A Comparative Analysis of First- and Second-Language Oral Reading Errors

by

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Abstract

The aim of the present study was to test the theory that reading performance is determined by linguistic competence gained as a primary language user. It involved a quantitative and qualitative analysis of the substitution errors produced by early French immersion students as they read aloud graded series of English and French language texts of approximately equivalent subjective difficulty. It was found that by manipulating language and text difficulty, measures used to control accessibility of higher-order linguistic information, significant differences were obtained on such variables as reading speed, accuracy, and the grammatical and semantic acceptability of substitution errors. It would seem that the extent to which the reader uses conceptual information on a given reading task is a function of the availability of that information to the individual, which in turn is a function of her competence in a language.

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INTRODUCTION

Interactive models of information processing (e.g., Rumelhart, 1977) describe fluent reading as a cognitive activity involving the simultaneous, parallel processing of information originating from lower-level perceptual analyses and higher-level conceptual knowledge stores. Higher level computations are thought to constrain, and be constrained by, the output of the lower-level stimulus analyses. Nonsensory information influencing the primary perceptual processes includes language-specific orthographic, lexical, syntactic and semantic knowledge. In a given reading situation, reliance on higher- or lower- level subprocessing varies as a function of contextual redundancy and decoding efficiency.

The interactive models have been formulated as an alternative to both bottom-up (e.g., Gough, 1972; Laberge & Samuels, 1974) and top-down models (e.g., Goodman, 1967). The former characterize information processing as a serial process whereby output from a particular computational stage acts as a database for the subsequent stage; the processing of print proceeds sequentially from the analysis of the perceptual stimulus to higher-level semantic computations. Top-down models, on the other hand, view fluent reading as a conceptually-driven process involving the testing of hypotheses, generated on the basis of stored semantic and syntactic knowledge, by way of textual sampling. The shortcomings of both bottom-up and top-down models have been discussed at some length in the experimental literature (see, for example, Rumelhart, 1977; Stanovich, 1980, 1984; Perfetti & Roth, 1981).

The central tenet of interactive models is, therefore, that word recognition is the result of the merging of information from many different knowledge sources. To this, Stanovich (1980, 1984) adds what he calls the compensatory assumption. This is the

assumption that deficiencies at any level in the processing hierarchy are compensated for by a greater reliance on information from other levels, and that this compensation takes place irrespective of the level of the deficient process. In particular, weakness in the data-driven decoding processes may cause heavier reliance on higher level linguistic information to facilitate word recognition. The facilitative effects of higher order knowledge on reading performance are referred to as contextual facilitation effects.

It has been shown experimentally that context may exert an inhibitory effect as well. Stanovich and colleagues (West & Stanovich, 1978; Stanovich & West ,1979; Stanovich, 1980; Stanovich, West & Feeman, 1981) conducted a series of experiments aimed at studying the mechanisms of contextual facilitation and inhibition. They required subjects to read isolated words preceded by either a congruous, incongruous or neutral context with response time as the dependent variable. It was argued that contextual facilitation effects would be reflected in decreased response times in relation to the neutral condition, while contextual inhibition effects would be reflected in increased response times. As expected, their results pointed to facilitation effects in cases where the target word followed congruous context. The effect was greater for children than for adults. Inhibition effects were obtained in cases in which the target was preceded by incongrous contexts for children only under normal text conditions. The context effects were attenuated in children given practice in identifying the target words and accentuated by increasing target word difficulty. Inhibition effects were obtained for adults where target words were presented in a physically degraded form.

The authors interpreted these findings within the framework of the two-process theory of expectancy developed by Posner and Snyder (1975). The theory suggests that semantic context affects word recognition via one of two processes that may work simultaneously but are independent. The automatic activation process occurs when

stimulus information causes a spreading from a target memory location to semantically related nodes within a memory network. It is fast acting, uses no attentional capacity and has no effect on the retrieval of information from memory locations unrelated to those activated by the context. This process is responsable for the contextual faciliation effects seen in the reaction times of adults. Because of its speed of operation, the automatic spreading activation process has time to operate even before the rapid word recognition of skilled readers is completed.

The conscious-attention mechanism, on the other hand, responds to a preceding context by directing processing capacity to the memory location of the expected information, thereby facilitating its retrieval. It is slow, uses attentional capacity, and inhibits access to information from unexpected locations for the time required to shift the processor away from the originally targeted memory location. The conscious-attention mechanism has time to come into operation where context-free word recognition is slow, causing the inhibition effects seen in children and in adults slowed by degraded stimulus conditions in the incongruous context conditions. It is the mechanism by which compensatory processing takes place. It facilitates word recognition in readers whose lower-level word analysis skills are weak, setting up higher-level expectancies based on context, at the cost of contextual inhibition effects in cases where expectancies are not met.

According to the interactive model, therefore, context has the potential to influence reading performance by facilitating or speeding up the word recognition process. Stanovich (1980) points out that context has a second possible function. Contexual cues may be used by the reader as a source of information to monitor comprehension. Bowey (1985) echoes the same thought when she refers to anticipatory use of context (to constrain possible reading responses and facilitate word recognition) and retroactive use

of context (to monitor comprehension).

An issue of some importance to interactive models of reading is the relationship between primary (hearing-speaking) and secondary (reading-writing) language experience in the acquisition of first language fluency. The models posit the existence of a store of tacit, higher-level knowledge relative to the structure of a particular linguistic system. This store of information is influential in directing the basic processes in reading. Various authors suggest that such knowledge is the substance of linguistic competence, acquired by the individual through primary language experience and initially manifested in aural/oral linguistic skill. The ability to access deliberately the conceptual knowledge store, indicative of one's level of linguistic awareness, is a metacognitive skill upon which reading acquisition and reading fluency ultimately depend (Mattingly, 1972). Therefore, certain of the cognitive prerequisites of secondary language development are believed to reside in primary language use. The relationship between the two language forms has been described in the literature as "parasitic" (Mattingly, 1984, p. 9) and "derivative" (Shankweiler & Liberman, 1972, p. 297).

A potentially fertile ground on which to investigate the notion that linguistic competence is a determinant of the reading process lies in the study of second-language reading acquisition through early immersion. In the Ontario school system, early immersion involves placing non-francophone children in a classroom environment where the sole language of instruction up to grade two is French. Immersion students are initially taught to read in French, a language with which they have only the minimal primary experience afforded them the preceding year in the kindergarten program. The kindergarten experience, short-lived as it is, instils in them relatively limited sensitivity to the phonological, lexical and grammatical constraints of the French language, as evidenced by the children's spontaneous speech. During a visit to a grade-one

immersion classroom late in the month of May, for example, a group of four children were observed engaging in a game of cards. Despite an apparent attempt to abide by the French-only classroom rule, the children frequently reverted to the use of English to express themselves. Statements such as, "Moi, c'est le boss de la team!" ("C'est moi le chef de l'équipe!" or "I'm the boss of the team!") were often overheard, attesting to limited ease in oral French and a clear preference for English as the language of communication. If in fact reading performance is determined, or at least facilitated by linguistic competence gained as a primary language user, first- and second-language reading must be thought of as qualitatively different processes, depending to differing degrees on available perceptual and conceptual information.

An evaluation of the oral reading performance of a group of anglophone children enrolled in an early French immersion programme in Toronto constitutes the focus of the following study. Specifically, an analysis of the errors produced while reading aloud English and French texts will be conducted, in an attempt to investigate the role of linguistic competence in the acquisition of reading skill. The results of the study will be interpreted within the framework of the interactive-compensatory model of reading.

The ecological validity of such a study within the Canadian context is evident, given the country's stance and policies on federal bilingualism. Swain and Lapkin (1982) attribute the large-scale implementation of French immersion programmes in Canada to a "heightened awareness of the value (economic, educational, cultural and political) of learning French" (p. 1) on the part of the majority anglophone group. Statistics compiled by Canadian Parents for French (1987) place the nation-wide, 1986-1987 immersion enrolment figure at just over 200,000 students, an increase of 20,000 over the previous academic year. This figure represents approximately 5.4% of the total eligible student population in Canada (with the exception of Quebec); eligible students

refer to those "for whom French is not the regular language of instruction" (p. 4).

Review of the Literature

A review of the literature relevant to the proposed study includes material drawn from two distinct bodies of research: research related to error analysis and research related to French immersion. Unlike the error analysis literature, the massive body of French immersion research will not be reviewed in depth; rather, a few general issues that are pertinent to the present study will be briefly discussed. These deal particularly with the student population under study. A third, and somewhat leaner, area of research to be presented is comprised of studies looking at first- and second-language reading processes.

The body of literature related to error analysis is impressive in volume. In attempting to integrate the available material for purposes of clarity, the author noted that all studies focused on at least one of five factors assumed to influence oral reading performance: the reader's age, her reading ability, the instructional methods and materials to which she was exposed, the difficulty of the text read, and her purpose for reading. Therefore, after discussion of the rationale behind oral reading error analysis and of the techniques involved, the literature will be presented under these five headings.

Three important assumptions underlie oral reading error analysis. The first of these is that the cognitive processes involved in oral and silent reading are virtually identical; as a consequence, errors made while reading aloud are typical of those made while reading to oneself. While the work of such authors as Swanson (1937) provides some support for this assumption, its validity has been called into question (Wixson,

1979; Leu, 1982). Secondly, oral reading errors are assumed to be observable manifestations of processing weaknesses and strengths. Error analysis provides a "window on the reading process" (Goodman & Goodman, 1977), a means of describing in quantitative and qualitative terms the interaction of the higher- and lower-level processes at work during reading. The third assumption is in fact a corollary of the second; in general, oral reading errors are systematic, rather than random. As such, error analysis is a potentially powerful diagnostic tool for the evaluation of reading performance.

The criteria adopted in defining and categorizing oral reading errors vary considerably throughout the literature, leading to frequently contradictory results and leaving past studies open to criticism (Weber, 1968; Hood, 1975; Wixson, 1979; Potter, 1980; Leu, 1982). However, four broad classes of errors are repeatedly encountered in the studies reported:

1) Substitutions: The child's response is incongruous with the printed text. Substitutions include real and nonsense words.
2) Omissions: The child skips over a printed word.
3) Insertions: The child adds a word not printed in the text.
4) Non-responses: The child is unable to respond to the printed word and either asks for assistance or is offered assistance after a previously determined period of time.

It is assumed that contextual information is used to constrain possible reading responses; the rate of reading errors that are consistent with the syntactic and semantic structure of the sentence (or passage) in which they appear is a direct meaure of that constraint. Errors falling into the category of substitutions (and in some cases, insertions and omissions) are therefore, analyzed in terms of their grammactical and

semantic acceptability within the framework of prior and/or overall context. For example, substitution of the word *saw* by the word *was* in the sentence, *Sally saw a dog* , produces a sentence that is both syntactically and semantically sound while the same error in the sentence, *He cut the wood with a saw,* produces an utterance that is neither syntactically nor semantically acceptable. Several authors (Weber 1970a; Siler, 1974; Potter, 1980) have noted the virtual overlap between syntactic and semantic acceptability; rarely is an error semantically acceptable if not syntactically acceptable. The criteria adopted in evaluating contextual acceptability differ from one study to the next; as a result, their findings are often difficult to generalize.

Substitutions are also analyzed with respect to their graphic similarity to the stimulus cue as a means of determining the extent to which print constrains the range of possible reading responses. Considerable variation exists in the methods used to evaluate graphic similarity. Some authors adopt scales of similarity based on the number and position of shared letters in the stimulus word and the error (Cohen, 1974-75; Goodman, 1969), while others confine their analysis to individual letter positions (Biemiller, 1970,1979) or to a count of shared letters (Blaxall & Willows, 1984). Weber (1970b) developed a complex formula assigning weights to selected graphic features; their values were determined on the basis of a hierarchy of cues hypothesized to be significant in word recognition.

Although analytical techniques are varied, the working hypotheses underlying error analysis studies are fairly consistent. An error in reading is a mismatch between perceptual input and processing output. But, as Weber (1970a) pointed out, errors are not random; they approximate the printed word to a greater or lesser degree. The "correct" features of an error are significant because they provide insight as to the source of information guiding word recognition in that particular instance. It is assumed

that indexes of graphic similarity serve as indirect measures of the reader's reliance on stimulus input in word analysis, just as the contexual acceptability of substitution errors reflects the use of higher-order linguistic knowledge in the processing of text. The interaction of the two, assumed to underlye error-free reading, is made apparent by the presence of multiple-source errors (contextually appropriate errors that are graphically similar to the printed word).

Oral reading error studies often include an analysis of spontaneous self-correction behaviour. Bowey (1985) classified self-corrections as either contextually optional or contextually obligatory. Contextually optional self-corrections are corrections of errors that are congruent with the syntax and semantics of prior and/or ensuing context while contextually obligatory self-corrections are corrections of errors that are contextually incongruent. The former are indicative of the reader's use of a bottom-up grapheme monitoring strategy, while the latter indicate the use of a top-down comprehension monitoring strategy.

Clay (1969) reported a developmental sequence of self-correction behaviour by first-grade children. Initially, errors were self-corrected only if they did not make sense in the context (i.e., created cognitive dissonance). Later, graphically dissimilar errors, creating perceptual dissonance, were corrected. Finally, both cognitive and perceptual dissonance were taken into account. Only contextually appropriate responses which were graphically similar to the stimulus were left uncorrected. Recht (1976) found that the best statistical predictor of self-correction was the error that was totally different graphophonically from the expected response and was syntactically and/or semantically acceptable up to the point of its occurence, but was inappropriate within the context of the completed sentence. This is the error most likely to attract the reader's attention.

Once again, in reviewing the body of research dealing with oral reading error analysis, the author found that all studies focused on at least one of five factors assumed to determine oral reading performance. The literature suggests that the strategies adopted in a given reading situation, and as a consequence, emergent error patterns, are a function of the following: the subject's age or reading level, her reading ability, the instructional methods and materials to which she has been exposed, and text difficulty. The fifth factor, proven to be of significance under contrived experimental conditions but perhaps of lesser importance in a natural reading situation, is one's purpose for reading. Each will be dealt with in turn.

Age or Reading Level

Ilg and Ames (1950) were among the first researchers to describe developmental trends in reading behaviour. Studying the oral reading samples of hundreds of children between 5 1/2 and 9 years of age, they identified three distinct developmental phases characterized by a predominant error type. They found that up until 8 years of age, substitutions of a visual form predominate. They occur about as frequently as substitutions of meaning between 8 and 9 years, beyond which point substitutions of meaning predominate.

Twenty years later, Biemiller (1970) proposed a three-phase description of early reading behaviour based on error analysis that differs from the Ilg and Ames model. Subjects were grade one students taught by an instructional program emphasizing meaning; data were collected weekly between the months of October and May. In the first phase, children attempted to minimize use of graphic information, relying heavily on the use of contextual cues in reading. As they came to understand the notion that a specific word is associated with each graphic pattern on the page, there was both an increase in

graphically constrained errors and an increase in non-responses. The third phase of development was characterized by a reduction in the frequency of non-responses and the co-occurence of errors (substitutions, omissions, and insertions) reflecting graphic and contextual constraints. Biemiller noted that the earlier a child moved into the non-response phase, the better her reading performance at the end of the school year.

Cohen (1974-75) observed trends in oral reading errors of beginning readers taught by a code emphasis approach and found a somewhat different pattern. The initial stage, lasting approximately four months, was characterized by a predominance of non-response errors, reflecting the early reader's awareness of letter-sound relationships but her limited skill in expressing them. A shift in response patterns followed, as non-response errors gave way to nonsense errors that became more graphically similar to the stimulus over time. Finally, word substitutions predominated. Again, there was steady improvement in graphic approximation to print, as well as an increase in grammatical acceptability of the substitutions. Self-correction of substitutions, while negligible at the outset, increased over time, particularly for good readers. The variable most predictive of end of year reading achievement proved to be the degree and duration of predominantly non-response error production relative to nonsense errors and substitutions. Cohen concludes that it may be the skill of scanning words for salient cues that is acquired by good readers during the first year of instruction. Though different in detail, the developmental trends outlined by Biemiller and Cohen show the process of reading acquisition to involve increased effectiveness in the integration of graphic and contextual cues.

Weber (1970a, b) performed a linguistic analysis of first-grade reading errors in an effort to assess the role of grammatical context in beginning reading. She found that when grammatical acceptability was assessed in relation to immediately preceding context

only, an overwhelming 87 to 91% of the errors were consistent with the prior syntactic structure. It would appear that even in the earliest stages of reading, word recognition is guided by preceding grammatical context. Weber argues that these high figures reflect the beginning reader's expectations that written language will conform to the constraints that the grammar of her spoken language imposes.

An analysis of errors on the semantic level revealed a virtual overlap between syntactic and semantic acceptability within sentences; 93% of grammatically acceptable errors were found to be consistent with the rest of the sentence. When evaluated on the basis of semantic acceptability within the context of the preceding passage, the figure dropped somewhat to 68%, suggesting that the immediate syntactic and semantic context impose greater limits on the range of possible responses than global context. At the same time, results showed an increase in the graphic similarity of errors over time, suggesting increasing integration of available text cues as decoding skill is acquired. Clay (1967, 1968, 1969) reports very similar results.

Miller and Isakson (1978) reported greater disruption of reading behaviour due to the insertion of pseudowords for children in grades-two and three as compared to children in grade-one. Their results suggest greater sensitivity to contextual constraints on the part of the older students. Christie and Alonso (1980) also report significant grade level effects on the oral reading performance of grade-one and three students presented passages of increasing difficulty. They found that the third-grade subjects made more grammatically and semantically acceptable errors than the first-grade students, leading them to conclude that the older subjects made better use of contextual cues. Differences between first and third graders on indices of self-correction were insignificant, but for one noteable exception. There was a decrease in the proportion of contextually unacceptable errors that were spontaneously corrected by the third graders as passages

become more difficult. This was not the case for the younger subjects. Tamor (1981) reports similar results; she found the effects of text difficulty to be greatest at grade two (vs. grades 3 and 5) where the drop in the median proportion of contextually constrained errors on harder passages was most dramatic.

Burke (1976) analyzed the oral reading errors of children aged seven, eight and nine in a study aimed at determing the relative importance of graphic, syntactic and semantic cues in the development of reading strategies. She found that "miscue scores," a combined measure of the use of graphic and contextual information, increased with age. When the overall score was broken down into it's constituent parts, it was seen that the differences across grades were largely accounted for by an increase in the children's use of semantic information. With a similar goal in mind, Murray and Maliphant (1982) studied first and second graders use of syntactic, semantic and graphemic information on cloze and error detection tasks and found that children use all three types of information more effectively in the second year. They also found that children are able to make use of syntactic information before semantic information, but that the two are used equally effectively by the end of second grade.

These findings are consistent with those reported by Willows and Ryan (1986) who tested children in grades one to three on various oral language tasks related to acquisition of reading skill and found significant development in grammatical sensitivity across grades. Taken in conjunction with earlier findings (Willows & Ryan, 1981) showing no increase across grades four, five and six in proportions of contextually constrained responses on material presented in a cloze format and on geometrically transformed text, the authors suggest that over the first three or four years of school, success in reading may be at least partly a function of linguistic development while in the later years, reading performance may be determined by enduring individual differences in language

processing.

Two oral reading studies report results that conflict with the notion that novice readers differ from experienced readers in the extent to which they use contextual cues. Working with grade-two and four students, Siler (1973-74) found that syntactic violations had a greater disruptive effect on reading performance than semantic violations, with no significant grade level effects. Danks and Hill (1981) had second-, fourth- and sixth-graders read texts containing lexical, syntactic, semantic and factual violations of critical words and reported no significant differences in the pattern of results across grades.

Reading Ability

The issue of relative dependance on, and effective use of, graphic and contextual information by skilled and less skilled readers is highly contentious. The frequent failure to distinguish between reliance and effective use may, in part, account for the general lack of consensus.

Weber (1970a) included comparisons of performance of high and low reading groups (determined on the basis of teacher reports) in her analysis of grade one oral reading errors. Higher graphic similarity scores were obtained for the better readers but no significant differences were found between the two groups in terms of proportions of syntactically and semantically acceptable word substitutions. Weber was lead to conclude that there were no differences in the use of contextual information among children of varying reading ability. However, examination of Weber's self-correction data prompted Willows and Ryan (1981) to question the validity of this conclusion. While high and low groups corrected a comparable proportion of grammatically acceptable

errors (27% and 32% respectively), the high group corrected grammatically unacceptable errors twice as often as the low group (85% compared to 42%). By their frequent correction of grammatically unacceptable errors, the better readers demonstrated a greater sensitivity to the syntactic constraints of the sentence than less skilled readers. This interpretation of the results is consistent with that of Bowey (1985) and Beebe (1980) who attribute the better readers' higher rate of contextually obligatory self-corrections to more effective use of context to monitor comprehension. It is also in keeping with Willows and Ryan's (1986) finding that grammatical sensitivity is significantly related to level of reading skill.

Whaley and Kibby (1981) examined the oral reading errors of grade one children in an attempt to investigate the relative importance of intraword (graphic and phonological) characteristics and interword (grammatical) constraints for early reading achievement. The results of their study showed that the reading strategies of the most successful readers were typified by a reliance on analysis of within-word characteristics. Similarly, Biemiller (1970, 1979) concluded that better grade one readers differed from poorer readers in their ability to make more effective use of graphic information. Wilkinson and Brown (1983), on the other hand, found that the reading strategies of the better readers in grade one were characterized by a greater dependance on syntactic and semantic cues. The use of grapho-phonic information did not discriminate among groups.

Stanovich (1984) assessed the speed and accuracy with which grade one children read coherent stories and paragraphs of random words in a study aimed at determining whether contextual factilitation effects are as great in good and poor readers at comparable levels of context-free decoding skill. A recognition efficiency score was devised to indicate the mean number of words read correctly per second. When the efficiency scores on the two paragraph conditions were plotted against one another,

considerable overlap was found in the scores of the reading groups suggesting equal recognition facilitation for good and poor readers on the coherent passage. Stanovich concluded that it is difficulty in graphophonemic analysis that characterizes the poor reader.

Au (1977) analyzed the oral reading samples of second-graders rated as good or poor readers on the basis of performance on a standardized reading test. She found that less skilled readers relied more heavily on grapho-phonic information than skilled readers. They produced a significantly higher proportion of semantically inappropriate but graphically similar substitutions (32% vs. 18%). Furthermore, when all error categories indicating use of context were collapsed, the good readers were found to have made a significantly greater proportion of contextually constrained errors than poor readers (72% vs. 38%). Frequency of self-correction proved to be the single most important factor discriminating between the two groups, skilled readers correcting their errors far more often than less skilled readers.

Leslie (1980) drew similar conclusions following a study investigating the effects of error rate on the quality of oral reading errors made by average second-grade readers and below-average third- to sixth-grade readers. He suggested that poor readers' over-reliance on graphic cues in word recognition leaves them less able to deal with difficult text than better readers who make more effective use of contextual information. In a study assessing the influence of reading ability and difficulty of material on the quality of oral reading errors of second-grade children, Blaxall and Willows (1984) found an overall increase in the proportion of graphically similar errors, with a concurrent decrease in the proportion of contextually constrained errors, as text difficulty increased. This trend was particularly striking among good readers, attesting to greater flexibility in the use of reading strategies by this group.

In a study aimed at comparing the word recognition strategies of reader's of varying skill, Juel (1980) required second and third grade students of high, average and low ability to read target words differing in type (decodability, frequency and length) under conditions of isolation, poor context and moderate context. Frequencies of uncorrected mispronunciations or non-pronunciations of the target word were recorded. Her results were interpreted as showing that the more skilled readers were predominantly text-driven, less skilled readers predominantly concept-driven while the average readers fluctuated between the two. However, the study is criticized (Bowey, 1985) on the grounds that good readers made so few errors in the poor context condition that there was "little scope for contextual facilitation" (p. 24).

Schwartz and Stanovich (1981) had grade three students designated by their teachers as good and poor readers read stories containing ten anomalous words differing from the intended word by one letter. The critical dependent variable was the proportion of times subjects read the contextually appropriate word rather than the printed word. When the grapheme altering procedure was explained before testing and subjects were directly instructed to read the passage so that it would make sense, both good and poor readers "read" the contextually appropriate word approximately nine times out of ten. However, when instructed to read as accurately as possible, poor readers proved to be less able to focus on graphic information and to ignore contextual information. The authors conclude that good and poor readers differ not in their ability to make use of context to facilitate word recognition but in their ability to suppress reliance on contextual information in order to process graphic information.

Isakson and Miller (1976) had two groups of fourth graders equivalent in word recognition skill but differing in reading comprehension ability read sentences, two-thirds of which had been manipulated at the verb position in such a way as to violate the

syntactic and/or semantic structure of the sentence. They found that poor comprehenders were less affected by the disruptive effect of semantic and syntactic violations than better readers, as evidenced by a relatively stable error rate over control and experimental sentence conditions. The results were interpreted as indicating less sensitivity to the syntactic and semantic constraints of written language among poor comprehenders. Neville and Pugh (1976-77) also found greater discrepancies in the scores of good fourth- and fifth-grade readers tested on cloze tests of reading and on the same tests presented as either cloze listening tests or restricted cloze reading tests. The three test conditions differed primarily in availability of contextual cues. However, differences between groups were largely quantitative. A qualitative analysis of incorrect responses revealed poorer readers were aware of the syntactic and, to a lesser extent, the semantic constraints but relied almost exclusively on preceding context. Willows and Ryan (1981) drew similar conclusions; they found that while both skilled and less skilled readers in grades four to six made use of contextual information, differences between the two groups were differences in degree. Evaluating performance on cloze tests and reading accuracy on geometrically transformed text, they noted consistently greater use of both syntactic and semantic information by the better readers on a number of measures.

Biemiller (1977-78) recorded oral reading speeds of children and adults for letters, words out of context, and simple text. He found no differences in the effects of context as a function of age or achievement level; all subjects read words in context faster than words out of context.

Instructional Methods and Materials

There is a general consensus that error trends in beginning reading reflect instructional method. The findings of Biemiller (1970) and Cohen (1974-75) regarding the developmental patterns in word recognition errors of children taught by a meaning- and code-emphasis approach were discussed above. Barr (1972, 1974-75) found that three error characteristics discriminated between subjects taught by a phonics and a sight-word method in the early phases of reading: the frequency of nonresponses, the source of substitutions and the graphic approximation of the error to the stimulus. Briefly, children who received phonics instruction made more nonresponses than children taught by a sight-word method. Their substitution errors were often words that had not been previously taught but were drawn from the child's vocabulary, and a substantial number were non-words. The substitution errors of children taught by a sight-word method were rarely previously taught words, untaught words or non-words. They tended to be words taught in the same lesson. Finally, while the substitutions of the phonics method group reflected the influence of graphic information, those of the sight-word group did not.

Barr (1975, 1978) conducted a study looking at whether experience with a particular type of reading material influences children's responses to print. Children taught by both a phonics and sight-word method were presented simple and complex words, categorized as such according to length and pattern. The simple, one syllable words were characteristic of those found in phonics material; less than half of the sight-word material was made up of simple words. Frequency of response to test words was recorded for each child and the mean response rate for each group determined. It was argued that if the words contained in the instructional material influenced response to printed words, the phonics group could be expected to respond more often to simple words while the

sight-word group could be expected to respond with equal frequency to simple and complex words. Barr's findings supported her hypotheses. She concluded that it is the specific sample of words presented in reading materials that effects the development of word identification strategies. Children using a sight-word strategy depend on form and length (particularly of initial and final portions of words) in identifying printed words; these characteristics reflect differences among words in the reading sample they experience. On the other hand, children using a phonics strategy learn to infer the characteristics of words to which their strategy can be applied through repeated exposure to certain word types. These children tend to respond most often to short regular words.

Text Difficulty

It is generally agreed that as text difficulty increases, the reader becomes increasingly dependent on graphic cues and less able to make use of contextual information. However, there are widespread differences in the methods used to match readers to texts of varying difficulty for the purpose of error analysis. In a study aimed at evaluating the use of grammatical relationships in reading texts of differing complexity, Kibby (1979) had fourth- to seventh-grade disabled readers read paragraphs from a standardized test and selected two (one diffuclt, one less difficult) for analysis for each student. Passage difficulty was determined against a standardized criterion cutoff score for number of acceptable errors on the paragraph. Kibby found that on the difficult passage, 76% of subjects were rated as weak in their use of grammatical relationships, while on the less difficult passage 74% were rated as strong.

Williamson and Young (1974) analyzed the oral reading errors of intermediate-grade subjects on texts judged to be at their individual instructional and frustration

levels, again defined by standardized criteria for the particular test used. They found an increase in the number of graphically similar errors on the harder text as well as fewer grammatically and semantically appropriate errors which were acceptable to the text as a whole. Christie and Alonso (1980) had first- and third-grade children read a series of graded texts up to frustration level, which they defined as 90% word recognition and/or 50% comprehension as judged by performance on a subsequent test of literal comprehension. They found that on difficult material, substitutions errors were higher in graphic and syntactic similarity to the printed word but lower in semantic similarity.

Leslie and Osol (1978) had eighth-grade students read passages of sixth-, eighth-, eleventh-, and thirteenth-grade readability and determined subjective difficulty on the basis of accuracy. Their results lead them to suggest that an accuracy rate of 95% or better is crucial for meaningful reading. Below this level, average and superior readers were seen to make fewer self-corrections of contextually inappropriate errors and to make a greater number of nonsense errors (as decoding strategies broke down). Watson and Clay (1975) set a 90% accuracy rate as the point below which the reader becomes deprived of grammatical structure and meaning.

In a study aimed at comparing strategy use by skilled and less skilled readers on text of increasing difficulty, Biemiller (1979) had grade one students read passages ranging from preprimer to grade two level. Achievement groups were formed on the basis of the most advanced passage a child could read without making more than 25% errors. Biemiller reported an increase in the number of graphically similar errors on more difficult text, but no change in the number of contextual errors. However, as Blaxall and Willows (1984) point out, these results are hard to interpret; because reading ability is determined on the basis of the most difficult passage read, the two factors are confounded.

Tamor (1981) attempted to determine subjective difficulty by matching a priori estimates of reading ability to objective measures of text difficulty. A grade level criterion was established for each reader on the basis of performance on the reading subtest of a standardized achievement test; rank-ordered passages falling at or below criterion were labelled subjectively easy, while passages above the grade level criterion were labelled subjectively hard. Subjects were second-, third-, and fifth-grade children. Tamor's results were consistent with the finding that as text difficulty increases, errors become more graphically constrained. She found the effects of difficulty level to be most striking at grade two; among this group of students, the median proportion of contextually constrained errors fell from 80% on easy text to 37% on hard text.

A similar method was used by Blaxall and Willows (1984) in a study assessing the influence of reading ability and difficulty of material on the types of oral reading errors made by second-grade children. Following administration of intelligence and reading achievement tests, children selected as good, average or poor readers were asked to read material representing seven levels of difficulty. Analyses were conducted on texts of comparable difficulty, relative to the actual reading ability of the three groups. Again, as text difficulty increased, an overall increase in the proportion of graphically similar errors, with a concurrent decrease in the proportion of contextually constrained errors, was found.

Purpose for Reading

Danks and Fears (1979) consider reading purpose or task to be one of three factors (along with reading skill and text difficulty) that interact to determine the specific level

at which text will be processed by the reader. In considering whether oral production is initiated solely on the basis of decoding output or is initiated only after comprehension processes have constructed a semantic representation of the message, the authors conclude that neither hypothesis holds true all of the time but that the particular processes involved in oral reading are reader and task specific. They write: "A given reader with specific materials and a definite purpose for reading processes the text to the extent that he or she is capable and to an extent consistent with the implicit or explicit purposes" (p. 103). Error patterns, a reflection of depth of processing, must then depend on the reader's purpose for reading.

Swanson (1937) found that changes in comprehension requirements affected the accuracy of oral reading. Adults subjects rated as poor readers (on the basis of performance on a standardized reading test and on performance on a university qualifying examination) were either asked to read passages in order to answer subsequent comprehension questions, or to read as effectively as possible so the meaning of the text would be clear to a listener. Swanson found a greater number of errors, particularly substitutions, repetitions and mispronunciations, in the oral reading samples of subjects in the second group. He concluded that reading is "less meaningful and less mature" (p. 56) when the reader is not required to meet specific comprehension demands. The results of his study need be interpreted with some caution, however, as all subjects were identified as poor readers. It is not clear whether his findings can be extended to more skilled readers.

Bowey (1984) had grade three and four students read passages differing in the amount of contexutal information they contained. Subjects were instructed to read either "slowly and carefully" or "very fast." The dependent variables in the study were reading speed and error rate. A significant instructions effect was obtained in the analysis of

reading rate, indicating that the experimental instructions were effective in modifying the subjects' reading speed. An examination of the context x instructions interaction suggested that their effectiveness varied as a function of the amount of available contextual information. Error rate increased with reading speed, suggesting a speed-accuracy trade-off in children's reading.

Finally, the experiment by Schwartz and Stanovich (1981) described above provides further support for the notion that task demands influence reading strategies. Differing instructions (i.e. reading for meaning or attention to accuracy) were proven to modify subjects' responses to the task.

In summary, past studies suggest that the error patterns obtained on oral reading samples are dependent on four factors (the subject's age, her reading skill, the instructional methods and materials to which she has been exposed, and the difficulty of the text), and may be influenced by a fifth factor, the purpose for reading. It follows that the validity of error analysis for research purposes depends on the experimenter's ability to control or account for all of these factors.

In the present study, a sixth factor will be introduced. This is the language factor. It is hypothesized that the strategies adopted in reading text in one's first- and second-language vary significantly, and that these variations in strategy can be inferred on the basis of differences in error patterns obtained on reading samples in each language. Again, the subjects involved in this study are a group of native English-speaking children whose first formal years of schooling were conducted entirely in French. In order to impart some appreciation for the student population under study, a brief review of the French immersion literature is in order. After describing French immersion itself, the author will touch on some issues concerning the immersion student population. Finally,

the body of research dealing specifically with first- and second-language reading processes will be presented.

Swain and Lapkin (1982) summarize the goal of French immersion as follows:

> Immersion programs ... (provide) a naturalistic setting for second language acquisition; that is, the second language is acquired in much the same manner as children acquire their first language, by interacting with speakers of the language in authentic and meaningful communicative situations. In both cases, the learner is provided... with rich language input and gradually begins to use the language in order to communicate. { p. 5}.

In Ontario, three alternative immersion programmes are currently in place. Early total immersion begins at the kindergarten level where the entire half-day programme is conducted in French. The main language of instruction in grades one to four is French; beginning in grade two or three, a daily period is alloted to English language arts. The amount of English language instruction increases over time so that by grade seven, half the curriculum is taught in French, the other half in English. Early partial immersion begins at the grade one level, following a half-day kindergarten programme conducted entirely in English. Throughout the elementary school years, partial immersion students are taught 50% of the curriculum in English, 50% in French. Finally, late immersion begins in grade seven or eight. The first year anywhere from 55% to 70% of the school day is conducted in French; in the early high school years, the proportion of French language to English language instruction is entirely dependent on the availability of personnel able to teach in French.

Whereas the implementation of French immersion programmes in Canada in the 1970's was politically and economically motivated, the bulk of the immersion research that appeared in the decade following was aimed at defending its pedagogical value. The French immersion literature is distinctly outcome oriented, made up largely of comparative studies aimed at evaluating the success of the various programmes (early total immersion, early partial immersion, late immersion) on a number of criteria measuring student's progress in both English and French, relative to one

another, to students in regular English programmes, and to native francophones (see, for example, Barik & Swain, 1975, 1976a, 1976b, 1978; Genesee, 1981; Harley, Hart & Lapkin, 1986; Swain, 1974) . The research findings of interest relative to the present study are summarized by Swain and Lapkin (1982):

> 1. In the area of English language skills (related to literacy), students in early total immersion exhibit temporary lags relative to the performance of regular English programme groups. By the end of grade three, however, these students are performing on a par with their English-educated counterparts. The overall trend in subsequent grades is for immersion students to perform as well as or better than students in regular programmes. No such lags are evident in the students' use of oral English.
>
> 2. In the area of French language skills, early total immersion students attain near-native profiency in listening and reading comprehension but their producative skills (speaking and writing) remain non-native-like.

Carey (1984) points out two major problems inherent in studies comparing the performance of immersion students to their peers in regular programmes. First, he draws attention to important differences in the two student populations. He cites an in-depth report published in 1977 by the Ottawa Board of Education in which teachers were asked to rate four -year-old kindergarten children in terms of their level of ability, motivation, social maturity and appropriateness for French immersion enrollment. Teachers consistently recommended those students who rated highly on the first three factors for enrollment in immersion. Furthermore, in comparing teacher ratings of students in the English and French immersion programmes, it was found that the regular programme received more children rated as below average in ability, fewer children rated as above average in ability, and more children who were likely to encounter learning difficulties in school. In short, it would appear that French immersion classrooms are composed of the most capable

students.

Secondly, Carey points to important differences in attitude among parents of students in the two groups. Citing findings from the 1977 Ottawa Board of Education report, he notes that parents of students in the regular programme were typically less confident in their child's academic ability, expressing concern that the French immersion programme would be an upsetting or confusing experience for their child and would cause basic English skills to suffer. The parents of French immersion students did not question the difficulty of the programme for their child, but focused on the importance of acquiring proficiency in a second language. They themselves were interested in speaking French and were more likely to be taking or have taken French language instruction than their English programme counterparts. Carey reminds the reader of the importance of such differences, given the influence parental attitudes are known to exert on both academic achievement and language acquisition. Moreover, the parents of the two groups were found to differ markedly in I.Q., SES, and in time spent reading to their child.

In summary, for the purposes of the present study it is important to bear in mind that the sample population is likely to be comprised of very able, mature students who can be expected to be performing below the level of their English programme peers in the area of English language arts, but be performing on a par with their peers in oral English. At the same time, the French oral skills of the sample population can be expected to be non-native-like, while their receptive language skills should be near native-like. As for specific first- and second-language reading skills, there is a small, fairly inconclusive body of research on the subject which will be reviewed below.

Cziko (1978) compared the use of syntactic, semantic and discourse constraints among seventh-grade readers of French as a second language (rated as beginner, intermediate and advanced) and native francophones. Subjects were instructed to read, as quickly as possible, texts that were meaningful, anomalous (semantic constraints were violated) and random (both semantic

and syntactic constraints were violated). It was believed that by requiring subjects to read as quickly as possible, reliance on visual information would be restricted so that increases in reading speed between random and anomalous or anomalous and meaningful text could be attributed to the reader's use of available syntactic and semantic constraints respectively. The author found that all groups read the anomalous texts significantly faster that the random texts; only the advanced and francophone groups read the meaningful texts faster than the anomalous texts. He concludes that whereas readers with limited knowledge of a second language are able to use syntactic constraints, only proficient readers are able to use semantic constraints. The results of a further study involving the intermediate, advanced and francophone groups on a cloze procedure task lead Cziko to postulate a developmental order in the ability of second-language readers to use contextual constraints. Sensitivity to syntactic constraints precedes sensitivity to semantic constraints which in turn precedes sensitivity to discourse constraints. He suggests that much of the difficulty inherent in reading a language other than one's native language is due to the reader's inability to capitalize on available sources of contextual information.

In yet another study, Cziko (1980) compared the errors obtained on reading samples of English-speaking students with intermediate and advanced competence in French as a second language with those of native French-speakers of the same age. He found the least proficient readers produced error patterns suggestive of an over-reliance on graphic information and inefficient use of contextual information while the advanced and francophone groups appeared to make use of both graphic and contextual information. Cziko concludes that second-language readers "adopt an interactive strategy once they have attained a high level of competence in the language" (p. 113), though the term "high level" is never clearly defined.

The validity of Cziko's findings is questionable given the lack of control for the relative difficulty of the test material for the various groups. The question of subjective difficulty was addressed in a study of first and second language reading processes by Malicky, Fagan and

Norman (1988) . The authors collected English and French reading samples obtained from grades 1 and 2 French immersion students on texts judged to be at instructional and frustration levels, the cutoff being an accuracy level of at least 90% or a performance level of at least 70% on subsequent comprehension questions. The children received their first-grade instruction entirely in French and were introduced to English language arts at the beginning of grade two, as is typical of French immersion programmes. Not surprisingly, the authors found that only about 20% of first graders were able to read independently at the preprimer level in English, compared to approximately 70% in French. A somewhat more revealing finding is the failure of approximately 29% of the students to perform adequately in French, even at the preprimer level, toward the end of the school year. By grade 2, the children were generally more proficient readers in English, the mean reading level being grade 3.4 in English compared to grade 2.2 in French.

The reading samples gathered from children able to meet instructional level criteria on preprimer text in both English and French were retained for error analysis (6 of 42 grade-one students, 28 of 34 grade-two students). The authors found no significant differences in the children's ability to process print-based and knowledge-based information in both languages when reading material at an instructional reading level. They did find, however, that their subjects had greater difficulty integrating such information when reading in French than in English (i.e., made more errors changing the meaning of the text in French than in English).

Problems are apparent, however, in the authors' choice of subjects and material. As far as subjects are concerned, the authors point out that 10 of the 42 grade-one children and 4 of the 34 grade-two children, had one French-speaking parent. This failure to control for experience with the French language is particularly troublesome given the authors' choice of test material; it was deemed important to present familiar French material to the children since school instruction was assumed to be the only contact with French, while it was considered neither possible nor essential to base selection of English test materials on the children's specific reading experiences given the

"wide range" of English-language materials likely read at home. It is possible, in the case of 14 subjects, that the range of French material encountered outside of the classroom could be as broad as the range of English language material encountered by the anglophone children. It would be interesting to find out how many, if any, of this group of grade1 children were among the six whose data were included in the error analysis.

Furthermore, the authors specifically stated that illustrations accompanied each French passage but make no mention of equivalent visual adjuncts for the English materials (the Bader Reading and Language Inventory was used). As Willows (1978 a, b) demonstrated, the presence of pictures can affect reading performance by causing attention to be diverted from the decoding task. She found that children read illustrated lists of words more slowly and less accurately than control lists, the interference effect being greatest for less skilled readers. The inclusion of pictures in the test material is problematic given Willows' finding, particularly in a study of this nature.

In conclusion, the literature reviewed dealing with first- and second-language reading processes is somewhat flawed. Although the research question is an interesting and timely on, in view of the wide-spread implementation of French immersion programmes across Canada, lack of control for subject and test-material-related factors render previous results inconclusive. The present study attempted to integrate the assumptions and conclusions drawn from past research relating to oral reading error analysis and extend them to a comparative investigation of first- and second-language reading processes.

Rationale for the Study

The aim of the present study was to test the theory that reading performance is determined by linguistic competence gained as a primary language user, so that first- and second-language

reading may be thought of as qualitatively different processes that depend to differing degrees on available perceptual and conceptual information. In order to do so, a quantitative and qualitative analysis was conducted on the oral reading errors produced by grade 2 and 3 early French immersion students as they read English and French language texts. In light of previous research, every effort was made to account for a number of factors assumed to influence error reading performance, with particular care taken in controlling for the difficulty of the material subjects are required to read relative to their level of reading skill.

The primary assumption underlying the present study is typical of oral reading error analyses: that the word recognition strategies adopted in a particular reading situation can be inferred on the basis of the quality of oral reading errors produced. In this case, it was differences in error patterns across languages that are of particular interest. It was expected that the greater sensitivity of anglophone subjects to the syntactic and semantic constraints of English, developed through primary-language experience, would result in a greater incidence of contextually determined errors in English. On the other hand, lack of sensitivity to the syntactic and semantic constraints of the French language on the part of these non-native speakers was expected to lead to greater dependance on print, resulting in a higher incidence of errors being graphically similar to the stimulus word but contextually inappropriate. It was further assumed that error patterns in both languages would be determined in large part by the difficulty of the material encountered, relative to the individual's reading skill. Performance was, thus compared on material judged to be at comparable levels of subjective difficulty in English and French.

The following hypotheses were investigated. When comparing reading performance in English and French on texts of approximately equivalent subjective difficulty, it was expected that:

1. a greater proportion of semantically and syntactically acceptable substitutions would be made in English;
2. a greater proportion of graphically based, contextually inappropriate substitutions would be made in French;
3. a greater proportion of pseudoword relative to real word substitutions would be produced in French; and
4. a greater number of contextually obligatory self-corrections would be made in English.

The error patterns produced in oral reading are assumed to be indirect measures of the allocation of processing capacity. Those predicted on French text would be indicative of the reader's need to allocate cognitive capacity to the lower-level sensory processes involved in decoding text at the expense of the higher-level processes of comprehension monitoring. The greater incidence of nonword substitutions predicted would attest to the non-native speaker's restricted vocabulary and to a limited ability to judge her productions in French as meaningful or nonmeaningful. On the other hand, the error patterns expected on English text would reflect the reader's superior sensitivity to the syntactic and semantic constraints of her mother tongue. The relative competence of the native speaker allows for increased interaction between higher-order conceptual knowledge and print, reducing the perceptual processing load and facilitating word recognition. Processing capacity is freed up for the more demanding task of comprehension monitoring.

The study further compared performance across text difficulty levels both within

and across languages. It was predicted that:

5. patterns of errors in both languages would vary as a function of text difficulty. The most significant qualitative shift (from predominantly top-down to predominantly bottom-up processing) was expected to occur in English.

When faced with relatively difficult English text, the reader finds herself in a situation comparable to that in which she is placed when reading in French. Since the higher-order linguistic knowledge necessary to process such text is unavailable, she is forced to rely more heavily on stimulus information.

Testing took place in the month of November. As is typical of French immersion programmes, the grade-two students had completed a full year of reading instruction in French in grade one. The entire grade-one curriculum had been taught in French (as had the kindergarten curriculum the year before). In grade 2, students were continuing to receive instruction in language arts in French while beginning formal English-language reading instruction. Eighty minutes were allocated daily to the teaching of reading and mathematics in English. Students in grade 3 had completed two years of formal language arts instruction in French and one year in English. They, too, were continuing to receive a total of 80 minutes of English-language instruction each day in the areas of language arts and mathematics. French was the language of instruction in both grades in all subjects other than those mentioned.

The inclusion of second- and third-grade students as subjects was intended to serve two purposes. First, cross-grade comparisons are useful in controlling for instructional factors likely to influence reading performance. Comparisons of the reading strategies adopted across grades allow one to consider whether or not differences in error patterns

in French and English at the grade-two level are attributable to French-language reading instruction. If it were found, for example, that the grade-two subjects exhibit a greater dependence on print in French than in English, one could simply point to formal introduction to print in French as a possible cause. A similar finding at the grade-three level, where instruction has begun in both English and French, would weaken the case for instructional factors. At the same time, if error patterns in English are found to ressemble one another across grades, one could safely dismiss the suggestion that differences in performance by the grade-three subjects in the two languages are due solely to differences in instructional methods and materials encountered in English versus French. Instructional factors, such as teaching methods, were further minimized by selecting subjects from each of five different classrooms at each grade level.

Secondly, inclusion of grade-three subjects provided the opportunity to investigate possible developmental patterns in reading performance. Specifically, it was of interest to evaluate whether potential main effects were attenuated or accentuated from one grade to the next.

METHOD

Subjects

Testing was carried out on the two campuses of a private Toronto school. The school is recognized by France's Ministère de l'Education as an "établissement français à l'étranger;" the staff is predominantly francophone, the student population predominantly anglophone. The school's curriculum, with the exception of language arts and mathematics, is taught exclusively in French from junior kindergarten to grade seven.

The children begin a full-day program in senior kindergarten which is conducted entirely in French. The instructional materials used at all grade levels were originally intended for a native francophone population, many of them coming from France. School policy requires that, outside of time set aside for English language instruction, students communicate with staff and among themselves in French.

Subjects were drawn from the five grade-two and five grade-three classes in the school. Letters of consent were sent home with the children. These included a brief description of the intended study and a short questionnaire concerning the child's linguistic and educational background. It was particularly important that the study sample limit itself to children whose mother tongue was English. Students whose parents indicated on the questionnaire that a language other than English was spoken in the home were excluded as potential subjects.

A sample of 48 children, an equal number of grade two's and three's, participated in a pre-test phase. The children ranged in age from 7,0 to 9,1.

Procedures

The study was conducted in two phases, a pre-test phase and a test phase. The purpose of the pre-test phase was to determine the approximate reading skill of each of the subjects involved. Test materials judged to be of appropriate levels of difficulty were chosen for each student on the basis of performance on the pre-test. During the test phase, subjects were required to read a minimum of three passages of graded difficulty in English and in French. Their reading samples were tape recorded for later transcription. An analysis of errors was then performed. A detailed description of the pre-test and test

phases of the study follows.

Pre-test materials and methods

The pre-test phase involved the administration of tests of vocabulary and context-free word recognition in both English and French. Such measures were considered to be fairly accurate predictors of reading skill and were used in assigning subjects to texts of appropriate difficulty levels in the test phase of the study, as described below. The pre-test phase was particularly important in the case of the second-grade subjects. It was necessary to establish that all had acquired some skill in reading English, despite limited formal instruction.

The Peabody Picture Vocabulary Test (Form L) (Dunn, 1959) was selected to test English-language vocabulary. No standardized test of vocabulary was found in French. It was decided, therefore, to translate the alternate form (Form M) of the Peabody Picture Vocabulary Test. The translation was done by an anglophone considered by her francophone peers to be a native-like speaker of French. Verbs in the infinitive were directly translated. Concrete nouns were prefixed by either a definite or indefinite article as is customary in French. Verbs conjugated in the present continuous tense in English (sharing, arguing) were translated in the present tense with a corresponding subject (ils partagent, ils se disputent). In no case did the subject gender nor the verb conjugation provide clues as to the correct response. As for adjectives, the French masculine form was deemed most appropriate despite the gender of the object pictured. The translated version of the PPVT was administered to two native francophone adults and modifications made on the basis of their feedback. A copy of the final form is included in Appendix 1.

To test skill in context-free word recognition, a series of word lists was created in English and in French. Each list was made up of 20 to 25 items. For the most part, these words were randomly selected from lists of key words introduced from one lesson to the next in the reading materials in use in the school. The five French word lists were based entirely on vocabulary presented in the textbooks in use in grades one to five. Nouns were again preceded by either a definite or indefinite article and conjugated verbs by a subject. English word lists ranging in grade level from pre-primer to grade 3 were similarly developed. Beyond this level, however, no single textbook was used in the school. It was necessary, therefore, to turn to standardized word lists to complete the English series. Word lists corresponding to grades 4 and up on the Wide Range Achievement Test (Jastak & Jastak, 1965) were included. A copy of both the English and French word lists used appears in Appendix 2.

The pre-test phase was conducted in two sessions of approximately 15 minutes each on two separate days for each subject. One session was in French, the other in English. The tests were administered in both languages by a native English speaker considered by her francophone peers to be a native-like speaker of French. The experimenter alternated between English and French from one subject to the next. The tests were presented in a counterbalanced order.

The PPVT was administered and scored according to standardized procedure, providing age equivalent scores for each child in English and French. The validity of the French-language scores is obviously questionnable. However, they were considered to be informative in estimating vocabulary skill, a component of reading proficiency, and useful as a tool in determining the text grade levels appropriate to each subject.

The word lists were presented one by one to each child, beginning with the easiest.

The subject was simply instructed to read down the list; testing was discontinued when five errors were recorded on a given list or when five errors on twenty consecutive words were recorded on the sixth, English-language list. The grade level of the preceding list was taken to be an estimate of reading grade level.

Test materials and methods

The reading materials used in the test phase were taken from the Gray Oral Reading series (Gray, 1969). Again, the unavailability of standardized test material in French gave rise to the need to translate English text into French. Two texts per grade level (pre-primer to grade 7) were arbitrarily selected and translated. These translations were done by an anglophone woman considered by her francophone peers to be a native-like speaker of French. Two adult native francophones were asked to read and comment on the texts, and modifications were made on the basis of their feedback. The English texts averaged 55 words/text, the French translations 61.4 words/text. Copies of the original texts and their translations are provided in Appendix 3.

Testing was carried out in two sessions of approximately 15 minutes each on two separate days for each subject. One session was in French, the other in English. The person responsible for testing in phase one also conducted the test phase. The experimenter alternated between English and French from one subject to the next. All 48 children who participated in the pre-test phase were retained for testing purposes.

Following Tamor (1981), the choice of test material to be presented to each subject was determined by matching a-priori estimates of reading ability to objective measures of text difficulty. The grade level achieved on the test of context-free word recognition, in conjunction with the PPVT age equivalent score, were used as estimates of reading level.

On the basis of these pre-test measures, subjects were assigned to a series of three texts that were rank-ordered with respect to objective difficulty level. The easiest text was judged to be at the individual's approximate reading level; it was believed that reading level text would be sufficiently challenging to produce some errors, while remaining within the range of the reader's linguistic skill. The second and third texts assigned to each subject were estimated to be one and two grades above reading level. By way of example, consider the case of L.H., a grade two student whose age equivalent score on the French translation of the PPVT was 6 years, 6 months, and who completed only half of the grade two word list before making the allowed 5 errors. Given these pre-test results, L.H. was assigned to a series of French texts judged to be at a grade 1, 2 and 3 level.

Subjects were instructed to simply read the texts, taking as much time as needed. The texts were presented in a randomized order; however, if the series proved to be either too easy (fewer than 5 errors on the most difficult text) or too difficult (5 errors or more on the least difficult text), the subject continued reading forwards or backwards in sequence as required until the above-mentioned criteria for acceptable levels of difficulty were met. All sessions were tape-recorded for later transcription.

Scoring procedures

The following types of errors were considered in the analysis:

1) Substitutions: The child's response is incongruous with printed text. Substitutions include words and nonsense words.
2) Omissions: The child skips over a printed word.
3) Insertions: The child adds a word that is not printed in the text.

4) Non-responses: The child is unable to respond to the printed word and either asks for assistance or is offered assistance after 5 seconds.

Substitutions were also judged as to their graphic similarity to the stimulus word. Following Blaxall and Willows (1984), an error was scored as graphically similar if it contained at least half the letters of the printed word. Letter order was not taken into consideration.

Substitutions were further analyzed in terms of their syntactic and semantic acceptability within local and total context (as in Willows & Ryan, 1981,1986). An error was scored as syntactically appropriate within its local context if the sentence up to and including the error could be completed in a grammatically consistent way. The same error was considered to be syntactically acceptable within its total context if the sentence in which the error occurred was in fact completed in a grammatically consistent way. An error considered to be syntactically acceptable within local context alone is the substitution of the word "*climbing*" for the the word *cleaning* in the sentence, *Several boys were cleaning it off.* The substitution of "*brought*" for *bought* in the sentence, *Most of the customers bought old but useful furniture*, was scored as grammatically acceptable within both local and total context. Errors occurring as the first word in a sentence were not scored in terms of their syntactic acceptability.

A substitution error was scored as semantically appropriate within its local context if it conformed to the meaning of the sentence as read up to the point of its occurrence. The same error was judged to be semantically acceptable within its total context if it conformed to the overall meaning of the paragraph up to the end of the sentence in which the error occurred. In the example cited above, substitution of the word "*brought*" for the word *bought* would be considered semantically appropriate within local context but

inappropriate within the total context of a paragraph describing a bargain sale. Substitution of the word "*spof*" for *stop* in the sentence, *They also serve as traffic police and stop speeding cars on highways,* was scored as semantically acceptable within both local and total context.

It was possible for a single substitution error to be scored in all categories. The final example cited above was also scored as syntactically acceptable within both local and total context. Non-word substitutions, on the other hand, were not scored in any of these categories.

An analysis of spontaneous self-corrections was included. Following Bowey (1985) self-corrections were classified as contextually optional or contextually obligatory.

To test interrater reliability (percentage of agreement), a native English speaker and a native French speaker were asked to score 20 randomly selected texts each, based on the criteria outlined above. In English, agreement was reached on 92% of the errors encountered; in French, agreement reached 90%.

RESULTS AND DISCUSSION

The data collected on a sample of 40 subjects (19 grade- two and 21 grade-three students) were retained for analysis. Eight of the 48 subjects were unable to complete the test phase in the time allotted the experimenter by the school, most often for reason of illness.

A Grade (two, three) x Language (English, French) x Text Difficulty (1, 2, 3) mixed design analysis of variance (ANOVA) was carried out, with grade as a between-subjects factor and

language and difficulty as within-subjects factors. For the sake of brevity, the short forms E1, E2, E3; F1, F2, F3 will be used herein to stand for the least difficult (1), the second most difficult (2) and the most difficult (3) texts read in English (E) or French (F). The level of absolute difficulty of each text was the grade level assigned it as a component of the Gray Oral Reading Test. The subjective level of difficulty of each text was determined relative to the skill of individual subjects; again, this was achieved by matching a priori estimates of reading ability to objective measures of difficulty. It follows that any given text could have been one child's easiest text, and another child's most difficult. The average grade level achieved at each of the three levels of subjective text difficulty level are outlined in the tables below:

TABLE 1: Average levels of objective text difficulty corresponding to subjective difficulty levels for grade 2 subjects in English and French

E1 = grade 2	F1 = grade 1
E2 = grade 3	F2 = grade 2
E3 = grade 4	F3 = grade 3

TABLE 2: Average levels of objective text difficulty corresponding to subjective difficulty levels for grade 3 subjects in English and French

E1 = grade 3	F1 = grade 2
E2 = grade 4	F2 = grade 3
E3 = grade 5	F3 = grade 4

TABLE 3: Abbreviations of Variable Names

Independent Variables

E = English
F = French
1 = least difficult text attempted by subject
2 = second most difficult text attemptec by subject
3 = most difficult text attempted by subject

Example:
E1 = least difficult text attempted by subject in English

Dependent Variables

GS = graphically similar substitutions
S = substitution errors
RWS = real word substitutions
PWS = pseudoword substitutions
GAT = substitutions that are grammatically acceptable within total context
GAP = substitutions that are grammatically acceptable within prior context
SAT = substitutions that are semantically acceptable within total context
SAP = substitutions that are semantically acceptable within prior context
SCOB = contextually obligatory self-corrections

Example:
RWSE1 = real word substitutions on the least difficult text attempted in English

Frequency data were analysed for five variables: error rate (errors per 100 running words per text), reading rate (words per minute per text), average number of errors per text, contextually obligatory self-corrections (SCOB), and contextually optional self-corrections. The infrequency of occurence of contextually optional self-corrections (7 in English, 6 in French) precluded detailed comparisons.

The proportions of the total numbers of errors scored as subsitutions (S), omissions , insertions and non-responses were calculated for each subject and separate analyses of variance were planned for each type of error. Again, the infrequency of occurence of omissions (5% of errors in English, 4% in French), insertions (4% in English, 2% in French) and non-responses (3% in English, .005% in French) precluded detailed comparisons. Analyses of variance were performed for substitutions errors, which made up the vast majority of errors (86% of errors in English, 94% in French).

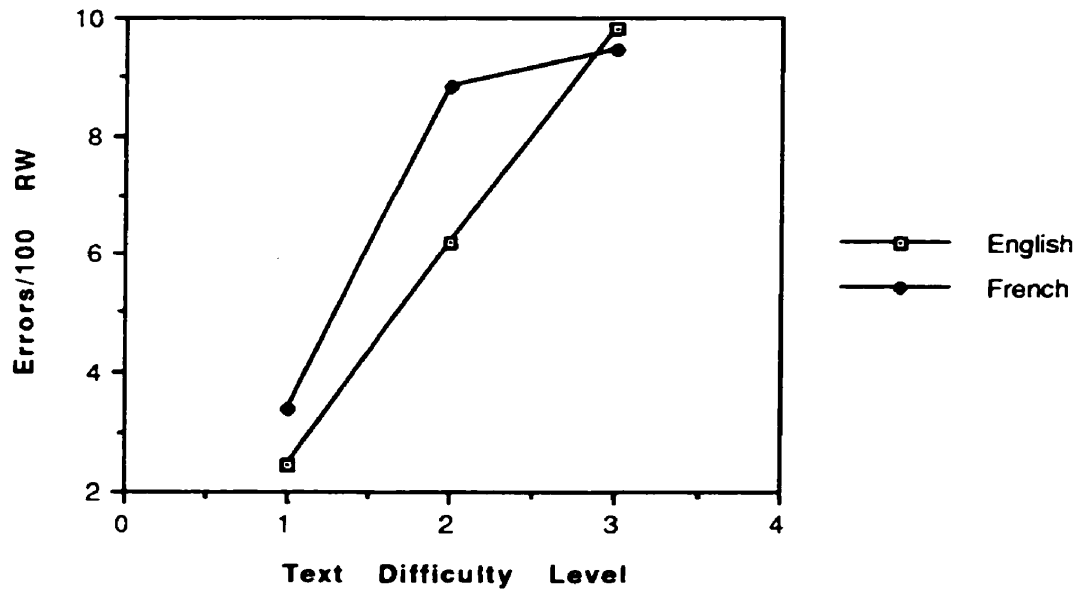
The proportions of subsitutions which were scored as real words (RWS) and pseudowords (PWS) were calculated for each subject and separate analyses of variance were performed for these variables. Real word substitutions were further analysed in terms of the proportions of these errors which were graphically similar (GS) to the stimulus word, semantically acceptable within the total context of the text read (SAT), semantically acceptable given prior context alone (SAP), grammatically acceptable within total context (GAT) and grammatcially acceptable given prior context (GAP). (See Table 3 for a resumé of variable name abbreviations.) The results obtained on each of the variables under study will be discussed in turn.

Error rate

The analysis of error rate (errors per 100 running words per text) indicated no main effect for grade. However, the data yielded significant main effects for language (F [1,31] = 13.89, p

<.001) and difficulty (F[2,62] = 45.36, p <.001). As expected, subjects averaged more errors in French than in English and more errors on harder text than on easier text. There was also a significant language by difficulty interaction (F[2,62] = 4.43, p <.016). When error rate is plotted against text difficulty, a relatively smooth, linear relationship develops across E1, E2 and E3; this contrasts with a sharp rise in error rate between F1 and F2 that levels off at F3 (see Figure 1). Subjects quickly found themselves struggling with the French language material; all but the simplest of text proved challenging, attesting to the limited second-language skills of the population under study.

FIGURE 1: Mean Number of Errors per 100 Running Words



The following table indicates the mean number of errors actually produced at each level of difficulty in English and French.

TABLE 4: Mean Number of Errors Produced At Each Level of Text Difficulty

Grade 2		Grade 3	
E1 = 1.21	F1 = 3.25	E1 = 2.88	F1 = 3.50
E2 = 7.38	F2 = 8.32	E2 = 5.05	F2 = 9.34
E3 = 10.90	F3 = 9.22	E3 = 8.88	F3 = 9.64

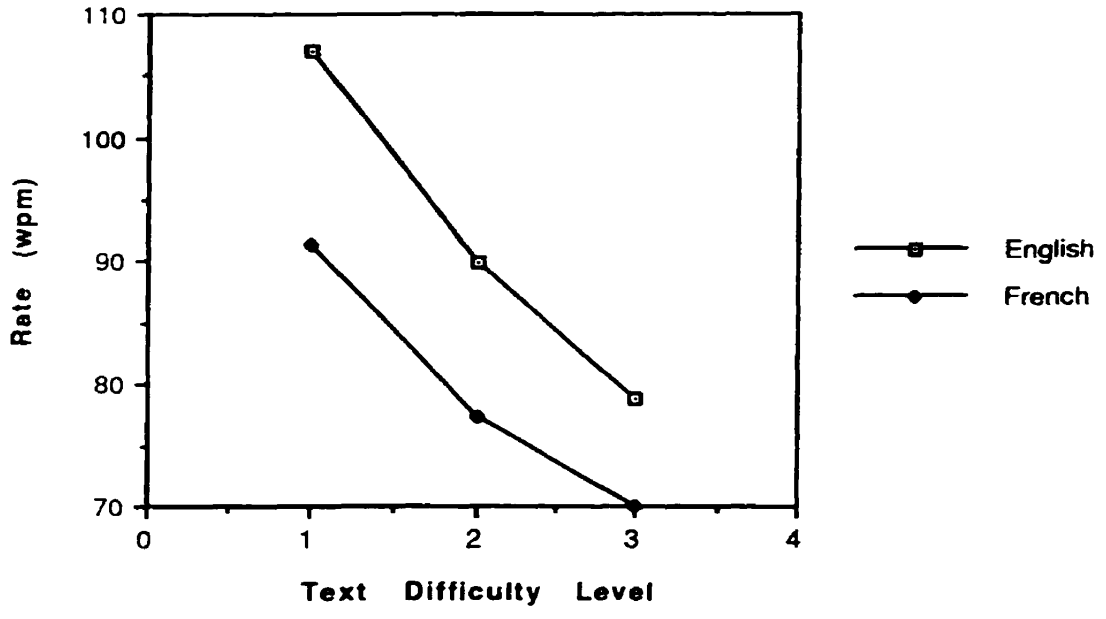
Reading rate

The analysis of reading rate indicated no main effects for grade. The main effects for language and difficulty, however, were highly significant ($F[1,31] = 37.8$, $p < .001$ and $F[2,62] = 72.53$, $p < .001$, respectively). Overall, subjects read considerably faster in English than in French, but the speed with which they read in both languages decreased as text material became more difficult. These significant effects are shown in Figure 2.

As Biemiller (1977-78) points out, there is a substantial body of research relating reading speed and achievement. It is generally accepted that better readers read more quickly. In the present study, significant differences in reading speed were obtained when the same subject read in English and French. The "better" reader was the one reading in English, the language in which all subjects demonstrated superior aural/oral skills. While reading significantly more quickly, subjects averaged fewer errors in English than in French. These findings are consistent with the view that higher level knowledge of a language, acquired through primary language experience, can be influential in directing and facilitating such basic processes in reading as word recognition. They are particularly telling, given the important differences in absolute difficulty of the test material. At any given level of difficulty, subjects attempted texts that were, on average, one full grade level higher in English than in French, yet they were able to read them

more quickly while making fewer errors.

FIGURE 2: Mean Reading Rate in Words per Minute



As expected, reading rate decreased significantly across levels of difficulty in both English and French. The effect of difficulty was more pronounced in English than in French. The initial discrepancies in performance in English and French virtually disappeared as difficulty level increased; subjects demonstrated levels of performance on E1 that were never matched in French, yet the average values obtained for reading rate on F2 and E3 are almost identical. When faced with material well beyond their level of linguistic competence, be it in English or French, the children were unable to access the higher order contextual information necessary to facilitate (i.e. speed) word recognition. Again, it must be remembered that the objective level of difficulty of the texts tackled was higher in English than in French. In English, the average grade two subject was reading grade 4 material at approximately the same speed (and with approximately equal numbers of errors) as she was reading grade 2 material in French, whereas

the average grade three was handling grade 5 text in English with comparable speed and accuracy as grade 3 text in French.

While there was no significant Language x Difficulty interaction, the analysis indicated a significant three-way Grade x Language x Difficulty interaction (F[2, 62] = 3.27, $p < .05$), shown in Figure 3. The reading rate of the grade- two students on English texts was particularly affected by the difficulty of the material. This interaction may be viewed as a function of two factors: the absolute level of difficulty of the passages read, combined with the relatively limited amount of formal reading instruction provided the second grade students at the time of testing. Having had little chance to hone their automatic word recognition skills through repeated practice in English, the children are forced to adopt a "slow-down" strategy in an attempt to cope with the unfamiliar content and vocabulary of the test material.

Substitution errors: real words and pseudowords

The overwhelming majority of errors made were substitutions errors, corroborating findings by Biemiller (1970) and Weber (1970). An analysis of the proportion of the total number of errors which were scored as substitution errors indicated main effects for both language (F[1,31] = 6.66, $p <.01$) and difficulty (F[2,62] = 8.51, $p <.001$). Overall, subjects in both grades made proportionately more substitution errors in French than in English. Overall, the proportion of substitution errors increased with text difficulty in both languages. These main effects are illustrated in Figure 4. There was no Language x Difficulty interaction and no main effect for grade.

FIGURE 3: Reading Rate as a Function of Grade, Language, and Text Difficulty

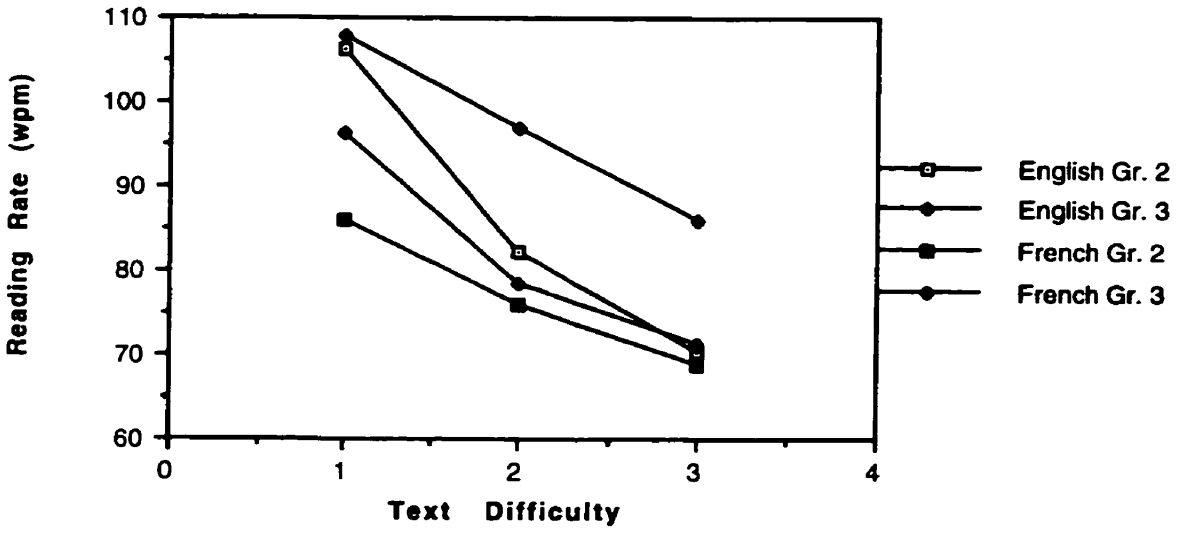
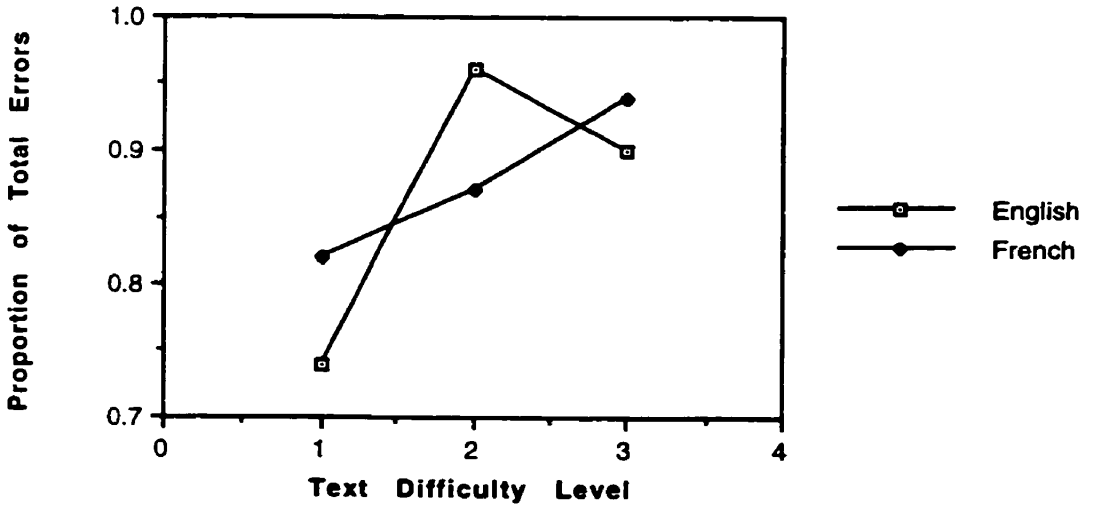


FIGURE 4: Mean Proportion of Total Errors Scored as Substitutions



All substitution errors were scored as either real words or pseudowords. The analyses of the proportion of substitution errors which were real words and pseudowords yielded siginificant main effects for difficulty only (F [2,62] = 8.28, p <.001 and F[2,62] = 26.41, p <.001, for real words and pseudowords, respectively). As expected, increases in text difficulty lead to decreases in the proportion of real word substitution errors relative to pseudowords (see Figures 5 and 6).

FIGURE 5: Mean Proportions of Substitutions Scored as Real Words

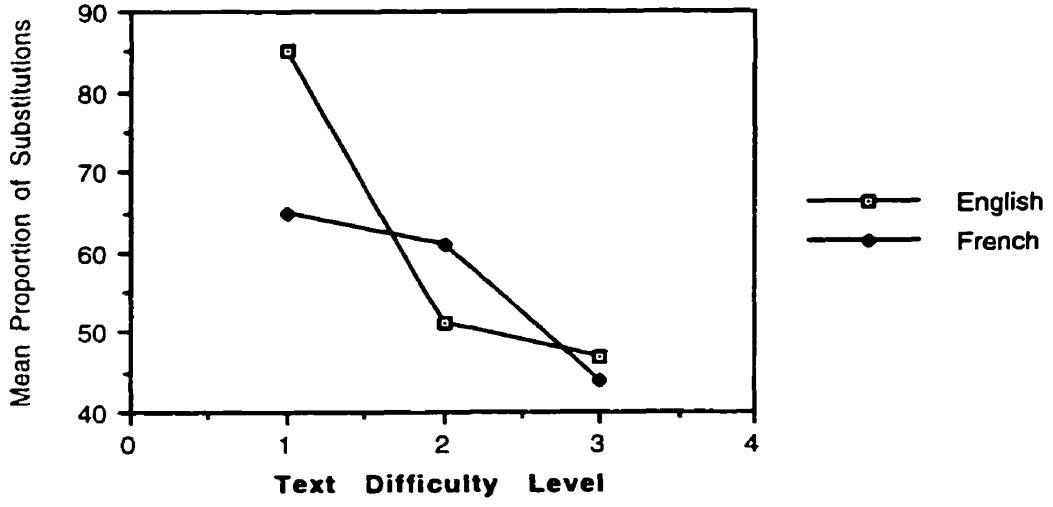
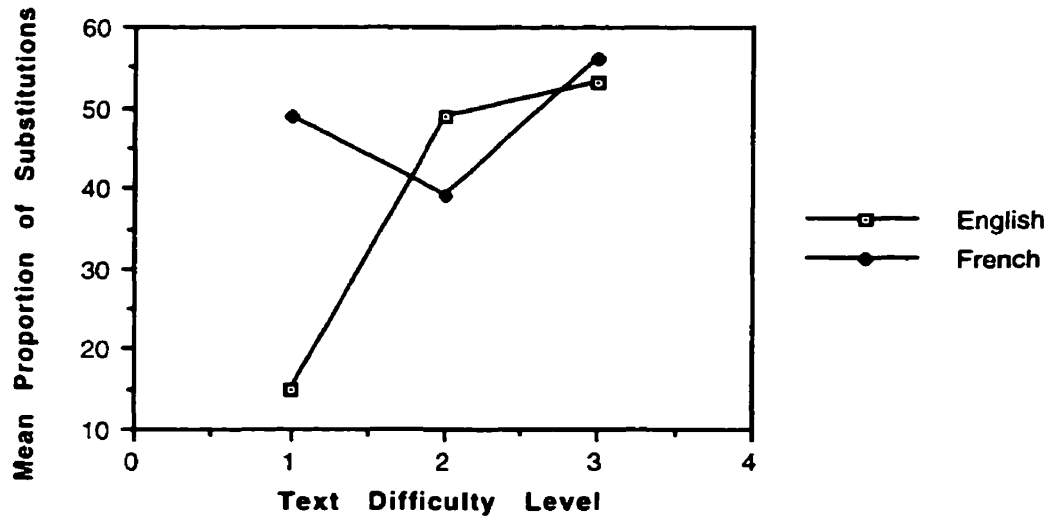


FIGURE 6: Mean Proportion of Substitutions Scored as Pseudowords



On E1 and F1 combined, 75% of all substitutions were scored as real words; on E3 and F3 combined, just over half of all substitutions were pseudowords. As text difficulty increased in both English and French, the children were attempting material well beyond their level of linguistic competence, particularly where vocabulary was concerned. As a result, contextual facilitation effects were gradually attenuated. The majority of the substituition errors produced on the most difficult text in both languages can best be described as meaningless "stabs in the dark".

No main effect was found for language on the real word and pseudoword variables. However, t-tests for paired samples were used to test suspected differences on E1 and F1 where mean proportions of RWS were found to be .85 and .65 respectively, and mean proportions of PWS were found to be .15 and .35, respectively. The results approached significance ($p < .07$). There was no main effect for grade.

Although the considerable differences obtained on RWSE1 and RWSF1 and on PWSE1 and PWSE2 fall short of statistical significance, they do suggest differences of some importance. As is the case for reading rate, the initial level of performance attained in English on the easiest passage is not even closely matched in French, yet subjects produced approximately equal proportions of real word and pseudoword substitutions on the most difficult passage. This pattern of results is to be expected assuming, as one does here, that facilitation effects peak at E1, as a result of the unparalleled accessibility of contextual cues contained within the relatively familiar text presented to subjects at this level. Contextual effects were attenuated as the availability of higher order information was limited, as was the case either when subjects attempted more challenging text in English or French text at any level.

Real word substitutions: graphic similarity

The graphic similarity data yielded no main effects. Therefore, the present study provides no data to support the claim that when higher-order linguistic knowledge is unavailable, the reader relies more heavily on stimulus information. There were no significant differences in the occurrence of substitution errors judged to be graphically similar to the printed stimulus either across languages or levels of text difficulty. The lack of a main effect for difficulty stands in contrast to the findings of Blaxall and Willows (1984) that as text difficulty increases, so does the overall proportion of graphically similar errors. The authors found that the mean proportions of errors that were graphically similar increased from 50-60% among normal and good readers on the least difficult text to nearly 90% on the most difficult. Subjects became print bound as contextual clues to facilitate word recognition became increasingly inaccessible. Tamor (1981) found that subjective difficulty influenced the rate of graphically similar errors produced by her grade 5 sample, noting a greater proportion of errors that were graphically related to the print in "hard" text. She failed to find significant effects for difficulty at the grade 2 and 3 level, where the

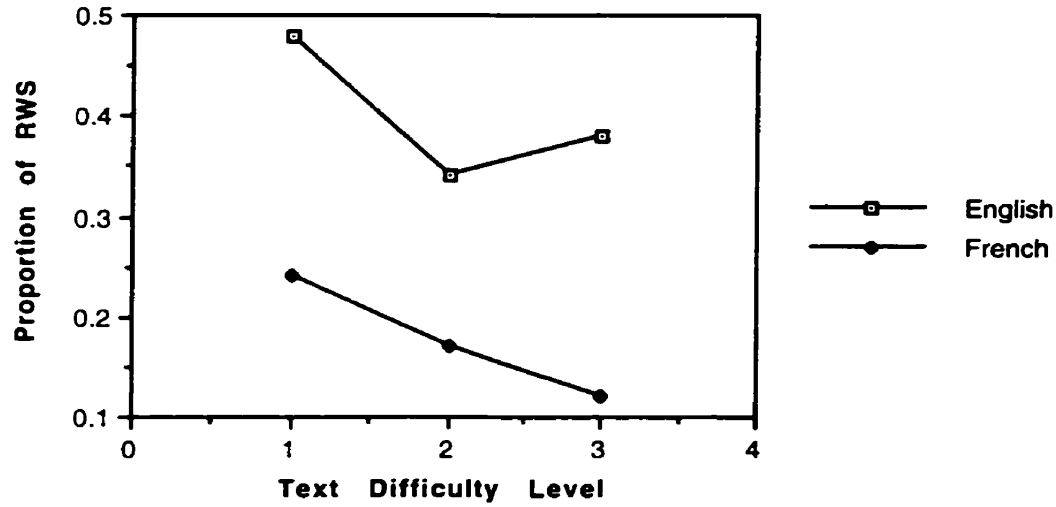
proportion of graphically similar errors on both "easy" and "hard" text hovered around the 60% mark.

These findings contrast with those of the present study. It is interesting to note the high proportions of errors in both English and French which were graphically similar to the stimulus and the stability of these proportions across text difficulty levels (E1=.80, E2=.81, E3=.78; F1=.88, F2=.93, F3=.83). These results suggest that a ceiling effect may be in evidence. The question remains as to why subjects were so print bound. At this point, one can simply speculate that the glue-to-print strategy is initially learned by students in French immersion as a means of coping with reading material written in a language for which they have limited conceptual knowledge, and that it is transferred to the English language reading situation. In the same way that the basic skills of reading may transfer from one language to the next (Swain, 1974; Swain & Lapkin, 1982), so may acquired reading behaviours. Kendall, Lajeunesse, Chmilar, Shapson, and Shapson (1986) echo a similar thought in suggesting that in lieu of well-developed French language skills, immersion students rely on the phonological and letter-sound principles to aid word recognition. Once acquired, these "generic skills" (p. 151) instil in children an analytical approach to reading which transfers to English.

Real word substitutions: syntactic and semantic acceptability

The analysis of the proportion of real word substitutions which were grammatically acceptable within the total context of the passage read indicated main effects for language (F [1,29] = 5.47, p <.026). This significant effect is shown in Figure 7. As expected, subjects made a proportionately greater number of errors in English which fit the syntactic structure of the text as a whole than they did in French. No main effects were found for either grade or difficulty. The data on semantic acceptability within total context revealed no main effects.

FIGURE 7: Mean Proportions of Real Word Substitutions That Were Grammatically Acceptable Within the Total Context of the Passage



Analyses on the semantic and syntactic acceptability of errors within the context prior to their occurence yielded no main effects at all. This finding was surprising, particularly in view of the siginificant differences in performance in English and French on the GAT variable. After a closer look at the data, an explanation for the lack of significant main effects became apparent. In French, a sub-category of errors emerged which were judged to be both semantically and syntactically acceptable within the context prior to their occurence. These can best be described as errors of gender in which an article or adjective is replaced by its feminine or masculine counterpart. Substitution of the article "*le*" for *la* in the sentence, *Elle cherche dans la maison...*, would be scored as both semantically and grammatically acceptable up the the point of occurence, as the gender of the noun cannot be determined until the noun is actually encountered. On the other hand, the error would be neither semantically nor syntactically

acceptable within the broader context of the sentence. Twenty-six percent of substitutions rated as SAP errors and twenty-five percent of those rated as GAP errors were gender errors of this type. English having no equivalent sub-category of errors, figures on these two variables were inflated in French, masking possible differences. A similar problem exists in interpreting the real word substitution data, where main effects for language fell just short of significance. The results obtained on this variable in French would have been inflated by the presence of gender errors, masking potential differences. On the other hand, gender errors may be responsible for creating differences as far as the substitution data is concerned. Gender errors made up 8% of all substitutions; the overall difference in the proportion of substitutions in French to English (a significant statistic) was also 8%.

While the unexpected "gender errors" may be problematic in statistical terms, they are of considerable interest in theoretical terms. It may be argued that the frequency of occurence of these errors in and of itself attests to the subjects' insensitivity to the semantic and grammatical constraints of the French language. Although no objective data were found to substantiate the claim, it is intuitively unlikely that native francophone children would allow such blatant errors as "par un belle journée d'été" or "la belle neige blanc" to remain uncorrected. Yet examples such as these abound in the reading samples of the anglophone population studied. The suggestion that gender errors are a function of text difficulty is readily dismissed; 70% of these errors were found in F1 and F2, and most occurred on articles or adjectives associated with relatively common nouns. Gender errors are symptomatic of the subjects' limited higher-level knowledge of the structure of the French language, without which overt reading responses go unchecked. Lambert et al. (1973) draw similar conclusions with respect to oral language. They report that the invented stories of the grade 4 and 5 French immersion students they tested were seriously marred by errors of gender. The students' lack of control of this language-specific feature distinguished them from native-speaker controls. The authors suggest these errors could best be remedied by increased contact with French-speaking adults and children.

Contextually obligatory self-corrections

The data on contextually obligatory self-corrections yielded no main effects. The pattern of results was, in fact, opposite to that predicted. In both English and French, the incidence of self-correction increased (though not significantly) as text difficulty increased. Contextually obligatory self-corrections were more frequent in French than in English, and in both languages the incidence of self-correction increased (though not significantly) as text difficulty increased. These findings corroborate that of Thompson (1984), who found the frequency of self-corrections to be positively correlated with the total number of uncorrected errors. Thompson suggests that, rather than reflecting efficient reading by the child, self-corrections arise on some of those occasions when processing has been insufficient and overt responding premature. In this case, a higher incidence of self-corrections would be expected with increases in other (uncorrected) premature responses. Such increases were found in French relative to English and on difficult text relative to easy text.

It is important to keep in mind that, at the time of testing, the grade two students had completed only two months of formal reading instruction in English, on the basis of eighty minutes per day. French language reading instruction had begun the previous year, during which French had been the children's sole language of instruction. Nonetheless, the children tackled English language material which was, on the average, a full grade level higher than the French language material attempted at any given text difficulty level. The same was seen to be true of the grade-three students. This finding raised the possibility that the lack of main effects for language on the real word and pseudoword variables in particular, was a function of the differences in the absolute level of text difficulty read. For the most part, the English language material was well beyond grade placement; the content and vocabulary of the passages would have been generally less familiar than that of the French passages, limiting access to contextual cues to facilitate word recognition.

To investigate this hypothesis, a second series of analyses was conducted. Performance was compared in English and French on texts of approximately equivalent absolute difficulty. Since no main effects for grade had been found, the author chose to combine the data for grades 2 and 3. As previously mentioned, it was found that, at any given level of difficulty, the children were reading material that was one grade higher in English than in French. Therefore, an analysis of errors made on texts E2 and F3, deemed to be at a grade 3 level for the grade twos and grade 4 level for the grade threes, allowed for a comparison of reading performance in English and French on material of approximately equal difficulty. Two-tailed t-tests for paired samples were performed for each of the variables under study. Some caution is warranted in interpreting the results of the supplementary analyses; the paucity of errors in English (an average of 3.85 errors per text in English vs. 7.24 errors per text in French) leads to an inflation of the values of the mean proportions used in the calculations.

Again, significant differences were found for error rate ($p < .001$) and reading rate ($p < .001$), clearly indicating that the children read more quickly and made fewer errors in English than in French. However, the supplementary analyses indicated no significant differences in the proportions of errors scored as substitution errors. As in the primary analyses, the data yielded no significant differences due to language in the proportions of substitutions which were graphically similar to the stimulus word, or in the proportions of substitutions which were real words or pseudowords.

As for the SAP and GAP categories, potential differences may again have been masked by gender errors on F3 (comprising 26% of RWS scored as SAP and 25% of RWS scored as GAP). The data on GAT yielded significant differences ($p < .01$); the children made a proportionately greater number of substitution errors which were grammatically acceptable within the total context of the passage in English than in French. The data on SAT revealed marginal

differences; because of the small number of cases involved (12 % of RWS in English, 5% in French), the results just fail to reach levels of significance ($p < .1$). They do, however, suggest a trend. Subjects are clearly making a greater proportion of real word substitutions that are semantically acceptable within the total context of the passage in English than in French.

The pattern of results obtained on the supplementary analyses is essentially identical to the pattern of results which emerged in the primary analyses. This finding is significant because it allows one to safely dismiss the notion that differences in error patterns (or the lack thereof) across languages can be solely attributed to the absolute difficulty of the English language material relative to the French language material. The fact that at each level of subjective difficulty the children attempted passages in English that were, on the average, more difficult than the passages attempted in French is a significant finding, attesting to the superior oral skills of the children in their native language; however, if conclusions are to be drawn regarding the role of linguistic competence in directing reading processes, the confound of absolute text difficulty must be isolated.

The failure to achieve main effects for grade on any of the variables under study is in itself a significant finding. It allows one to reject the notion that potential variations in the word recognition strategies adopted across languages (and as a consequence, differences in error patterns) in the grade two sample were merely a by-product of instruction. Unlike their younger counterparts, the grade three students had received formal reading instruction in both English and French. Given the similarities in error patterns across grades, one cannot simply attribute differences in performance found at the grade two level to differences in the amount of classroom reading instruction received in each language. Again, instructional factors, such as teaching methods, were greatly minimized by selecting subjects from each of five grade-two and five grade-three classrooms. The students had been, or were being, formally taught to read by five different French teachers and three different English teachers. While the school favoured a

meaning-emphasis approach, there was considerable room for flexibility in teaching materials and individual preferences in teaching style. It is clear that the overall pattern of errors is uncharacteristic of the pattern expected where a sight-word method of instruction is strictly implemented (Barr, 1972; 1974-75).

The absence of main effects for grade also attests to the importance of primary language experience in directing the reading process. Despite limited formal reading instruction in English, students at the grade-two level performed in much the same way as the third-grade subjects. They attempted English texts which were, on average, objectively more difficult than the French texts attempted at each level of subjective difficulty, reading them more quickly and making fewer errors. The grade-twos were also seen to make better use of the grammatical structure of subjectively easy text in English than in French. These findings are consistent with the view that the relative competence of the native speaker allows for increased interaction between language-specific conceptual knowledge and print.

CONCLUSION

The aim of the present study was to test the theory that reading performance is determined by linguistic competence gained as a primary language user, so that first- and second-language reading may be thought of as qualitatively different processes that depend to differing degrees on available perceptual and conceptual information.

The data certainly support the view that higher order knowledge is influential in guiding the basic processes in reading. By manipulating language and text difficulty, measures used to control accessibility of higher-order linguistic information, significant qualitative differences in reading performance were obtained. This was particularly evident with regards to reading speed and accuracy, to the reader's ability to produce meaningful utterances, and to her ability to make use of the grammatical structure of the text, both across languages and across subjective levels of difficulty. It would seem that the extent to which the reader uses conceptual information on a given reading task is a function of the availability of that information to the individual, which in turn is a function of her competence in a language.

The data do not, however, suggest a trade-off of conceptual information for perceptual information as text becomes less familiar, as an interactive model of reading would imply. A high rate of graphically similar substitution errors was maintained across all levels of text difficulty in both languages. The argument was made, however, that the subjects' reliance on graphic information for word recognition in both languages and at all levels of text difficulty may indicate a transfer of acquired generic skills from French to English. It just may be that this learned dependance on print, a by-product of initial French language reading instruction, can be considered a trade-off of conceptual for graphic information to aid word recognition. French immersion students commence formal reading instruction with the limited aural/oral skills acquired in the kindergarten classroom, and as a result are forced to resort to print-based strategies to guide their earliest attempts at deciphering text. The end result is a learned reliance on perceptual information, a fairly persistent trait of the French immersion student's reading behaviour that transfers to English. It may be of interest to conduct a similar study involving students in grades 4 and up, to establish if and when this dependance on graphic information gives way to more knowledge-based processing when reading subjectively easy material.

Given the overall findings of the present study, it is reasonable to suggest that as English text becomes more difficult both objectively and subjectively, limiting the availability of higher-order linguistic knowledge, the reader's performance gradually comes to resemble performance on French texts of lesser objective difficulty. The initial levels of performance attained in English on a number of variables (error rate, reading rate, proportion of real words relative to pseudowords) are not matched in French, yet data on E3 and F3 on these variables were virtually identical. This pattern of results is to be expected assuming that facilitation effects peaked at E1 where the accessibility of contextual information was greatest, due to the reader's high level of linguistic competence relative to the absolute difficulty of the text. Contextual effects were attenuated as the availability of higher order information diminished, be it on the objectively more difficult English text or on any of the French passages attempted (most of which were of equal or lesser objective difficulty than E1).

Unfortunately, the intrusion of gender errors restricted access to information concerning the subjects' use of the syntactic and semantic structure of text, a potentially valuable clue to the role of linguistic competence in guiding the reading process. With hindsight, the author acknowledges that the problem was both inevitable and unavoidable, given the student population under study and the insistence on examining the children in as natural a reading situation as possible. The obvious solution would have been to simply exclude these errors from the analyses; however, time constraints made the task of data re-entry impossible. As a follow-up to the present study, it may be worthwhile to re-run the analyses, eliminating gender errors. Having said this, the author recognizes the value of gender errors in establishing the subjects' lack of sensitivity to the syntactic and semantic constraints of the French language.

While the findings of the present study are tentative pending replication, they point to some possible educational implications. The wisdom of initiating written language activities in French at the grade-one level in immersion classrooms is called into question. The data tend to

suggest that reading in French is a slow, print-driven process that is highly prone to error; even by grade 3, the children seem to have mastered little more than the mechanics of decoding. The author attributes the mechanical quality of their reading to the limited competence of the non-native speaker; there is little room for the interaction of perceptual and conceptual information that is necessary to reduce the perceptual processing load and facilitate word recognition . Furthermore, it may be the case that the learned dependance on print transfers to the English language reading situation.

By postponing reading and writing activities in French until at least grade 2, and emphasizing such aspects of oral language as conversational skills and vocabulary development, early immersion students would be provided the opportunity to develop a more adequate primary language base on which to build secondary language skills. This implies that the entire grade-one French curriculum should be oral (with the possible exception of mathematics, where written numbers could be introduced), and would require a shift away from the practice of using print as a medium of instruction, to using print as a visual prop or adjunct to discourse.

At the same time, it may be advantageous to begin English language reading instruction in grade 1. Our data suggest that immersion students are better able to access contextual cues when reading age-appropriate English language material, a result of their increased sensitivity to the lexical, syntactic and semantic constraints of their native language. Again, it is important to keep in mind that they tackled objectively more difficult material in English than in French, despite relatively limited instruction in English language arts. It appears that written language skills in English are able to build on a solid oral language base, facilitating the acquisition of the mechanical aspects of reading (sound-symbol correspondance) and allowing for greater interaction between lower-level perceptual analyses and higher-level conceptual knowledge stores. It may be reasonable to expect a transfer of these interactive strategies to the French reading situation, should formal reading instruction be held off until a satisfactory oral language base is in place.

Despite the tentative, somewhat inconclusive, nature of the results discussed, the present study points to the importance of re-directing the focus in French immersion research away from academic outcome, toward cognitive process. The question is no longer whether or not children can learn to cope in an academic environment in a second-language (and at what cost to first-language skills); research conducted over the past twenty years establishes that French immersion students attain at least functional levels in both receptive and productive skills in French, with no long-term lags in English language skills. The issue to pursue now is how they do so. Only then can the practice of immersion be fully evaluated.

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Appendix A

French Translations of the PPVT (Form L)

a. un lit b. une chaise c. dormir d. un navire e. un balai éponge

1. une voiture _____
2. une balle _____
3. l'argent _____
4. un balai _____
5. une abeille _____
6. une bouteille _____
7. un cercle _____
8. une bougie _____
9. une plante _____
10. lire _____
11. une échelle _____
12. plein _____
13. le courrier _____
14. une trompette _____
15. il tire _____
16. le cou _____
17. un portail _____
18. un kangourou _____
19. un cadenas _____
20. un cerf volant _____
21. un bureau _____
22. verser _____
23. un fermier _____
24. cassé _____
25. cueillir _____
26. l'ambulance _____
27. une galipette _____
28. l'heure _____
29. un arbuste _____
30. une baleine _____
31. en bois _____
32. il attrape _____
33. une toile d'araignée _____
34. une rivière _____
35. des traces _____
36. un coup d'oeil _____
37. un seau _____
38. ils partagent _____
39. une chenille _____
40. une branche _____
41. une selle _____
42. le dentiste _____
43. un aigle _____
44. rugueux _____
45. une paillasse _____
46. un uniforme _____
47. un bijou _____
48. un meuble _____
49. une pièce de monnaie _____
50. ils tirent à la corde _____
51. un liquide _____
52. la cheville _____
53. flotter _____
54. des jumelles _____
55. le poignet _____
56. la ruche _____
57. ils se disputent _____
58. il écrit _____
59. un serveur _____
60. une racine _____
61. un morse _____
62. un marais _____
63. un angle _____
64. la machoire _____
65. elle amuse _____
66. diriger _____
67. l'artiste _____
68. la côte _____
69. une paire _____
70. un plafond _____
71. une sécrétaire _____
72. une falaise _____
73. flamber _____
74. un entonnoir _____
75. laineux _____
76. nutritif _____
77. construire _____
78. un dé _____
79. une céréale _____
80. furieux _____
81. trier _____
82. une musicienne _____
83. accueillir _____
84. une compétition _____
85. lasser _____
86. des bois _____
87. la moisson _____
88. hargneux _____
89. plâtrer _____
90. les triplets _____
91. aider _____
92. se peigner _____
93. tropical _____
94. un savant _____
95. applaudir _____
96. un cor _____
97. embêtant _____
98. ronger _____
99. un chevalet _____
100. une boussole _____
101. accompagner _____
102. une cale _____
103. un breuvage _____
104. cubique _____
105. l'Arctique _____

Appendix B

English and French Word Lists (Pre-test Measures)

1.

and

baby

can

do

dog

have

his

it

like

my

mother

play

pretty

run

see

the

to

will

yes

you

2.

said

are

what

Father

some

she

could

old

give

very

was

of

don't

all

where

school

going

once

mouse

your

3.

water

two

they

farmer

bread

more

out

yellow

quiet

one

eyes

great

again

along

lion

door

called

soup

poor

blew

4.

woman

built

thought

shoes

both

brothers

because

nothing

highest

oven

many

their

sure

pulled

loved

laugh

warm

friends

animals

fruit

5

sew

already

scissors

people

suit

daughter

heart

broad

promise

precious

soldier

enough

tongue

ocean

honour

guarded

forehead

straight

wondering

pleasure

6.

approve	emphasis
plot	aeronautic
huge	intrigue
quality	repugnant
sour	putative
imply	endeavour
humidity	heresy
urge	discretionary
bulk	persevere
exhaust	anomaly
abuse	rudimentary
collapse	miscreant
glutton	usurp
clarify	novice
recession	audacious
threshold	mitosis
horizon	seismograph
residence	spurious
participate	idiosyncrasy
quarantine	itinerary
luxurious	pseudonym
rescinded	aborigines

1.

une école

c'est

la bouche

petit

une pomme

la fenêtre

le frère

je suis

dans

beau

le lait

la neige

un jouet

premier

il regarde

la queue

un garçon

elle mange

la main

lui

2.

un retour

travailler

le quartier

chez

j'ai vu

il se déguisent

il fallait

vieille

une marionnette

tant de

elles étaient

un coeur

le printemps

la nourriture

ensuite

une aventure

ce serait

le maquillage

une chenille

un voilier

3.

une discussion

un cycliste

j'aurais voulu

une étrangère

une abeille

l'automne

une cuillère

un écureuil

un ours

un timbre-poste

un pays

des allumettes

il s'est moqué

un moyen

une étiquette

ils veilleront

un besoin

un nid

il pourra

un policier

4.

une personnalité

un métier

humoristique

misérable

hebdomadaire

enregistrer

un chuchotement

timide

la migration

disponible

les sens

une impression

une silhouette

un air

rugueuse

quotidien

un rayon

national

l'atmosphère

géographique

5.

un handicap

une interruption

la mécanique

l'horizon

magnétique

l'oxygène

symétrique

un concurrent

assaisonner

côtoyer

l'envergure

géologique

un indigène

une protéine

une éruption

un hectare

un charpentier

un spécimen

spécifique

l'environnement

Appendix C

English Texts and Their French Translations (Test Materials)

Look, Father.

See the ball.

I want you to play.

We can play ball here.

Come, Father.

Play ball with me.

Regarde, Papa.

Tu vois la balle.

Je veux jouer avec toi.

Je veux jouer ici.

Viens, Papa.

Viens jouer à la balle avec moi.

Look, Mother, look.

See Father.

Father is here.

We want to play.

Can you play, Mother?

We can play here.

Regarde, Maman, regarde.

Tu vois Papa.

Papa est là.

Je veux jouer avec Papa.

Je veux jouer ici.

Tu peux jouer avec Papa et moi, Maman.

"Look here," said Mother.

"I can make something for you.

It is good to eat.

You will like it."

"Mother," said the girl.

"I want to help you."

"You are a good girl," said Mother.

"You can help me now."

- Regarde, dit Maman.

  Je fais quelquechose pour toi.

  C'est bon à manger.

  Tu vas l'aimer.

- Maman, dit la fille.

  Je veux t'aider.

- Tu es gentille, dit Maman.

  Tu peux m'aider.

One morning a boy made a boat.

"Where can I play with it?" he asked.

Father said, "Come with me in the car!

We will take your boat with us."

Soon the boy called, "Please stop. I see water.

May I play here?"

"Yes," said Father. "Have a good time."

Ce matin, un garçon fait un bateau.

<< Où est-ce que je peux jouer avec mon bateau? >> il demande.

Papa dit: << Viens avec moi en voiture. Prends ton bateau avec toi. >>

Plus tard, le garçon crie: << Arrète, s'il te plaît. Je vois de l'eau. Je peux jouer ici? >>

<< Oui, >> dit Papa. << Amuse-toi bien. >>

A cat wanted to find her kittens. She looked in the house and all over the farm. But she could not find them. Soon the mother cat saw a girl. "Mew," she said. "Help me find my kittens." "Look," laughed the girl. "Your kittens are coming to find you."

Une chatte veut retrouver ses petits. Elle cherche dans la maison et partout dans la ferme. Elle ne les retrouve pas. Puis, la chatte voit une fille.
<< Miaou, dit-elle. Aide-moi à retrouver mes chatons. >>
<< Regarde, >> dit la fille, << Tes petits arrivent. Ils te cherchent aussi. >>

One day five children went out to play in the beautiful white snow. They played for a long time and then began to make snow animals.

One of the animals was a dog. Soon the dog next door came out of the house. When he saw the snow dog he said, "Bow-wow."

The children laughed. "Now we have a dog that can bark!"

Un jour, cinq enfants sont allés jouer dans la belle neige blanche. Ils ont joué très longtemps. Ensuite, ils ont commencé à faire des animaux avec la neige.

Un des animaux était un chien. Bientôt le chien des voisins est sorti de chez lui. Quand il a vu le chien de neige, il a fait << Ouah, ouah! >>

Les enfants ont ri. << Maintenant, nous avons un chien qui peut aboyer! >>

A little girl ran out of a white house into a big yard. "Mother," she said, "my pet bird is gone. It went out of the open window."

Mother laughed and said, "Look on my hat." When the girl looked she had a big surprise. A yellow bird with blue wings was on Mother's pretty hat. It was the bird that flew away.

Une fille est sortie en courant d'une maison blanche et elle est allée dans un grand jardin. << Maman, >> elle a dit. << Mon oiseau est parti. Il est parti par la fenêtre ouverte. >>

Maman a ri et elle a dit: << Regarde sur mon chapeau. >> Quand la fille l'a regardé, elle a eu une grande surprise. Un oiseau jaune aux ailes bleues était sur le joli chapeau de maman. C'était l'oiseau qui s'était envolé.

Many people were busy all week on an empty lot near the park. Several boys were cleaning it off. Seven of them picked up old boards, sticks and dry branches. Others cut the tall grass and carried it away. Then all the girls raked the ground and made it smooth. At last two men came and built a strong fence. Then the children had a safe playground.

Toute la semaine, beaucoup de gens étaient occupées sur le terrain vague près du parc. Plusieurs garçons l'ont nettoyé. Sept d'entre eux ont ramassé de vieilles planches, des bouts de bois, et des branches sèches. D'autres ont coupé l'herbe haute et l'ont emportée. Ensuite, toutes les filles ont passé le rateau et ont égalisé le sol. Enfin, deux hommes sont venus construire une clôture solide. Alors, les enfants avaient un terrain de jeu sans danger.

One bright summer day twin brothers walked to a lake with their uncle to fish. They sat still for a long time waiting for the fish to bite. Finally one boy got a bite. He became so excited that he dropped his pole into the water. The fish quickly swam away with it. Soon the pole disappeared. The surprised boy looked at his uncle and then laughed.

Par une belle journée d'été, deux frères jumeaux sont allés à pied au lac avec leur oncle pour pêcher. Ils sont restés longtemps sans bouger, en attendant qu'un poisson morde. Enfin, un poisson a mordu à la ligne d'un des garçons. Tout excité, le garçon a lâché sa canne qui est tombée à l'eau. Le poisson s'est sauvé rapidement, avec la canne. En peu de temps la canne a disparu. Tout étonné, le garçon a regardé son oncle et puis, il a rigolé.

Airplane pilots have many important jobs. They fly passengers, freight, and mail from one city to another. Sometimes they make dangerous rescues in land and sea accidents, and drop food where people or herds are starving. They bring strange animals from dense jungles to our zoos. They also serve as traffic police and spot speeding cars on highways.

Les pilotes d'avion font des travaux importants. Ils transportent passagers, marchandises et courrier d'une ville à l'autre. De temps en temps, lors d'accidents sur terre ou sur mer, ils font des opérations de sauvetage dangereuses. Ils laissent aussi tomber de la nourriture là où des gens ou des troupeaux meurent de faim. Ils amènent dans nos zoos des animaux étranges venus de jungles profondes. Ils rendent aussi service comme policiers de la route et repèrent les voitures qui roulent trop vite sur les autoroutes.

One morning a big poster outside of Oak School told people about a basement bargain sale. Inside were long counters on which things collected by the children were displayed. Price tags were fastened to all articles. Most of the customers bought old but useful furniture. The sale was a huge success, and the money was used to purchase library books.

Un matin, une grande affiche à l'extérieur de l'école des Chênes annonçait aux gens une foire aux bonnes affaires. A l'intérieur se trouvaient de grandes tables exposant les affaires ramassées par les enfants. Des étiquettes affichant les prix étaient attachées à tous les articles. La plupart des clients a acheté des vieux meubles utiles. La vente était un grand succès, et l'argent a été utilisé à l'achat de livres pour la bibliothèque.

Hundreds of years ago, most of Europe was a very poor region. But China, a large country in eastern Asia, had many of the comforts of a rich civilized nation. Only a few people from Europe had visited this distant region. One was the famous Marco Polo. He learned some of the languages that were spoken in China and served its great ruler for many years.

Il y a des centaines d'années, la plupart de l'Europe était une région très pauvre. Mais la Chine, un grand pays dans l'est de l'Asie, avait plusieurs des commodités d'une nation riche et civilisée. Seules quelques personnes de l'Europe avaient visité cette région lointaine. L'une d'elle, était le célèbre Marco Polo. Il a appris quelques unes des langues parlées en Chine et a servi son grand souverain pendant plusieurs années.

For real excitement and much danger nothing can equal whale hunting. A fully grown whale has such great strength that it can terrify even very brave men. It is so enormous in size that it can easily pull a large whaling boat. It can also upset such boats and even greatly damage them. Nevertheless, men are able to capture this monster of the deep.

Rien n'équivaut la chasse à la baleine pour les sensations fortes et le danger. Une baleine de taille adulte a tant de force qu'elle peut terrifier l'homme le plus courageux. Elle est tellement énorme qu'elle peut facilement tirer un grand baleinier. Elle peut aussi faire chavirer de tels bateaux et peut les abîmer sévèrement. Néanmoins, les hommes sont capable de capturer ce monstre des profondeurs.

Rocky portions of the earth's surface are always changing. Many huge glaciers in the mountains carry along immense boulders which crush the rocks beneath. Chemicals in many streams penetrate rocks and dissolve them. Rocky surfaces are also broken up by processes of freezing and thawing which occur in most regions of alternate hot and cold weather.

Les parties rocheuses de la surface terrestre changent sans cesse. Dans les montagnes, d'énormes glaciers transportent d'immenses blocs de pierre qui broient la roche en dessous. Les substances chimiques des cours d'eau pénètrent les roches et les font dissoudre. Les processus de congélation et de décongélation qui ont lieu dans la plupart des régions où les temps froids et chauds alternent, font aussi éclater la surface rocheuse.

Mark was pleased to receive his deputy sheriff's badge, and was excited about the difficult task he faced. He had been authorized to take a prisoner to Preston, a county seat, for trial. The shrewd, nimble prisoner had previously escaped the clutches of the law. Mark was eager to demonstrate his competence as an officer by bringing in a prisoner.

Marc était content de recevoir son titre de shériff adjoint, et se réjouissait de la tâche difficile qui l'attendait. Il avait été autorisé à accompagner un prisonnier à Durtal, le siège du comté, pour jugement. Le prisonnier, agile et malin, avait échappé précédemment à l'emprise de la loi. Marc désirait ardemment prouver ses compétences d'officier en amenant le prisonnier à destination.

The oil industry has been greatly increased by recent advances in science. Geologists have discovered new ways of locating veins of oil-producing rock. Problems of gusher control have been solved. Very effective also are newer methods of refining crude oil which have resulted in a higher ratio of quality fuel oil from a given volume of crude oil.

L'industrie pétrolière s'est developpée de façon importante grâce aux progrès scientifiques récents. Les géologues ont découvert de nouvelles méthodes pour localiser les veines de roches produisant du pétrole. Les problèmes liés au contrôle des puits jaillissants ont été résolus. Très efficace aussi sont les méthodes les plus récentes de raffinement du pétrole à l'état brut qui ont pour résultat, une proportion plus élevée de mazout de qualité pour un même volume de pétrole brut.

At last the captain had selected a sturdy vessel for his dangerous voyage and prepared to sail. His first mate was a reformed buccaneer who was a proud but clever knave, and a deadly opponent in hand-to-hand encounters. The crew too was a surly lot, but the best he could get on short notice. Even before they embarked he saw mutiny lurking in their eyes.

Le capitaine avait enfin sélectionné un vaisseau robuste pour son voyage dangereux et se préparait pour le départ. Son second était un flibustier réformé qui était un fripon fier mais habile, un adversaire implacable dans le combat au corps-à-corps. L'équipage n'était qu'une bande de bourrus, mais avec si peu de préavis il ne pouvait pas trouver mieux. Même avant l'embarquement, il voyait la mutinerie cachée dans leurs yeux.