

Reading Transfer in Second Language Readers

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Recent research in first language (L1) reading has suggested that fast, automatic reading, and the text-level transfer associated with it, result from automaticity of word recognition, allowing readers to process texts at higher linguistic levels instead of word by word. As the difference between text-level and word-level forms of reading transfer becomes clearer in L1 research, the implications of this difference for second language (L2) reading can be explored. The purpose of the current study is first to follow up previous claims that fluent readers experience transfer not at the word level, but at higher linguistic levels, and second to assess L2 reading transfer, comparing it to L1 transfer.

The difference between the ways fluent and nonfluent readers organize word representations has been addressed by previous studies of both adult reading and remedial treatment of beginning readers' problems. Carr, Brown, and Charalambous (1989) compared transfer resulting from initial readings of randomized words to transfer resulting from initial readings of normal, intact passages, and they found that adult readers experienced equivalent transfer from both initial reading conditions. The results suggested that transfer was mediated at the word level, a finding that is inconsistent with other studies which concluded that changing the context in which words were first encountered either reduced or eliminated the transfer benefit (e.g., Levy & Burns, 1990; Oliphant, 1983; Whittlesea, 1990). To examine the nature of transfer from scrambled passages, Whittlesea (1990) asked participants to read a scrambled version of a text and then to read a scrambled version which was either the same as or different from the first scrambled text. He found more transfer when the scrambled versions were the same than when they were different, indicating that contextual information affected transfer in a way that could not be accounted for by abstract word representations. Whittlesea claimed that in the Carr et al. study, changing the word's context was confounded with the linguistic level of analysis, making it difficult to draw firm conclusions about the role of context, or lack thereof, from that study. Further support for the conclusion that changing the context of words decreases the transfer benefit comes from the Levy and Burns (1990) finding that the amount of transfer decreased as more linguistic structure was lost in initial readings scrambled at the paragraph, sentence, and word levels.

Reading orientation, as created by strong demand characteristics or by difficulty of word recognition, may be the key to explaining the incongruity between the Carr et al. (1989) results and those of the other studies. Carlson, Alejano, and Carr (1991) varied the demand characteristics of their instructions to participants, finding that when the instructions were to read word by word, word-level transfer was seen as well as text-level transfer, but when the instructions were to read for meaning, only text-level transfer occurred.

Creating strong demand characteristics, then, is one way of eliciting a certain reading orientation; however, Faulkner and Levy (1999) propose that the difficulty of word recognition also influences reading orientation and the resulting transfer that occurs. In two experiments, the first with children and the second with adults, Faulkner and Levy presented each participant with passages in two conditions; in one condition a scrambled version of a text was followed by the normal version, and in the other condition the normal version of a text was followed by the same normal version. The participants were timed as they read the passages aloud. The results of the first experiment showed that the good readers' time improved only after a normal first reading (text-level transfer) but not after the scrambled first reading (word-level transfer), whereas the poor readers' time improved after both the normal and the scrambled readings. In the second experiment, the time of the high-ability adult group improved after a normal first reading for both easy and difficult texts, but did not improve after a scrambled reading for either the easy or difficult texts. The low-ability readers, however, not only

improved after normal first readings, but also after scrambled first readings for both easy and difficult texts. Moreover, the amount of word-level transfer for the low-ability group was equivalent to the amount of text-level transfer for the difficult passages.

Faulkner and Levy's (1999) conclusion that ease of word recognition is determined by the difficulty of the text relative to the reader's ability is clouded by problematic methodological issues which the present experiments attempt to control. Specifically, having the participants read aloud in the two experiments would have forced them to focus on individual words. This focus creates a bias for word-level transfer, the type of transfer poor readers were expected to show. Beyond this bias, in the first experiment with fourth grade students, some children did not know how to pronounce some of the words; after a pause of a few seconds, the experimenter provided such words to prevent highly inflated reading times. Although Faulkner and Levy do not report the frequency of such pauses, the poor readers may have had more pauses because of their lower level of reading skill. Thus, the poor readers likely had initial reading times that were more augmented than the good readers' initial times due to pauses for unfamiliar words, as well as a heightened focus on individual words. Both of these factors may have contributed to the distinct performances of the two reader groups in the first experiment.

Despite the possible methodological problems with their study, Faulkner and Levy's (1999) claims are supported by other research (Bourassa, Levy, Dowin, & Casey, 1998; Levy, 1993) concluding that word-level transfer of poor readers is mediated by word representations whereas text-level transfer of good readers is mediated by higher order linguistic structures. One widely recognized implication of poor readers' reliance on single-word processing is that slow word recognition creates a bottleneck in processing, with word-level information arriving too slowly to be efficiently analyzed for meaning (Levy, 1993). Fluent adult readers do not focus attention at the word level because word recognition has been automated, and as a result, when these readers read words in one context, there is little or no transfer to reading the same words in a different context (Faulkner & Levy, 1999; Levy, Barnes, & Martin, 1993; Levy et al., 1995). In contrast, poor readers show context-independent transfer, which in turn allows text-level fluency gains in comprehension as word recognition becomes faster (Bourassa et al., 1998).

Like children who are poor readers in their native language, L2 readers demonstrate inefficient word recognition that decreases their reading performance (see Grabe, 1991, and Koda, 1994, for reviews of L2 reading research). Researchers constructing models of reading in second language contexts "argue that students are word-bound precisely because they are not yet efficient in bottom-up processing. The problem is that students do not simply recognize the words rapidly and accurately but are consciously attending to the graphic form" (Grabe, 1991, p. 391). Despite this difficulty in word recognition when reading in their L2, these adult readers may be completely competent when reading their native language. Unlike the children, then, the adults reading in their L2 would not have inherent text-processing problems in addition to their poor word recognition. Therefore, the confounding of reading skill and word-recognition difficulty can be eliminated, or at least controlled, by studying L2 readers, and the unconfounded effect of word-recognition difficulty on transfer type can be seen.

In addition to affecting the type of reading transfer that occurs, word recognition that is not automatic also inhibits reading comprehension (Hoover & Gough, 1990; Lee & Schallert, 1997). Alderson (1984) explored whether L2 reading is primarily a language problem or a reading problem, concluding that it is both; however, for less proficient L2 speakers, language is more of a barrier to L2 reading than general reading skills are. This conclusion is supported by Lee and Schallert's (1997) study in which they tested the English and Korean reading comprehension of Korean middle and high school students. They found a substantial correlation between L1 and L2 reading abilities, although the correlation was stronger for highly proficient L2 learners than for those with low proficiency. They also found that the correlation between L2 proficiency and L2 reading was greater than that between L1 and L2 reading abilities, indicating that L2 proficiency has a more crucial role in L2 reading than does L1 reading ability.

The experiments in the present study investigated reading transfer and comprehension in L1 and L2 readers. First, we tested the claim that fluent adult readers show text-level transfer benefits after reading a normal passage, and that nonfluent readers show word-level transfer benefits after reading a scrambled passage. Faulkner and Levy (1999) included nonfluent children readers in their first

experiment; the present study instead included adult L2 readers in order to control the confounding effects of processing problems on how word-recognition difficulty impacts reading transfer. By also modifying some aspects of Faulkner and Levy's design, which are elaborated in the introduction to Experiment 1, the results were expected to show that readers would demonstrate text-level transfer benefits after reading normal passages in their L1, and no word-level transfer benefits after reading scrambled passages. When reading in their L2, however, the readers were expected to experience both word- and text-level transfer.

Second, we assessed the role L2 proficiency plays in comprehension and transfer. Because slower word recognition should impede reading comprehension, we predicted that slower reading times for L2 relative to L1 would not result in better comprehension scores for L2 relative to L1, but rather the opposite: Faster, more fluent reading would correspond with better comprehension scores.

1 Experiment 1

Intermediate level students of Spanish who were native speakers of English read normal and scrambled versions of passages in both English and Spanish. Students were shown each passage twice in either normal or scrambled form, with all four combinations of passage type shown to each participant across passages in each language. This design differs from the Faulkner and Levy (1999) study in that the second passage in both of their experiments was always normal, never scrambled. For all participants, regardless of reading ability, reading two normal passages resulted in decreased reading times in Faulkner and Levy's study. Their claim is that this improvement is due to text-level transfer, whereas transfer from an initial scrambled passage is due to word-level transfer. If transfer from scrambled passages is in fact due to word-level transfer that poor readers experience and good readers do not, when two scrambled passages are presented, the poor readers (in this experiment, those reading their L2, Spanish) should improve more than the good readers (in this experiment, those reading English).

The collection and analysis of comprehension data is another difference from the Faulkner and Levy (1999) study. Although they administered comprehension questions, they did not report these results. The comprehension questions in the present study not only oriented the reader to focus on the meaning of the text, but also provided evidence of how well participants understood the passages and how successful they were in reading for meaning.

1.1 Method

1.1.1 Participants

Twenty-four college students from the University of Colorado at Boulder participated in this study; 12 students received course credit for participation in the experiment, and 12 were paid \$10 for their participation. All participants were native English speakers who had intermediate-level Spanish skills: They had studied Spanish 2 to 4 years in high school, or 2 to 4 semesters in college. No independent Spanish proficiency test was used to assess Spanish language ability. Although there was, thus, some variability in the level of Spanish skills among the participants, two facts are clear: First, they all had a basic reading ability in Spanish. Second, their ability to read English was superior to that for Spanish.

1.1.2 Materials and apparatus

Every participant received a total of eight passages to read, four in English and four in Spanish; two versions of each passage were read. Passages were between 100-150 words long, presented line-by-line on a MacIntosh computer screen, using a HyperCard program. The speed of presentation was controlled by the reader through a keypress (the spacebar) on the computer keyboard. The time from the presentation of the first line of a passage until the participant pressed the spacebar key after reading the last line of the passage was recorded by the computer. Each passage had a normal version and a scrambled version. For the normal versions of the passages, the texts were presented in their correct

order; for the scrambled versions of the passages, each sentence of the text was individually scrambled at the word level so that no two words adjacent in the original passage were adjacent in the scrambled version. The normal and scrambled versions of a text always used the same words and appeared on the same number of lines, although sometimes there were different numbers of words on a given line because the number of words on a line was determined by the length of the words. The passages were left- (but not right-) justified. Participants read silently, thus eliminating the possible bias toward word-level processing of Faulkner and Levy's (1999) study. Following each pair of readings, four multiple-choice comprehension questions, each with four alternatives, appeared on the screen; the questions were created for this study and were not independently validated. Participants answered these questions by typing in a number corresponding to one of the four possible choices. They were not able to refer to the text when answering the questions, which tested their memory and understanding of the passage and oriented them to read for meaning. For the English passages, the comprehension questions were in English, and for the Spanish passages, the questions were in Spanish.

The four English passages were excerpted from the reading comprehension section of the Graduate Record Exam (*GRE Verbal Workout*, 1997), similar to the difficult passages in Faulkner and Levy's (1999) study. The four Spanish passages were taken from a beginning Spanish reader, *Learning Spanish* (Keniston, 1940). All participants read all eight passages.

1.1.3 Design and procedure

Participants were tested individually; they were told that they would read four English passages excerpted from the GRE reading comprehension section, as well as four Spanish passages from a beginning Spanish reader, and that they would read each passage twice in succession. Participants were told that sometimes the passages would be normal, but sometimes they would be scrambled with the words out of order. Participants were instructed to read at a normal, comfortable rate, and to read the scrambled versions as normally as possible (i.e., as if they were reading a normal passage). Before the experiment started, participants were also told about the comprehension questions after the two readings of a given passage. They were assured that they were not expected to know the answers if they had just read two scrambled versions of a passage, and they could guess the answers in this case.

A short 50-word English passage was given to participants to practice the procedure before the actual experiment began. For this practice passage, first the normal and then the scrambled versions of the passage were presented line-by-line as the participants pressed a key on the keyboard, and four multiple-choice comprehension questions followed the two versions. These data were recorded but not examined in a statistical analysis.

The order in which the passages in a given language were presented was the same for all participants, but the order of the languages was counterbalanced so that half of the participants read the four English passages first and half read the four Spanish passages first. There were four passage conditions: NN—normal + normal, NS—normal + scrambled, SN—scrambled + normal, and SS—scrambled + scrambled. The order of the passage conditions was counterbalanced using a balanced Latin Square, and for a given participant was the same for each language. After each pair of readings, participants were asked the four comprehension questions.

1.2 Results and discussion

1.2.1 Reading time

A multifactorial repeated measures analysis of variance was used to analyze the data, with a 2 x 2 x 2 x 2 design, all within subjects; the variables were: language of the text (English/Spanish), type of first passage (normal/scrambled), type of second passage (normal/scrambled), and passage position (first/second). These results are summarized in Table 1.

Language was a reliable main effect [$F(1,23) = 41.81$, $MSE = 2361.53$, $\eta^2 = .65$, $p < .001$], indicating that English passages ($M = 51.54$ s) were read more quickly on average than Spanish passages ($M = 83.61$ s). Passage position was also a reliable main effect [$F(1,23) = 53.63$, $MSE = 1049.43$, $\eta^2 = .70$, $p < .001$], such that the average reading time of the second passages ($M = 55.47$ s)

was shorter than that of the first passages ($M = 79.68$ s). Another main effect, type of second passage [$F(1,23) = 8.34$, $MSE = 829.74$, $\eta^2 = .27$, $p = .008$], shows that passages were read more slowly when the second passage was normal ($M = 71.82$ s) than when it was scrambled ($M = 63.33$ s). This result suggests that participants did not spend as much time reading the passages when the second one was scrambled and conveyed little meaning as they did when it was normal and the content was understandable.

Table 1: Mean Reading Times in Seconds (and Standard Errors of the Mean) for Experiment 1

Language of Text	Passage Position	Passage Condition			
		Normal + Normal	Normal + Scrambled	Scrambled + Normal	Scrambled + Scrambled
English	1 st	59.62 (4.35)	59.95 (4.75)	63.25 (6.29)	56.50 (6.66)
	2 nd	39.08 (2.41)	35.79 (3.27)	52.18 (3.97)	45.93 (3.88)
Spanish	1 st	111.97 (9.36)	111.71 (10.55)	90.27 (9.49)	84.16 (9.62)
	2 nd	67.60 (4.94)	47.92 (6.32)	90.57 (6.64)	64.65 (5.11)

There were also significant three-way interactions between language, type of first passage, and passage position [$F(1,23) = 17.90$, $MSE = 363.79$, $\eta^2 = .44$, $p < .001$] and between language, type of second passage, and passage position [$F(1,23) = 4.38$, $MSE = 446.91$, $\eta^2 = .16$, $p = .048$].

To appreciate these interactions and to test the reading transfer hypotheses of Faulkner and Levy's (1999) study, planned paired comparison t -tests were used to examine the reading times for first normal passages compared to second normal passages. The NN and SN conditions were the two conditions Faulkner and Levy measured, on which they based their conclusions that poor readers experience word-level transfer and good readers experience text-level transfer. To get a stable measure of reading time for first normal passages, the times of the first passages in the NN and NS conditions were averaged, although paired comparison t -tests indicated there were no significant differences between the first normal means for these two conditions in English or in Spanish. There were significant differences between the average times of first normal passages and the times of second normal passages in the NN condition (English [$t(23) = 7.57$, $p < .001$] and Spanish [$t(23) = 5.92$, $p < .001$]), as well as in the SN condition (English [$t(23) = 2.18$, $p = .040$] and Spanish [$t(23) = 2.83$, $p = .010$]). Furthermore, there was a difference between the second passages in the NN and SN conditions for both English [$t(23) = -3.62$, $p = .001$] and Spanish [$t(23) = -3.19$, $p = .004$]. As shown in Table 1, in the readers' L1, English, they read the second passage in the NN condition faster than they read the second passage in the SN condition, but they also read second normal passages faster than first normal, even when the second normal passage followed a scrambled passage. Thus, contrary to Faulkner and Levy's findings, some word-level transfer seemed to occur in the readers' L1. In the readers' L2, there was also evidence of word-level transfer. Although participants read the second passage in the NN condition faster than they read the second passage in the SN condition, second normal passages were read significantly more quickly than first normal passages, including when they followed a scrambled passage. This indication of word-level transfer in Spanish follows Faulkner and Levy's hypothesis of finding word-level transfer for poor readers, in this case, those reading in their L2.

Another set of planned paired comparison t -tests examined first and second scrambled reading times, a comparison not included by Faulkner and Levy (1999). The reading times of first scrambled passages in the SS and SN conditions were averaged for a stable measure of reading time for first scrambled passages, although, as with the first normal passages, paired t -tests showed that the differences between first scrambled means in the SS and SN conditions were not significant for either

English [$t(23) = -1.39, p = .179$] or Spanish [$t(23) = -.81, p = .428$]. There were significant differences between the average time of first scrambled passages and the times of second scrambled passages in the SS condition for English [$t(23) = 2.30, p = .031$] and Spanish [$t(23) = 3.69, p = .001$]. In the NS condition, the same effect is exaggerated, and second scrambled times are significantly faster than the average first scrambled time (English [$t(23) = 4.57, p < .001$], Spanish [$t(23) = 5.93, p < .001$]). These results seem to indicate that word-level transfer occurs from one scrambled passage to another scrambled passage, but this conclusion must remain tentative because other factors may also contribute to the results. For instance, second scrambled passages in the SS condition may be read faster in part because of effects of context, as the two scrambled passages presented the words in the same scrambled order. In addition, the large decrease in reading times for scrambled passages which follow normal passages may be partially due to word-level transfer, but because the effect is much more dramatic than the decrease following scrambled passages, it seems that participants are skimming over the relatively meaningless scrambled passages quickly if they have first read a normal passage.

1.2.2 Comprehension

The comprehension scores (number correct out of four possible) were analyzed with a multifactorial repeated measures analysis of variance, using a 2 x 2 x 2 design, all within subjects; the variables were: language of the text (English/Spanish), type of first passage (normal/scrambled), and type of second passage (normal/scrambled). This analysis does not include passage position because comprehension questions were asked following the second reading only. The comprehension results are summarized in Table 2.

Table 2: Mean Comprehension Scores (and Standard Errors of the Mean) for Experiments 1 and 2

Language of Text	Passage Condition			
	Normal + Normal	Normal + Scrambled	Scrambled + Normal	Scrambled + Scrambled
<i>Experiment 1</i>				
English	3.17 (.19)	3.13 (.23)	3.21 (.23)	1.92 (.26)
Spanish	2.58 (.24)	2.04 (.20)	2.29 (.22)	1.21 (.19)
<i>Experiment 2</i>				
English	3.25 (.20)	2.42 (.22)	2.71 (.22)	1.67 (.19)
Simple Spanish	2.96 (.21)	2.88 (.22)	2.88 (.18)	1.80 (.24)
Complex Spanish	2.04 (.23)	2.04 (.24)	2.33 (.24)	1.50 (.22)

There was a significant main effect of language [$F(1,23) = 52.03, MSE = 0.625, \eta^2 = .69, p < .001$]. Participants scored better on the English comprehension questions ($M = 2.85$) than on the Spanish questions ($M = 2.03$). Although both of these means are above chance, which would be 1.0 for these four multiple-choice questions with four options, participants seemed to understand the passages in English better than those in Spanish.

Two other significant main effects, type of first passage [$F(1,23) = 18.01, MSE = 0.875, \eta^2 = .44, p < .001$] and type of second passage [$F(1,23) = 26.12, MSE = 1.005, \eta^2 = .53, p < .001$], show that comprehension scores were higher when either the first or second passages were normal (first normal $M = 2.72$, second normal $M = 2.81$) than when they were scrambled (first scrambled $M = 2.16$, second scrambled $M = 2.07$), regardless of the type of the other passage in that condition.

The interaction between first and second type was also significant [$F(1,23) = 9.96, MSE = 0.967, \eta^2 = .30, p = .004$]. Averaging across English and Spanish, comprehension scores for the NN

condition ($M = 2.88$) were higher than for the SN condition ($M = 2.75$), which were higher than for the NS condition ($M = 2.58$), which were higher than for the SS condition ($M = 1.56$). Thus, comprehension scores were worst for the SS condition, in which readers saw only scrambled versions of the texts, and best for the NN condition, in which readers saw two normal versions. These results suggest that readers did extract meaning from the passages they read at least in the case of normal passages.

One-sample t -tests were also performed on the comprehension data to determine if the scores were significantly above chance in both of the passage conditions for English and for Spanish. For the English data, the scores in all conditions were above chance [$t(23) > 3.60$, $p < .002$, in each case], including the SS condition in which readers saw only scrambled versions of the text. For the Spanish data, however, scores in the SS condition were not significantly above chance [$t(23) = 1.10$, $p = .285$], whereas they were above chance for the other conditions [$t(23) > 5.11$, $p < .001$, in each case]. These results suggest that readers did extract meaning from the passages they read, and in English, they comprehended even the scrambled passages to some extent. In Spanish, however, the scrambled passages were not meaningful.

2 Experiment 2

In Experiment 1, both word-level and text-level transfer were found in English and Spanish. The finding of word-level transfer in English (L1) was unexpected based on the results of Faulkner and Levy (1999). As expected based on research in both L1 and L2, there was also word-level transfer in Spanish (L2), which was numerically larger than in English. The apparent difference in the magnitude of the word-level transfer in Spanish and in English may be due to the complexity of the passages rather than the participants' reading ability in the language. In order for the Spanish texts to be comprehensible for the intermediate level students of Spanish, the vocabulary and syntax were simple. Despite the relative simplicity of the Spanish passages, reading times were longer and comprehension scores were lower for the Spanish passages than for the English passages, verifying that the Spanish passages were more difficult than the English passage for the readers. Nevertheless, to avoid the confounding of passage complexity and language, in Experiment 2, advanced students of Spanish were employed as participants, and complex as well as simple Spanish texts were read in each condition. The complex Spanish texts were roughly equivalent in their level of complexity to the English texts. The comparison of the simple and complex Spanish texts allows for a second type of comparison of easy and difficult reading.

2.1 Method

2.1.1 Participants

Twenty-four college students from the University of Colorado at Boulder participated in this study; all were paid \$15 for their participation. All participants were native English speakers who had advanced-level Spanish skills: They had studied Spanish more than 4 years in high school, or more than 4 semesters in college, and all but one participant had studied Spanish abroad or used Spanish on a regular basis outside of class. Although there was some variability in the level of Spanish skills among the participants, it is clear from the amount of Spanish studied that the participants in this group were at a more advanced level than were those in Experiment 1. However, as in Experiment 1, no independent Spanish proficiency test was used to assess Spanish language ability.

2.1.2 Materials

Every participant read a total of 12 passages, 4 in English and 8 in Spanish. The English passages were the same as in Experiment 1, as were four of the Spanish passages, which became the "simple" Spanish passages in Experiment 2. Four additional "complex" Spanish passages were included; these passages were excerpts from *The Modern Spanish Essay* (Rodriguez & Rosenthal, 1969), a book of philosophical essays by Spanish writers of the Nineteenth and Twentieth Centuries. All passages were

between 100-150 words long, presented line-by-line on a computer screen, with the speed of presentation controlled by the reader through a keypress on the computer keyboard. As in Experiment 1, participants read silently and answered comprehension questions following the second reading of the passages. For the English passages, the comprehension questions were in English, and for the Spanish passages, the questions were in Spanish.

2.1.3 Design and procedure

The procedure of this experiment was the same as that in Experiment 1. The design was essentially the same, with the exception of the order of the Spanish and English texts, which was different because of the addition of the four complex Spanish texts. There were four orders of the language types: a) English, simple Spanish, complex Spanish; b) English, complex Spanish, simple Spanish; c) simple Spanish, complex Spanish, English; d) complex Spanish, simple Spanish, English. Thus, half of the participants received English texts first, and half received Spanish texts first; in addition, half of the participants read the simple Spanish texts first, and half read the complex Spanish texts first. With these orders, the Spanish texts were always presented together in a block of eight. As in Experiment 1, the order in which the passages in a given language type were presented was the same for all participants, but the order of the passage conditions (NN, NS, SN, and SS) was counterbalanced separately for each of the four language type orders. For a given participant the order of the passage conditions was the same for each language type. After each pair of readings, participants were asked the four comprehension questions.

2.2 Results and discussion

2.2.1 Reading time

As in Experiment 1, a multifactorial repeated measures analysis of variance was used to analyze the data, with a 3 x 2 x 2 x 2 design, all within subjects; the variables were: language of the text (English/simple Spanish/complex Spanish), type of first passage (normal/scrambled), type of second passage (normal/scrambled), and passage position (first/second). The results are summarized in Table 3.

Table 3: Mean Reading Times in Seconds (and Standard Errors of the Mean) for Experiment 2

Language of Text	Passage Position	Passage Condition			
		Normal + Normal	Normal + Scrambled	Scrambled + Normal	Scrambled + Scrambled
English	1 st	63.99 (4.03)	60.27 (4.39)	42.53 (5.19)	43.24 (5.33)
	2 nd	34.04 (3.23)	24.33 (3.50)	54.39 (3.25)	42.58 (3.84)
Simple Spanish	1 st	74.49 (6.30)	82.43 (6.99)	64.00 (9.40)	52.84 (7.15)
	2 nd	35.83 (3.11)	24.53 (3.89)	75.12 (9.71)	52.35 (6.01)
Complex Spanish	1 st	109.46 (13.90)	100.52 (10.38)	60.22 (6.96)	56.11 (5.15)
	2 nd	51.37 (4.75)	31.32 (5.19)	92.16 (9.94)	49.15 (5.82)

Language was a reliable main effect [$F(2,46) = 14.92$, $MSE = 1719.48$, $\eta^2 = .39$, $p < .001$], indicating that English passages ($M = 45.67$ s) were read more quickly on average than simple Spanish

passages ($M = 57.70$ s), which were read faster than complex Spanish passages ($M = 68.79$ s). These differences were all significant by a Student-Newman-Keuls post hoc test.

Passage position was also a reliable main effect [$F(1,23) = 72.24$, $MSE = 817.09$, $\eta^2 = .76$, $p < .001$], such that the average reading time of the second passages ($M = 47.26$ s) was shorter than that of the first passages ($M = 67.51$ s). Another main effect, type of second passage [$F(1,23) = 15.31$, $MSE = 1241.84$, $\eta^2 = .40$, $p < .001$], shows that overall passages were read more slowly when the second passage was normal ($M = 63.13$ s) than when it was scrambled ($M = 51.64$ s). In addition, the four-way interaction between language, type of first passage, type of second passage, and passage position was significant [$F(2,46) = 3.34$, $MSE = 285.56$, $\eta^2 = .13$, $p = .044$].

Planned paired comparison t -tests were also used to analyze the reading time data, and these tests not only allow for specific comparison of these results to those of Faulkner and Levy (1999), but also highlight trends reflected in the four-way interaction. Reading times of first normal passages in the NN and NS conditions were averaged in order to get a stable measure of reading time for first normal passages, although paired t -tests showed that the differences between first normal means in the NN and NS conditions for all three language types were not significant. Results indicate a significant difference between the average time of first normal passages and the time of second normal passages in the NN condition (English [$t(23) = 6.60$, $p < .001$], simple Spanish [$t(23) = 6.53$, $p < .001$], complex Spanish [$t(23) = 4.76$, $p < .001$]). In the SN condition, there were also significant differences between average first normal passages and second normal passages for English [$t(23) = 2.76$, $p = .011$] and complex Spanish [$t(23) = 2.48$, $p = .021$]. However, for simple Spanish passages, the difference was not significant [$t(23) = .57$, $p = .577$]. As shown in Figure 1, in the readers' L1, English, they read the second passage in the NN condition faster than they read the second passage in the SN condition, both of which they read faster than the average first normal passages. This same pattern held for complex Spanish passages; however, for simple Spanish passages the decreased reading time of second normal passages in the SN condition was not significantly different from the average first normal passage reading time. These results seem to indicate that readers experienced no word-level transfer when reading simple Spanish passages, but they did experience word-level transfer when reading English and complex Spanish passages.

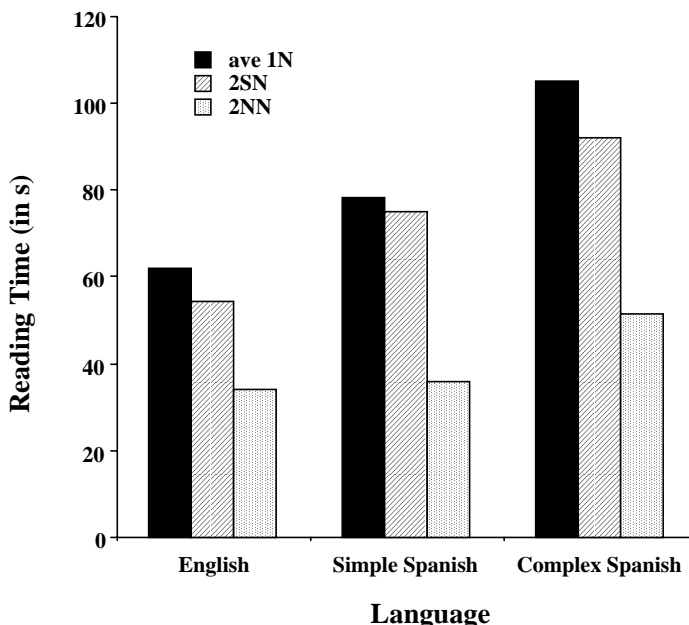


Figure 1. Average first normal passage reading times compared to second normal passage reading times in the SN and NN conditions in Experiment 2.

The reading times of first scrambled passages in the SS and SN conditions were also averaged for a stable measure of reading time for first scrambled passages, although, as with the first normal passages, paired *t*-tests showed that the differences between first scrambled means in the SS and SN conditions for all three language types were not significant (English [$t(23) = -.157, p = .877$], simple Spanish [$t(23) = 1.54, p = .137$], complex Spanish [$t(23) = .88, p = .386$]). Results indicate that there were no significant differences between the average time of first scrambled passages and the times of second scrambled passages in the SS condition for all language types (see Figure 2). However, in the NS condition, second scrambled times were significantly faster than the average first scrambled time (English [$t(23) = 4.17, p < .001$], simple Spanish [$t(23) = 4.79, p < .001$], complex Spanish [$t(23) = 7.37, p < .001$]). These results seem to indicate that there is no word-level transfer from one scrambled passage to another scrambled passage. Following normal passages, the large decrease in reading times for scrambled passages may be in part due to word-level transfer, but because the effect is much more dramatic than the decrease following scrambled passages, it seems to be due in large part to participants' skimming over scrambled passages quickly if they have first read a normal passage.

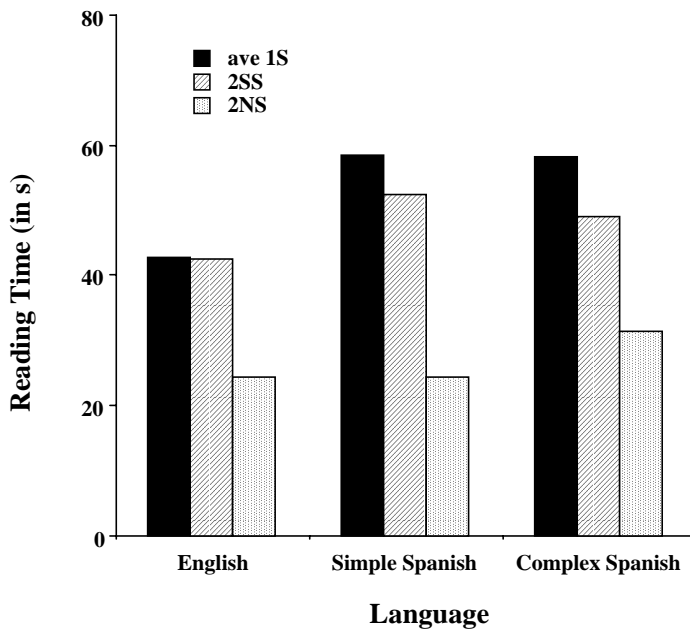


Figure 2. Average first scrambled passage reading times compared to second scrambled passage reading times in the SS and NS conditions in Experiment 2.

2.2.2 Comprehension

The comprehension scores (number correct out of four possible) were analyzed with a multifactorial repeated measures analysis of variance, using a 3 x 2 x 2 design, all within subjects; the variables were: language of the text (English/simple Spanish/complex Spanish), type of first passage (normal/scrambled), and type of second passage (normal/scrambled). As in Experiment 1, comprehension questions were asked following the second reading only, so passage position is not included in the analysis. Means for the comprehension scores are presented in Table 2.

There was a significant main effect of language [$F(2,46) = 12.48, MSE = 0.914, \eta^2 = .35, p < .001$]. Participants scored better on the simple Spanish comprehension questions ($M = 2.63$) than on the English questions ($M = 2.51$), which yielded higher scores than the complex Spanish questions (M

= 1.98). The differences between the complex Spanish scores and the other scores were significant by a Student-Newman-Keuls post hoc test, but the difference between the simple Spanish scores and the English scores did not differ by that test. All these means are above chance, which would be 1.0 for these multiple-choice questions with four options and four questions for each passage; however, participants seemed to understand the simple Spanish passages and English passages much better than the complex Spanish passages.

As in Experiment 1, the two other significant main effects, type of first passage [$F(1,23) = 9.57$, $MSE = 1.532$, $\eta^2 = .29$, $p = .005$] and type of second passage [$F(1,23) = 30.18$, $MSE = 0.995$, $\eta^2 = .57$, $p < .001$], indicate that comprehension scores were higher when either the first or second passages were normal (first normal $M = 2.60$, second normal $M = 2.70$) than when they were scrambled (first scrambled $M = 2.15$, second scrambled $M = 2.05$), regardless of the type of the other passage in that condition.

The interaction between first and second type was also significant [$F(1,23) = 8.75$, $MSE = 0.953$, $\eta^2 = .28$, $p = .007$]. Averaging across the three language types, comprehension scores for the NN condition ($M = 2.75$) were higher than for the SN condition ($M = 2.64$), which were higher than for the NS condition ($M = 2.44$), which were higher than for the SS condition ($M = 1.65$). Thus, comprehension scores were worst for the SS condition, in which readers saw only scrambled versions of the texts, and best for the NN condition, in which readers saw two normal versions.

2.2.3 Experiment 1 vs. Experiment 2

Finally, a comparison of the reading times between Experiments 1 and 2 indicated significant differences between the two groups of participants for the English and simple Spanish passages. An analysis of variance was performed on the reading time scores, with a $2 \times 2 \times 2 \times 2 \times 2$ design. The between-subjects variable was experiment (Experiment 1/Experiment 2); all other variables were within subjects: language of text (English/simple Spanish), type of first passage (normal/scrambled), type of second passage (normal/scrambled), and passage position (first/second). The reading times for the complex Spanish passages were not included in this analysis because only participants in the second experiment read the complex passages. Only the effects including the variable experiment are reported here, as this is the relevant variable for this mixed analysis.

Experiment was a reliable main effect [$F(1,46) = 12.04$, $MSE = 4023.67$, $\eta^2 = .21$, $p = .001$], indicating that passages in Experiment 1 were read more slowly on average ($M = 67.57$ s) than passages in Experiment 2 ($M = 51.69$ s). Also significant was the interaction between language and experiment [$F(1,46) = 9.35$, $MSE = 2062.91$, $\eta^2 = .17$, $p = .004$] and the interaction between experiment, language, and type of first passage [$F(1,46) = 6.21$, $MSE = 432.64$, $\eta^2 = .12$, $p = .016$].

To clarify the trends underlying the significant interactions, unpaired t -tests of the differences in reading times across experiments were conducted; they indicate no significant differences between Experiments 1 and 2 for the English reading times [$t(46) = 1.62$, $p = .112$]. However, Spanish reading times were significantly slower in Experiment 1 ($M = 83.61$ s) than in Experiment 2 ($M = 57.70$ s) [$t(46) = 3.65$, $p < .001$]. The participants in Experiment 2, then, were faster readers in Spanish but not in English.

An analysis of variance was performed on the comprehension scores, with a $2 \times 2 \times 2 \times 2$ design. The between-subjects variable was experiment (Experiment 1/Experiment 2); all other variables were within subjects: language of text (English/simple Spanish), type of first passage (normal/scrambled), and type of second passage (normal/scrambled). As in the comparison of reading times between experiments, the complex Spanish passages were not included in the analysis because only participants in the second experiment read them. The relevant variable for this analysis is experiment, and the only significant effect including experiment was an interaction between language and experiment [$F(1,46) = 28.44$, $MSE = .742$, $\eta^2 = .38$, $p < .001$]. Paired-comparison t -tests of the differences in comprehension scores indicate that for English passages, scores are marginally better in Experiment 1 than Experiment 2 [$t(46) = 1.94$, $p = .058$], but scores are significantly better in Experiment 2 than Experiment 1 for Spanish passages [$t(46) = -3.42$, $p = .001$]. Thus, the advanced Spanish learners of Experiment 2 not only read the simple Spanish passages faster than the intermediate Spanish learners of Experiment 1 but also scored better on the comprehension questions. The differences for the

Spanish passages support our classification of the participants in Experiment 2 as being at a more advanced level of Spanish than those in Experiment 1.

3 General discussion

The experiments presented here demonstrate that, although the L2 Spanish texts were more difficult for readers to process, reading transfer in L1 is similar to that in L2. Because of the similarity in transfer, with both word- and text-level transfer occurring in English and Spanish, these experiments do not show that good readers experience only text-level transfer whereas poor readers experience only word-level transfer. Instead, as is apparent from this and other research, word- and text-level transfer are not mutually exclusive types of transfer in which the occurrence of one type disallows the occurrence of the other type. These results suggest that good readers experience less extreme word-level transfer than poor readers, and though their text-level transfer may be greater than that of poor readers, they do not experience exclusively text-level transfer. Furthermore, difficulty of word recognition is not the only linguistic factor that affects reading orientation and influences the type of transfer that occurs. Rather, these experiments suggest that reading orientation is likely determined by the interplay of the complexity of the syntax and ease of word recognition, as well as task demand characteristics.

As expected based on previous L2 reading research (Grabe, 1991; Koda, 1994), the L2 readers in this study displayed reading difficulties that included slower reading speeds and poorer comprehension, making them an appropriate foil for the poor readers in L1 reading transfer research. These difficulties, which are similar to those of nonfluent L1 readers, justify the comparison of L1 and L2 readers' performance to that of the fluent and nonfluent readers of L1 reading transfer studies. In other words, the difficulty of processing L2 texts is apparent from the longer mean reading times of the Spanish passages and the poorer performance on the Spanish comprehension questions (Hoover & Gough, 1990; Lee & Schallert, 1997). When reading in their L2, then, these readers show signs of inefficient word recognition, and because they are proficient readers in their L1, other remedial reading problems arising from processing difficulties or lack of basic reading skills do not create exaggerated or confounded effects in the results.

This study also corroborates the importance of L2 language skills in L2 reading (Alderson, 1984; Lee & Schallert, 1997). The two groups of participants in Experiments 1 and 2 had similar L1 reading skills, although the participants in Experiment 2 tended to read with less comprehension but perhaps more rapidly than those in Experiment 1. The L2 reading abilities of the two groups were quite different, however, with the advanced Spanish learners reading the simple Spanish passages approximately 26 s, or about 45%, faster on average than the intermediate learners. Clearly, the less advanced language skills of the intermediate learners, not their English reading abilities, were the source of their slower reading times in Spanish. Nevertheless, the influence of proficient L1 reading skills can be seen in the intermediate Spanish learners' ability to adjust their reading speed to match the passage difficulty, something poor L1 readers are unable to do (Levy, 1993). By slowing down, the intermediate learners were able to understand the content of the passages and score above chance on the comprehension questions in all but the Spanish SS condition. Therefore, although L2 language skills are an essential part of reading effectively in an L2, L1 reading skills can provide strategies necessary for dealing appropriately with L2 texts.

In contrast to the findings of L1 reading transfer research, this study indicates that word-level transfer occurs for competent readers who have been oriented to read for meaning. The readers in this study read silently, therefore avoiding the focus on individual words inherent to reading aloud, and they answered comprehension questions, scoring above chance on them. Nevertheless word-level transfer occurred when they read both English and Spanish, with an important exception. The advanced Spanish learners in Experiment 2 did not demonstrate word-level transfer in reading normal simple Spanish passages.

The advanced Spanish learners' reading simple Spanish passages with no word-level transfer effects suggests that the complexity of the syntax of a passage contributes to the type of transfer that occurs. The simple Spanish passages were syntactically quite simple, in addition to using a limited

vocabulary. Although the advanced Spanish learners had slower reading times for the simple Spanish passages than for English, they scored numerically (but not significantly) better on simple Spanish comprehension questions than on English and also showed a numerical advantage for guessing on comprehension questions after reading two scrambled passages in simple Spanish than in English. The longer reading times are evidence of slower word recognition for Spanish than for English, despite the relatively basic vocabulary of the simple Spanish passages as compared to the English passages. Therefore, the fact that advanced learners understood the simple Spanish passages better than the English, despite word-recognition difficulty, may indicate that the uncomplicated syntax of the passages played a large role in enabling comprehension and text-level transfer instead of word-level transfer. Because the comprehension questions were not independently validated, it may have been easier to make educated guesses about the simple Spanish questions than the English questions. In Experiment 1, intermediate Spanish learners scored worse on these questions than the English questions even when both passages were scrambled, but the advanced learners may have been better at noticing key words, and possibly even reconstructing the scrambled texts to some extent, because of their advanced language skills combined with the simple syntax. Thus, the role of syntax in reading transfer appears to be important, but further research is needed to assess how syntax and word recognition interact to determine reading transfer.

The additional time spent reading normal first passages may contribute to faster readings of passages after normal first passages than those after scrambled first passages, as was seen in the three-way interaction between language, type of first passage, and passage position in Experiment 1. When readers spend less time looking at the words of the scrambled texts, they may not be processing the words as well as when they spend more time with the words. Thus, the depth of word processing, which would necessarily be thorough or complete in order to understand the message of a text, may be part of the key to text-level transfer. Text-level transfer, then, would not merely be determined by automaticity of word processing, but additionally by the depth of word processing. Regardless of the explanation for these results, it is clearly inadequate to state that readers with fluent and automatic word-recognition experience text-level transfer but not word-level transfer, and that readers lacking such fluency experience only, or even primarily, word-level transfer.

References

- Alderson, J. Charles. (1984). Reading in a foreign language: A reading problem or a language problem? In J. Charles Alderson & A. H. Urquhart (Eds.), *Reading in a foreign language* (pp. 122-135). New York: Longman.
- Bourassa, Derrick C., Levy, Betty Ann, Dowin, Samantha, & Casey, Andrew. (1998). Transfer effects across contextual and linguistic boundaries: Evidence from poor readers. *Journal of Experimental Child Psychology, 71*, 45-61.
- Carlson, Laura A., Alejano, AnnJanette R., & Carr, Thomas H. (1991). The level-of-focal-attention hypothesis in oral reading: Influence of strategies on the context specificity of lexical repetition effects. *Journal of Experimental Psychology: Learning, Memory & Cognition, 17*, 924-931.
- Carr, Thomas H., Brown, Joseph S., & Charalambous, Alkistis. (1989). Repetition and reading: Perceptual encoding mechanisms are very abstract but not very interactive. *Journal of Experimental Psychology: Learning, Memory & Cognition, 15*, 763-778.
- Faulkner, Heather J., & Levy, Betty Ann. (1999). Fluent and nonfluent forms of transfer in reading: Words and their message. *Psychonomic Bulletin & Review, 6*, 111-116.
- Grabe, William. (1991). Current developments in second language reading research. *TESOL Quarterly, 25*, 375-406.
- GRE verbal workout*. (1997). New York: Random House.
- Hoover, Wesley A., & Gough, Phillip B. (1990). The simple view of reading. *Reading and Writing, 2*, 127-160.
- Keniston, Hayward. (1940). *Learning Spanish*. New York: Henry Holt.
- Koda, Keiko. (1994). Second language reading research: Problems and possibilities. *Applied Psycholinguistics, 15*, 1-28.
- Lee, Jeong-Won, & Schallert, Diane L. (1997). The relative contribution of L2 language proficiency and L1 reading ability to L2 reading performance: A test of the Threshold Hypothesis in an EFL context. *TESOL Quarterly, 31*, 713-739.

- Levy, Betty Ann. (1993). Fluent rereading: An implicit indicator of reading skill development. In Peter Graf, Michael E. J. Masson (Eds.), *Implicit memory: New directions in cognition, development, and neuropsychology* (pp. 49-73). Hillsdale: Lawrence Erlbaum Associates.
- Levy, Betty Ann, Barnes, Lauren, & Martin, Lisa. (1993). Transfer of fluency across repetitions and across texts. *Canadian Journal of Experimental Psychology, 47*, 401-427.
- Levy, Betty Ann, & Burns, Kelly Irene. (1990). Reprocessing text: Contributions from top-down processes. *Canadian Journal of Psychology, 6*, 293-323.
- Levy, Betty Ann, Campsall, June, Browne, Janet, Cooper, Diane, Waterhouse, Christine, & Wilson, Carol. (1995). Reading fluency: Episodic integration across texts. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21*, 1169-1185.
- Oliphant, G.W. (1983). Repetition and recency effects in word recognition. *Australian Journal of Psychology, 35*, 393-403.
- Rodriguez, Alfred, & Rosenthal, William. (Eds.). (1969). *The modern Spanish essay*. Waltham, MA: Blaisdell Publishing Company.
- Whittlesea, Bruce W. A. (1990). Perceptual encoding mechanisms are tricky but may be very interactive. Comment on Carr, Brown, and Charalambous. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 16*, 727-730.

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