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Lire en Francais: Cross-linguistic Effects of Reading Fluency Interventions in French Immersion

Programs

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Abstract

Research on the development of reading skills in bilingual students suggests that reading skills develop interdependently across languages. The current study examined the effects of a French reading fluency intervention on the French and English reading skills of three Grade 3 students attending a French immersion program using a concurrent multiple baseline across participants single-case design. Results indicate that the intervention produced improvements in French reading fluency on instructional passages during intervention sessions and generalized improvements in English reading fluency skills. These findings provide additional support for the transferability of reading skills across languages.

Lire en Français: Cross-linguistic Effects of Reading Fluency Interventions in French Immersion Programs

French immersion programs, in which Anglophone children acquire French proficiency through academic content instruction in French, facilitate Canadian children receiving a bilingual education. Although students in immersion programs, on average, achieve as well as students in regular programs, some immersion students face academic difficulties (Genesee, 2007). Student attrition in these programs is high (~20-40%; Canadian Parents for French, 2013; Halifax Regional School Board, 2011; Ottawa-Carleton District School Board, 2007), in part because school staff sometimes recommend that students with difficulties exit French immersion programs to receive academic supports and improve performance. Despite the need to adequately support immersion students with reading difficulties so that they can remain in these programs, it is challenging to do so because the effectiveness of reading interventions in language immersion programs is largely unknown.

The purpose of the current study is to evaluate the effectiveness of a French reading fluency intervention with students attending a French immersion program. Given evidence suggesting that literacy skills transfer across languages (e.g., Melby-Lervåg & Lervåg, 2011), we examine the effects of the intervention on reading fluency in both French and English.

Linguistic Interdependence Principle

Growing evidence suggests that reading skills develop interdependently across languages for bilingual students. The Linguistic Interdependence Principle (LIP; Cummins, 1979, 1998) states that there is an underlying cognitive academic language proficiency (CALP) that facilitates transfer of academic and literacy-related skills across languages. Accordingly, reading instruction in one language leads to a deeper CALP, which facilitates literacy in the second

language. This principle would explain results from research on immersion programs showing that students instructed for all or part of the day through a minority language experience no long-term academic delays in the majority language (Genesee & Jared, 2008; Lapkin, Hart, & Turnbull, 2003; Rubin, Turner, & Kantor, 1991).

In line with LIP theory, research with immersion and other bilingual students has shown a strong association between reading skills in students' first and second language. A meta-analysis of 47 correlational studies on cross-linguistic transfer found moderate to large correlations between decoding skills and phonological processing in bilingual readers' first and second languages (Melby-Lervåg & Lervåg, 2011). Specific to students in French immersion programs, studies have found that phonological processing and rapid automatized naming tasks administered in English in early elementary grades are predictive of later word reading skills in both French and English (Comeau, Cormier, Grandmaison, & Lacroix, 1999; Jared, Cormier, Levy, & Wade-Woolley, 2011; MacCoubrey, Wade-Woolley, Klinger, & Kirby, 2004). Studies have also shown that early literacy indicators measured in English were not only predictive of French decoding skills, but also later reading fluency reading comprehension skills, and that they were predictive of reading achievement across languages even when the instruction of French was delayed for several years (Bourgoin, 2014; Erdos, Genesee, Savage, & Haigh, 2011).

In comparison to these studies that have focused on cognitive processes and decoding skills, fewer studies have focused on cross-language transfer of higher-level reading skills such as fluency and comprehension. One correlational study by Geva and Clifton (1994) found positive relations between English and French reading accuracy, speed, and comprehension of typically developing and struggling readers in Grade 2 French immersion programs. Similar results were found in immersion programs in other languages (Geva, Wade-Woolley, & Shany,

1997; Verhoeven, 1994). Geva et al. (1997) examined the cross-language relation between reading speed and accuracy for letters, words in isolation, and text in students learning how to read in English (their first language) and in Hebrew simultaneously, and found that reading speed and accuracy across the two languages were positively correlated. Additionally, a longitudinal study examining the transfer of literacy and language skills in Turkish students placed in Dutch immersion in the Netherlands showed that literacy skills (word reading efficiency and reading comprehension) in the students' second language at age 6 were predictive of their literacy skills in their first language 2 years later (Verhoeven, 1994).

Several studies have also focused on the relations between elementary students' oral reading fluency in Spanish, their native language, and their oral reading fluency in English across one academic year. Ramírez and Shapiro (2007) found that fall oral reading fluency in Spanish predicted spring oral reading fluency in English. Similarly, Keller-Margulis and Mercer (2014) found that annual growth in Spanish and English oral reading fluency was moderately to highly correlated ($r = .64$ to $.89$), with weaker cross-language correlations as English oral reading growth increased for students in grades 2 and 3.

Reading Interventions with Bilingual Students

Although the results from these correlational studies indicate that reading skills are related across languages, there have been few direct investigations of the effects of reading interventions across languages. Nonetheless, the findings from reading intervention studies conducted with bilingual students such as students enrolled in immersion programs and English Language Learners (ELLs) highlight the possible cross-language effects of reading interventions.

Early Literacy Skills

Studies with Kindergarten and Grade 1 French immersion provide evidence that systematic and explicit phonological awareness (PA) and letter-sound correspondence instruction is effective with immersion students at-risk for later reading difficulties (Wise, 2014; Wise & Chen, 2010). Wise and Chen (2010) assessed the effects of a 20-week-long PA small-group intervention first delivered in English and then delivered in French as students became more proficient. Results indicated that students attained significantly higher French reading achievement levels in comparison to the previous school year's at-risk readers who had not been provided with PA training. Similarly, Wise (2014) assessed the effects of PA instruction delivered in English with struggling Grade 1 French immersion students and found that although the students did not demonstrate superior French PA skills immediately at the end of the intervention, the students in the intervention group performed significantly better than a control group on French measures of PA and French word reading skills at a ~2 year delayed post-test.

Second-language Reading Interventions

Two studies conducted by Vaughn et al. (2006) with different samples of ELL students examined the effects of multi-component reading interventions delivered either in English or in Spanish depending on the language of core instruction. Results indicated students receiving instruction in their first language (Spanish) outperformed the control group on a number of Spanish literacy measures (i.e., phonological processing, letter-sound and letter-word identification, word reading fluency) and English measures of phonological processing, letter-sound and letter-word identification. By contrast, students receiving intervention in English outperformed the control group on some English measures, but no significant differences were found between the intervention and control group on Spanish literacy measures. This study provides some support for the transfer of the effects of reading instruction across languages;

however, its findings also suggest that this transfer may be more likely to happen when instruction is provided in a student's first language.

Reading Interventions in Immersion Programs

Although research on the development of reading skills in ELL students provides valuable information on the skills involved in learning how to read in a second language, ELL students often differ from immersion students who speak the majority language as their first language on other important variables such as culture and socioeconomic status. In addition, immersion programs have several characteristics that set them apart from ELL education programs. For instance, in immersion programs all students usually enter with similar (and limited) levels of proficiency in the language of instruction, the majority culture in the classroom is for most students the same as the one at home, and French immersion students are all expected to eventually master English in addition to French. Studies with French immersion students therefore supplement studies on ELL students about the way reading develops in bilingual children, and whether the same skills can predict reading across languages. However, until now, most intervention studies conducted in immersion programs have focused on assessing teacher, parent, or student satisfaction with different intervention programs (Arnett, 2010; Rousseau, 1999) rather than the effectiveness of the interventions.

Reading Fluency Interventions

A well-researched area in the field of reading, oral reading fluency, or the oral translation of text with speed, accuracy, and expression has received recognition as a critical component of skilled reading and an important instructional target (National Reading Panel, 2000). Given the strong dependence of the ability to obtain meaning from print on the development of fluent and accurate word recognition, it has been proposed that reading fluency is an essential aspect of

successful reading development (Fuchs, Fuchs, Hosp, & Jenkins, 2001; LaBerge & Samuels, 1974). The need for effective fluency instruction methods is further emphasized by the fluency difficulties that students with reading disabilities often present (Archer, Gleason, & Vachon, 2003; Torgesen & Hudson, 2006).

When implementing interventions for monolingual English readers, reading fluency is commonly targeted because it is difficult to derive meaning from text when word reading is inaccurate and/or laborious (Lovett, Barron, & Frijters, 2013). Meta analyses have demonstrated moderate to large effects for reading fluency intervention on both reading fluency and comprehension (Lee & Yoon, 2015; Therrien, 2004). Within these interventions, repeated readings of instructional passages a set number of times or until a performance criterion is met (Samuels, 1979) is the most commonly included component (Lee & Yoon, 2015), and repeated readings are often combined with several other components, such as verbal cuing to focus on speed or comprehension, providing students with a model of fluent reading before repeated readings, and receiving corrective feedback from an adult (Begeny, Daly, & Valleley, 2006; Daly & Martens, 1994). In addition, goal setting, performance feedback, and contingent reinforcement can also improve reading fluency when combined with repeated readings (Chafouleas, Martens, Dobson, Weinstein, & Gardner, 2004; Eckert, Ardoin, Daly, & Martens, 2002). For these reasons, there is some support for combining these components when designing a reading fluency intervention for students with difficulties in French immersion.

The Current Study

The present study extends the primarily correlational research base on cross-linguistic transfer of reading skills by investigating transfer related to reading intervention. In addition to evaluating the effectiveness of a reading fluency intervention delivered in French on French

reading skills, we examine whether the intervention has generalized effects on reading skills in the student's native language (English). Two research questions are addressed:

1. Do reading fluency instructional methods that improve reading in monolingual English students also improve French reading fluency in immersion students?
2. Does reading fluency instruction delivered in French also improve English reading fluency?

Method

Participants

Three Grade 3 students in an independent French Immersion school in Vancouver, British Columbia, who were identified by their teacher as experiencing French reading difficulties participated in the study. Students were part of an Early Immersion program, in which instruction is provided entirely in French until Grade 4. As such, the students in the study were not receiving any formal instruction in English. None of the students had been identified as having a learning disability or had an individual educational program. The students were not receiving any additional support in reading other than the intervention used in the study. Students' parents provided demographic information about language(s) spoken at home, parental education, and length of time spent reading in French, English and/or other languages in the home, and this information is summarized in Table 1. Presented names are pseudonyms.

Measures

Cognitive functioning. The Kaufman Brief Intelligence Test, Second Edition (KBIT-2; Kaufman & Kaufman, 2004) was administered as a baseline estimate of the students' cognitive functioning for purposes of sample description.

Reading fluency. Students' reading fluency was assessed on French instructional passages and French and English standardized passages.

French instructional passages. Twenty French instructional passages were selected from Grade 2 passages in the *L'heure de la lecture* (Dorais, 2014) series. The selected passages were evaluated with the Lix readability formula (Bjornsson, 1968), which considers the number of multisyllabic words and sentence length. Passages were modified by substituting words and modifying sentence length until all had comparable difficulty (i.e., Lix scores between 29 and 31, which is similar to other Grade 2 level materials).

Students' within-session fluency was assessed by recording the number of words read correctly per minute (WCPM) on passages used in the intervention. WCPM were calculated by subtracting the number of words read incorrectly from the total number of words read by the student within exactly one minute. Words read incorrectly included mispronounced, substituted, and omitted words, words read in the incorrect order, as well as hesitations that lasted more than three seconds. Self-corrections that occurred within three seconds were scored as words read correctly.

Standardized English passages. The Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2011) are curriculum-based English literacy measures designed for universal screening and progress monitoring. For the present study, DIBELS Next Oral Reading Fluency (DORF) probes were used. On DORF, students read passages aloud for one minute while the number of correct words per minute is recorded (Good & Kaminski, 2011). Since same-level DORF passages are of approximately equal difficulty, different probes can be administered frequently to assess growth in skills and to evaluate the effects of intervention. Students' WCPM on the DORF probes were scored as described above.

Standardized French passages. The *Indicateurs dynamiques d'habiletés précoces en lecture* (IDAPEL; Dynamic Measurement Group, 2013) are a battery of French language measures modeled after the DIBELS. IDAPEL Facilité en Lecture Orale (FLO) passages were used to assess progress in French reading fluency, with WCPM scored as described above. At the time of the study, only benchmark FLO passages (9 per level) were available because progress monitoring passages were still under development. FLO passages were used despite the limited number of passages available because they were, to our knowledge, the only field-tested and validated French curriculum-based reading fluency assessment tool available at the time.

Experimental Design

Students participated in a reading fluency intervention integrating several evidence-based fluency-building strategies delivered in a concurrent multiple baseline across participants design (see Kazdin, 2010). The design included two conditions: (a) baseline and (b) intervention. During baseline, students participated in regular classroom instruction, and data on the dependent measures were collected regularly. The length of baseline phases (3, 5, and 7 weeks) was fixed *a priori* because there were too few IDAPEL passages (9 per grade level) to permit extended baseline or intervention phases; students were randomly assigned to the different baseline lengths. Following baseline, the intervention was introduced across students who received 9, 7, and 5 weeks of instruction, respectively.

Procedures

Recruitment and baseline assessments. After obtaining university research ethics approval, signed consent was obtained from parents, and student assent was obtained from the participants. Baseline benchmark assessments of reading fluency in French and English (Grade 3 IDAPEL and DIBELS Next) were conducted with each student to confirm that the students were

demonstrating reading difficulties, and the KBIT-2 was administered to obtain an estimate of the students' cognitive functioning.

A survey-level assessment was also conducted using IDAPEL and DIBELS to determine each student's progress monitoring level. For DIBELS, instructional level was defined as passages where students' scores were between the DIBELS Fall and Spring Benchmark scores for the grade (Good & Kaminski, 2011). The assessment was conducted by asking students to read 2 passages at their grade level (Grade 3) for 1 minute each, and then levels of decreasing difficulty until passages were within instructional level. Based on this process Grade 2 passages were used with Suzie, Grade 3 passages were used with Dylan, and Grade 1 passages were used with Billy. For IDAPEL passages, instructional level was defined as passages where students showed performance between the 25th and 75th percentile based on school-level norms. Based on the first two passages (one Grade 2 and one Grade 3 passage) administered as part of baseline, the Grade 2 passages were within instructional level for all students, and Grade 3 passages were slightly above their instructional level.

French and English reading fluency was assessed weekly in baseline and intervention. Due to the limited number of IDAPEL passages available (9 probes per grade level), French reading fluency was assessed weekly in the three weeks preceding and following a phase change for each student, and bi-weekly during the rest of the baseline and intervention phases (see Figure 1). During assessment sessions, reading fluency was assessed by asking students to read two unfamiliar DORF passages and two unfamiliar IDAPEL FLO passages aloud for one minute. Due to the limited number of IDAPEL probes, passages from two different levels (one Grade 2 and one Grade 3) were administered each session. WCPM on the two passages were averaged within each language because monitoring with more than one probe per occasion reduces the

standard error of measurement and increases the accuracy of growth estimation (Jenkins, Graff, & Miglioretti, 2009).

Intervention. Twice a week, students participated individually in individual intervention sessions. The first, third, and fourth authors, graduate students in school psychology with prior experience implementing reading interventions in English, who also are fluent in French, served as interventionists for this study. Intervention components were adapted from procedures included in the Helping Early Literacy with Practice Strategies (HELPS) program (Begeny, 2009), as detailed below.

Verbal cueing. At the beginning of each session, students were instructed to read with speed, accuracy, and good expression, and to try to understand and remember the story.

Repeated reading. Students read instructional passages aloud three times during each session.

Modeling. Interventionists read instructional passages aloud. To verify that students were following along, interventionists stopped five to seven times and asked students to read the next word.

Phrase-drill error correction. Interventionists selected up to five words that were read less fluently by students after each reading. After modeling how the words are read, interventionists asked students to read phrases containing the target word three times.

Goal-setting and performance feedback. After the first reading of a passage, interventionists graphed student performance on a progress chart. They then established a goal of increasing performance by 20 WCPM and drew a line representing the goal on the progress chart. For each reading, student performance was graphed, providing them with a visual

representation of performance, and interventionists discussed student improvement after multiple readings.

Motivational system. Students were given a grid chart with several white squares and a few shaded squares in each row. During each session, students could receive one sticker to place on the chart for improving their WCPM from the first to third read of a passage, and a supplemental sticker for meeting the goal established after the first reading. When students reached a shaded square, they were allowed to choose a small prize. While awarding stickers, interventionists delivered specific praise with statements such as “I can tell you are really working to meet your goal!” and “Look at how much you have improved!”

Fidelity of implementation. To ensure implementation fidelity, scripted directions were provided to interventionists for use during the sessions. Interventionists also completed checklists of critical intervention components, and they indicated all components were implemented in each intervention session. As a direct fidelity measure, all sessions were audio recorded and one-third of them were reviewed. The review confirmed that 100% of components were implemented in each session.

Inter-scorer reliability. One third of assessment sessions (i.e., 4 sessions per student) were recorded and reviewed so that WCPM could be independently scored. Agreement between raters was calculated for each reading of reviewed sessions. Percentage agreement was between 90% and 100% ($M = 97\%$), exceeding the minimal threshold of 80% required to meet evidence standards (Kratochwill et al., 2013).

Data Analysis

As preliminary analyses, within-session change in reading fluency on instructional passages was calculated by student as the mean difference in WCPM from the first and third read

of the passages. In addition, ordinary least squares (OLS) slopes were calculated for the students' first readings of instructional passages to determine if there was improvement during the intervention phase.

The research questions were answered through systematic visual analysis in conjunction with calculation of Kendall's rank correlation (Tau with and without baseline trend correction; Tarlow, 2016) as tests of statistical significance and effect size measures. Because academic interventions primarily change trend, we calculated a variant of Tau that considers nonoverlap between baseline and intervention plus upward trend in intervention to be improvement (Parker, Vannest, Davis, & Sauber, 2011). English and French WCPM on standardized passages were graphed and analyzed across students to determine if experimental control was demonstrated by replicating effects across the three different students (Horner et al., 2005).

Results

Preliminary Analyses

Student-specific means and standard deviations for WCPM on French instructional passages on the 1st and 3rd readings during intervention sessions are presented in Table 2. All students exhibited mean increases in WCPM from the 1st to 3rd readings: 26.1 WCPM for Suzie, 19.1 for Dylan, and 20.8 for Billy. OLS slope estimates were also calculated for each students' 1st readings (i.e., before instructional procedures) to determine if there was general improvement in French reading fluency on instructional passages. All students exhibited positive trends during intervention, with greater growth for Suzie and Dylan compared to Billy—Suzie exhibited average growth of 2.7 WCPM per week, Dylan had growth of 3.6 per week, and Billy had growth of 0.8 per week.

Reading Fluency on Standardized Passages

Students' weekly French and English reading fluency scores (WCPM) on standardized passages are displayed in Figure 1. Means and standard deviations for WCPM and within-phase OLS slope estimates are presented in Table 3. Tau correlations, with and without baseline trend correction, are presented in Table 4.

When examining performance on the standardized French passages (IDAPEL FLO), all three students appeared to continue baseline patterns into the intervention phase. Suzie and Dylan both had improving baseline trends that continued in intervention. In contrast, Billy displayed a variable pattern with minimal and/or inconsistent trend that continued. These observations are consistent with the Tau analyses. All three students had positive, but not statistically significant, baseline Tau values, indicating some degree of improving baseline trend. Although the non-baseline corrected Tau values were positive and statistically significant for Suzie and overall (a weighted average across students), these effects did not persist when Tau values were corrected for baseline trend. In sum, there was no evidence of an intervention effect on French reading fluency with standardized passages.

For the standardized English passages (DIBELS ORF), visual analysis indicates an increase in trend and/or level following the introduction of intervention for all three students. Suzie demonstrated a declining trend during baseline (-6.8 WCPM per week) that reversed upon introduction of the intervention (1.9 WCPM per week), contributing to an overall change in level across phases ($M_{Baseline} = 52.3$, $M_{Intervention} = 80.4$). Her Tau values were positive and statistically significant without (Tau = .57, $p = .013$) and with (Tau = .83, $p < .001$) baseline trend correction. Dylan demonstrated no change during baseline (trend = 0.0 WCPM per week), but positive trend during intervention (3.3 WCPM per week). Although he demonstrated an immediate decrease in level when intervention was implemented, the positive trend during intervention yielded

performance above baseline levels toward the end of intervention. This observation is largely consistent with Dylan's Tau values that were small and positive, but not statistically significant, with or without baseline trend correction. Billy demonstrated decreasing trends during baseline (-1.2 WCPM per week) and intervention (-1.7 WCPM per week), but demonstrated an immediate increase in level following the implementation of the intervention ($M_{Baseline} = 24.6$, $M_{Intervention} = 34.3$). Both his non-baseline corrected Tau (.57, $p = .021$) and baseline corrected Tau (.65, $p = .009$) were positive and statistically significant. Although the specific pattern of response (i.e., change in trend, level, or both) varied for each student, all three students showed improvement from baseline to intervention, as reflected in the overall moderate, positive, and statistically significant weighted Tau values across students, without (Tau = .53, $p < .001$) and with (Tau = .75, $p < .001$) baseline trend correction. In sum, the visual and statistical analyses indicated the intervention had an effect on the students' English reading fluency skills.

Discussion

The purpose of this study was to examine the effects of a French reading intervention on the French and English reading fluency skills of French immersion students. Two research questions were addressed: (1) Do reading fluency instructional methods that improve reading in monolingual English students also improve French reading skills in immersion students? (2) Does reading fluency instruction delivered in French also improve English oral reading Fluency?

Major Findings

Regarding Research Question #1, we could not attribute gains observed on French standardized progress monitoring probes solely to the intervention because trends observed during the intervention phase appeared to be a continuation of baseline patterns for all three students. Possible reasons for this finding are discussed below; however, inspection of French

reading fluency changes on instructional passages suggests that there were some improvements in French reading fluency. All students read more WCPM on the 3rd read of instructional passages than the 1st, with mean differences of 19.1 WCPM to 26.1 WCPM, and these gains are typical in studies of reading fluency intervention in English for students at similar grade levels (Martens et al., 2007). Students also showed progress in reading fluency on the 1st reads of the instructional passages, with average gains ranging between 0.8 and 3.6 WCPM per week. We did not anticipate the need to use instructional passage data to evaluate experimental control; for this reason, we did not collect data on reading performance on instructional passages during baseline, and this limits our ability to attribute observed improvements on instructional passages solely to the intervention.

Regarding Research Question #2, the intervention contributed to improvements in English reading fluency skills compared to regular classroom instruction. We observed positive changes in trend and/or level following the implementation of the intervention. Because effects on English reading fluency were replicated across the three students, results indicate that the improvements can be attributed to the intervention.

There are several potential explanations for effects on English reading fluency skills despite the limited generalization of positive trends observed on French instructional passages to French standardized passages. First, while students were not improving in English reading fluency before intervention, students were improving in French reading fluency during baseline. The positive French baseline trends are likely because students received classroom instruction in French, but not English, throughout the study. The improving French baseline trend made it more difficult to detect differential effects of the intervention. In addition, although English progress monitoring was conducted at instructional level, French progress monitoring was at the

same level for all students due to the limited number of passages available, which could have decreased sensitivity to growth (Hintze, Daly, & Shapiro, 1998).

An additional explanation is that students likely had more limited language proficiency in French compared to English. Studies of monolingual students (Nation & Snowling, 2004) and ELL students (Geva & Zadeh, 2006) have found vocabulary to be predictive of word recognition skills. Results on the Verbal Knowledge subtest of the KBIT-2 suggest that all students demonstrated typical English vocabulary for their age. By contrast, students' French vocabulary knowledge was not assessed; however, research on characteristics of French immersion students (Genesee, 2007), in addition to the interventionists' experience with the three students, suggests that the students showed more limited oral language proficiency in French compared to English. Thus, it is possible that the participants' slower access to French word meanings, due to limited language proficiency in French compared to English, limited their improvements in French reading fluency.

Limitations

Although the demonstration and preliminary evaluation of a reading fluency intervention for French immersion students is a strength of the current study, the results should be interpreted with some limitations. One limitation was the small number of IDAPEL passages available, which resulted in a number of design decisions that complicated our ability to evaluate experimental control on the standardized French reading passages. The IDAPEL were selected despite the limited number of passages available because they were, to our best knowledge, the only validated standardized reading fluency curriculum-based measures available at the time of the study. Because only nine IDAPEL probes were available per grade level, we decided to use *a priori* baseline and intervention phase lengths to ensure that we would have at least three data

points in our shortest phase, while also administering two probes (one per grade level) at each measurement occasion and averaging scores across the probes to reduce measurement variability that could complicate determination of experimental control. Based on *a priori* assignment, the baseline phase for one student was three data points and another student had four data points in the intervention phase, instead of the recommended minimum of five (Kratochwill et al., 2013). Even though we observed improving baseline trends on the standardized French probes during the study, we could not extend the length of the baseline phases without reducing the number of data points in the intervention phases.

Another limitation was that no data were collected on the students' French reading fluency on instructional passages during baseline. We collected data on the 1st and 3rd reading of instructional passages as an embedded part of our intervention procedures, and did not anticipate that we would need to examine instructional passage data to evaluate experimental control. The lack of instructional passage baseline data complicates determination of whether growth on the 1st reads of instructional passages observed in intervention can be attributed to the intervention.

Last, the demographic similarity of the participants, although ideal for multiple baseline designs, may limit generalizability. All students attended a small independent school with the same teacher, and had parents with high educational attainment who spent time reading with them. Replications of this study will increase confidence in the findings and determine the boundaries of the effects observed.

Implications for Practice and Research

Results from this study provide further support for the LIP (Cummins, 1979, 1998) in the context of reading intervention, an important contribution to the research literature. Most studies on cross-language transfer have been correlational (MacCoubrey et al., 2004; Melby-Lervåg &

Lervåg, 2011), and the results of the current study indicate that a French fluency intervention had effects on English reading fluency. In addition, the current study extends and contrasts prior intervention work on transfer with Spanish-speaking ELL students (Vaughn et al., 2006) that found reading instruction to only have effects across languages if instruction was delivered in the students' first language (Spanish). By contrast, we found generalization of effects from intervention provided in the second language (French) to the students' first language (English); The difference in results could be due to the amount of exposure to print in their first language students had outside of school. In our study, the students' first language, English, was also the majority language of the province. In addition to being exposed to print in English in their community, the students were reported to spend time reading in English at home, and were expected to master reading skills in their first language within a few years. The same may not be true for ELL students whose first language is not the majority language. The contrasting results suggest that there may be important limitations when applying research on bilingual learners across very different social contexts; thus, more research on students in French immersion is needed to inform instructional practices.

The effectiveness of reading interventions in the context of French immersion has received little research attention. At this time, immersion teachers have access to few evidence-based reading interventions. Although we detected no significant generalized French reading fluency gains, gains on French instructional passages and effects on English reading fluency suggest that the procedures are promising for improving reading fluency in French immersion students across languages. Developing interventions that are effective across languages has important implications for immersion education, because immersion students demonstrating difficulties

with French reading are also likely to struggle in English reading (Erdos et al., 2011; Geva & Clifton, 1994).

Recommendations for Future Research

Retention of struggling readers in French immersion is an important issue, and the development of evidenced-based interventions to address reading difficulties is necessary to address the needs of diverse learners in French immersion. Future investigations examining the effectiveness of reading interventions with struggling French immersion students are needed given the growing popularity of these programs and the distinct needs of these students (Canadian Parents for French, 2013; Halifax Regional School Board, 2011; Ottawa-Carleton District School Board, 2007). To start, a systematic replication of the current study with a between-groups design, longer intervention duration, and more comprehensive reading assessments is recommended.

Future studies should also look more closely at the cross-language effects of interventions on reading comprehension. Because fluency skills are predictive of reading comprehension (e.g., Riedel, 2007) and fluency interventions produce gains in reading comprehension in monolingual students (Therrien, 2004), it is possible the intervention developed for this study could have beneficial effects on reading comprehension across languages.

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Table 1

Parent-Reported Student Demographics and Results of Screening Assessments

Student Pseudonym	Age	Languages Spoken at Home	Time Reading in English/Week	Time Reading in French/Week	Parental Education	KBIT-2 IQ Composite	French Reading Fluency Percentile
Suzie	8.6	English (80%) French (20%)	2 hours	2 hours	Bachelor's Degree	124	15th
Dylan	8.0	English (100%)	1.5 hours	1.5 hours	Master of Arts	90	9th
Billy	8.6	English (100%)	1 hour	1.5 hours	Bachelor's Degree	99	6th

Note. KBIT-2 = Kaufman Brief Intelligence Test (2nd ed.). French reading percentiles are based on local (school) norms.

Table 2

Reading Fluency on Instructional Passages during Intervention Sessions

Student	WCPM 1st Reading		WCPM 3rd Reading		Change in WCPM
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>
Suzie	71.4	9.3	97.5	13.6	26.1
Dylan	73.8	11.2	92.9	12.5	19.1
Billy	51.5	6.8	72.3	9.5	20.8

Note. Change in Words Correct Per Minute (WCPM) is the within-session difference between the 1st and 3rd reading of a French instructional passage.

Table 3

Descriptive Statistics by Student and Phase for Reading Fluency on Untaught French and English Passages

Student	Language	Baseline			Intervention		
		<i>M</i>	<i>SD</i>	Slope	<i>M</i>	<i>SD</i>	Slope
Suzie	French	61.8	7.1	4.5	73.2	9.7	2.8
Dylan		66.5	4.8	2.8	72.9	7.4	1.5
Billy		47.2	4.6	0.5	54.5	3.9	-0.6
Suzie	English	52.3	9.1	-6.8	80.4	11.7	1.9
Dylan		79.1	2.6	0.0	82.1	8.1	3.3
Billy		24.6	3.7	-1.2	34.3	4.4	-1.7

Note. All values are Words Correct per Minute (WCPM). Slopes are scaled as change in WCPM per week.

Table 4

Tau Estimates with and without Baseline Trend Correction by Student and Overall

Student	Language	Baseline Trend		No Trend Correction		With Trend Correction	
		Tau	<i>p</i>	Tau	<i>p</i>	Tau	<i>p</i>
Suzie	French	.33	.999	.73	.011	-.38	.199
Dylan		.67	.308	.45	.144	-.53	.078
Billy		.40	.462	.50	.105	.07	.908
Overall					.62	<.001	-.34
Suzie	English	-.33	.296	.57	.013	.83	<.001
Dylan		.40	.462	.41	.086	.27	.278
Billy		-.43	.133	.57	.021	.65	.009
Overall					.53	<.001	.75

Note. Baseline Trend = Tau test for presence of baseline trend. No Trend Correction = Tau for non-overlap between baseline and intervention plus positive trend during intervention. With Trend Correction = Tau for non-overlap between baseline and intervention plus positive trend during intervention with correction for baseline trend. Overall = weighted Tau estimate across students.

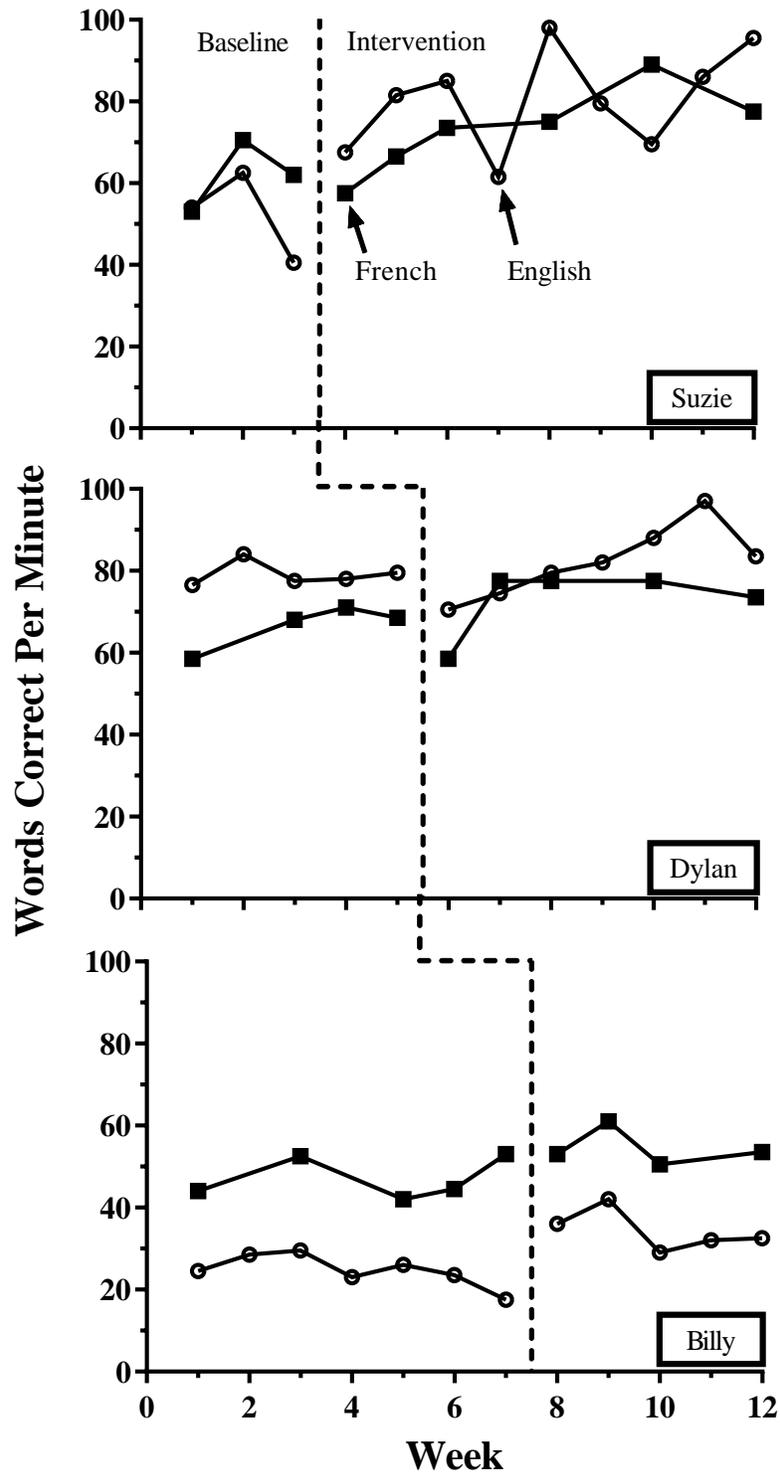


Figure 1. Students' French and English reading fluency on standardized passages by week.