participants with different native-language backgrounds. Although we didn't find any particular patterns of results by breaking down our participants into their respective native-language groups, at least those for whom we had sufficient numbers of participants (Vietnamese, $n = 28$; Koreans, $n = 14$), we did note that in some samples (e.g., the Russians), the women outperformed the men. But there were too few Russians ($n = 9$) for whom to run a separate analysis. This suggests that it would be desirable to test homogenous groups of native-language speakers.

Third, the design of this study was limited by the range of high and low prior-knowledge scores of some participants. Although the possible range of prior knowledge results went from 0 to 10 (an 11-point range), and although many of our participants had scores ranging from 1–9, 0–8, and 0–7, some participants' prior-knowledge scores had a more limited range (e.g., 0–5, 1–6, 1–5). Furthermore, in order to arrive at the four combinations of high topic interest and high prior knowledge (HH), high topic interest and low prior knowledge (HL), low topic interest and high prior knowledge (LH), and low topic interest and low prior knowledge (LL), the result in some instances was a small difference in the magnitude of prior knowledge. Thus, in some instances, the differences in prior knowledge for a topic considered "high" and a topic considered "low" were sometimes only a few points. Our results may have been more robust had there been even greater differences between high and low prior knowledge on the four topics read by each participant.

Fourth, a final limitation of the study is that we used only a single, very conservative measure of reading comprehension—namely, multiple-choice questions. Had different measures of reading comprehension been used (open-ended questions, short answers, recall protocols, etc.) or had multiple measures of reading comprehension been taken, perhaps some of the single effects that were not significant (prior knowledge, topic interest, gender) might have yielded significant results.

PEDAGOGICAL IMPLICATIONS

Some pedagogical implications are clear. Affective factors such as topic interest, and other factors such as prior knowledge, have a complex effect on sec-

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ond language reading. It is incumbent upon second language teachers to be concerned about both of these factors (as well as others) in their pedagogy. Teachers need to be sensitive to both factors in their students' reading. Topic interest and prior knowledge may or may not be correlated for a given set of students and a given set of topics. Students may have an intrinsic, personal interest in a topic but may not have much prior knowledge; similarly, students may have a great deal of prior knowledge but may not be particularly interested in a topic. Comprehension may suffer most when students have both low prior knowledge and low interest in a given topic. If learners are in settings in which their interests and prior knowledge can be factored into the selection of reading materials, clearly they should. A variety of extensive reading situations, including sustained silent reading and free voluntary reading, have these as rather automatic benefits. However, even in intensive reading situations where the students do not self-select their own reading materials, there are a variety of mechanisms available to teachers to gather topic-interest and prior-knowledge information from their students, including those used in this study and those used by Leloup (1993).

The roles played by prior knowledge and topic interest may also vary by the teaching or learning situation and the reasons learners are studying the second or foreign language. Our learners were clearly ESL students in an EAP context. They recognized that, although they may have had some latitude in the selection of their university courses, and therefore in the topics on which they would be reading, they would inevitably encounter readings in which they would have either low interest or low prior knowledge (or both) but would need to grapple with and understand the reading nevertheless. Therefore, such learners may be more persistent in dealing with topics in which they have low inherent interest and low prior knowledge. Learners in other educational settings may have greater latitude to pick and choose the topics they will deal with and, therefore, may have less persistence with topics in which they have either low interest or low prior knowledge or both.

Further, teachers need to be aware that gender differences may function differently with respect to the interactive effects of prior knowledge and topic interest, as well as of the fact that the importance of these variables may differ at different proficiency levels. For example, overall, the second language reading comprehension performance of males, more than of females, may be depressed on topics of low interest. However, this effect may be more of a factor at lower levels of proficiency.

Because this study and the others it has referred to are correlational, they cannot speak directly to the issue of causality in instruction. Thus, in those pedagogic situations in which students must (for good and valid reasons) confront texts in which they may have little prior knowledge as well as low topic interest, these studies cannot advise the teacher whether it is more advisable to use precious class time generating interest in a topic or whether to spend that time relating the new material to students' prior knowledge. Nor do these studies directly tell us whether getting students interested in a topic will have

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the same effect on comprehension as finding topics in which they are already interested. Such questions remain to be addressed by relevant pedagogic training studies.

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NOTES

1. However, some of this research also shows that second language learners do not always activate or apply appropriate prior knowledge, especially if their second language proficiency does not permit the transfer of such fluent L1 reading strategies (Carrell, 1983a; Carrell & Wallace, 1983).

2. One would obviously expect second language reading comprehension to depend upon, and thus to correlate highly with, second language proficiency (see, e.g., TOEFL correlations between the reading subsection and the total test; see also the "language threshold hypothesis" or "short circuit hypothesis" of second language reading, Clarke, 1980). Thus, it makes sense to include second language proficiency as a variable in any study of second language reading. However, we are interested in treating second language proficiency as an independent variable in this study, not as a covariate, because we wish to see how it interacts with topic interest, prior knowledge, and gender, which are our primary independent variables.

3. Some students ranked topic X higher than topic Y in Part I of the Reading Interest Inventory (indicating a relative interest in X higher than in Y), yet in Part II they gave a rating for absolute level of interest in topic Y that was higher than that given to topic X. See the Reading Interest Inventory in Appendix A. We concluded from post hoc student comments that they were sometimes confused by Part II of the inventory. Therefore, we relied on the relative interest ranking in Part I.

4. For all of the correlations reported between Topic Interest rankings and Prior Knowledge scores, the direction of the scales run in the same direction, from 10 = highest (knowledge, interest), to 1 = lowest interest, to 0 = lowest knowledge.

5. See the end of the Results section and note 6 for further information regarding the significant main effect for second language proficiency.

6. The results of the post hoc three-way ANOVA ($2 \times 2 \times 2$, Gender, Topic Interest, Prior Knowledge; with repeated measures on interest and knowledge) for each of the four program proficiency levels, revealed that the Interest*Gender interaction occurred primarily for the High Beginner level, $F(1, 14) = 11.88$, $p = .0033$, with the females doing slightly better on low-interest texts and males doing much better on high-interest texts; no other interactions and no main effects were significant at this proficiency level. The Interest*Gender interaction was not significant at any other proficiency level. At the Low Intermediate level, both Prior Knowledge and Gender were significant main effects: Prior Knowledge, $F(1, 13) = 7.11$, $p = .0176$; Gender, $F(1, 13) = 6.18$, $p = .0252$. Participants at this proficiency level performed significantly better on high–prior-knowledge texts ($M = 6.09$) than low–prior-knowledge texts ($M = 5.38$), and males ($M = 6.95$) performed significantly better than females ($M = 5.23$), although there were only 5 males but 12 females at this level. No other single main effects and no interactions were significant at this proficiency level. At the High Intermediate level, nothing was significant. At the Advanced level, Gender was a significant main effect, $F(1, 30) = 5.00$, $p = .0324$. At this level, females ($n = 16$, $M = 6.81$) performed significantly better than males ($n = 18$, $M = 5.75$). No other main effects and no interactions were significant at this level.

7. Leloup (1993) does not report any direct correlations between her learners' prior knowledge and interest in the topics in her study, so it is not possible to compare our results to these other L2 results.

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APPENDIX A

Reading Interest Inventory

Name: _____

Topic List:

a. Soccer
b. Natural Disasters (hurricanes, typhoons, earthquakes)
c. Islamic Art and Architecture
d. Human Evolution
e. Missionary Movements
f. Stock Exchange, Finance, Banking
g. Space Exploration
h. Olympics
i. Photography
j. Computers

Part I: Please take the ten topics listed above and write them down in the leftmost column of the following chart, in the order of your relative interest in them, from the one in which you have the most interest or curiosity about or want to learn more about, to the one in which you have the least interest. Write both the topic and its corresponding letter in the space provided.

Part II: After you have written the topics in the order of your interest, use the scale to the right to indicate the level of your absolute interest in that topic. Check the appropriate box.

NOTE: Your responses should be consistent such that a topic lower in your list should not be checked as being of greater interest than a topic higher on the list.

Part I *Part II*

TOPIC (NAME AND LETTER)	*1 VERY HIGH INTEREST*	*2*	*3*	*4*	*5 MODERATE INTEREST*	*6*	*7*	*8*	*9 VERY LOW INTEREST*	*10 NO INTEREST*
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

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Example:

Topic List

a. Table tennis
b. Ice skating
c. The human body
d. Dancing
e. Military uniforms
f. Gymnastics
g. Modern art
h. Fashion
i. The English language
j. Insects

Part I *Part II*

TOPIC (NAME AND LETTER)	*1 VERY HIGH INTEREST*	*2*	*3*	*4*	*5 MODERATE INTEREST*	*6*	*7*	*8*	*9 VERY LOW INTEREST*	*10 NO INTEREST*
1. Human body c	x									
2. Gymnastics f		x								
3. Dancing d				x						
4. Modern art g					x					
5. Fashion h					x					
6. English lang i					x					
7. Insects j							x			
8. Table tennis a							x			
9. Military uniforms e									x	
10. Ice skating b										x

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APPENDIX B

Sample Passage and Multiple-Choice Comprehension Questions

Space Exploration

Space exploration is the science and engineering of spacecraft and space probes used for investigation of physical conditions in space and in celestial bodies (stars, planets, and their moons). In a large sense, space exploration, or astronautics, is interdisciplinary in that it draws upon the findings of such fields as physics, astronomy, mathematics, chemistry, biology, medicine, electronics, and meteorology. Manned and unmanned space probes have provided a great new source of scientific data on the nature and origin of the solar system and the universe; earth-orbiting satellites have improved global communications, weather forecasting, navigational aids, and reconnaissance of the earth's surface for the location of mineral resources and for military purposes.

The space age and practical astronautics began with the launching of Sputnik 1 by the Soviet Union in October 1957 and of Explorer 1 by the United States (U.S.) in January 1958. In October 1958, the National Aeronautics and Space Administration (NASA) was created in the U.S. During the next two decades, more than 1600 spacecraft of all varieties were launched, mostly in earth orbit. Twelve men walked on the moon's surface and returned to earth. By 1986 several thousand objects—mostly spent, upper stages of space-launch vehicles and inert spacecraft—were circling the earth. Operational spacecraft numbered about 300.

Within a year after the successes of the first small artificial satellites in 1957 and 1958, both the U.S. and the Union of Soviet Socialist Republics (U.S.S.R.) were developing programs to place people in earth orbit. Both countries sent carefully monitored dogs and primates into orbit to study the effects of weightlessness on living creatures. The U.S.S.R. was first into space with a man, cosmonaut Yuri Gagarin, who made one orbit of the earth in Vostok 1 on April 12, 1961. The pilot of Vostok 6 was Valentina Tereshkova, the first woman to fly in space. In May 1961, U.S. President Kennedy instituted the Apollo program, designed to land a man on the moon and return him safely to the earth "before the decade is out." The year 1967 was one of tragedy, when on January 27 fire broke out in the three-man Apollo command module. Because of the pressurized pure-oxygen atmosphere inside the space craft, a flash fire engulfed and killed the three astronauts. In 1969 humans achieved the long-awaited goal of actually landing on the moon. Since 1971, space stations have orbited the earth for extended periods while crews came and went on other vehicles.

Circle the letter of the correct answer for each question on Space Exploration. Make sure you select the answer that is the most accurate and the most complete.
[Textually Explicit]

1. According to the passage, space exploration
   a. is about manned space probes
   b. involves a single discipline
   c. is interdisciplinary
   d. involves physics and astronomy
   e. involves physics, astronomy and chemistry
2. How many people have walked on the moon?
   a. 10
   b. 12
   c. 15

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d. 5
e. 2

3. By 1986 how many objects were in space?
   a. a hundred
   b. three hundred
   c. a thousand
   d. sixteen hundred
   e. several thousand
4. According to the passage, dogs and primates were sent into orbit in order to
   a. study the effects of oxygen deprivation
   b. study the effects of weightlessness
   c. study the effects of sunlight
   d. study the effects of take-off and landing
   e. all of the above
5. How many orbits of the earth did Yuri Gagarin make?
   a. none
   b. four
   c. three
   d. two
   e. only one

[Textually implicit]

6. According to the passage, space exploration has
   a. provided useful in many different ways
   b. helped the military
   c. aided weather forecasters
   d. located new mineral resources
   e. none of the above
7. When did the U.S. and the U.S.S.R. begin developing programs to put people in orbit?
   a. 1959
   b. 1961
   c. 1969
   d. 1971
   e. 1986
8. U.S. President Kennedy wanted to put a man of the moon before
   a. 1950
   b. 1960
   c. 1970
   d. 1980
   e. 1990
9. Space stations
   a. began before the 1970s
   b. began in the 1980s
   c. stay in lunar orbit
   d. stay in earth orbit
   e. transport crews back and forth to earth
10. People traveled in which of the following spacecraft?
    a. Vostok
    b. Sputnik
    c. Explorer
    d. Both a and b above
    e. Both a and c above

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