IDENTIFICATION OF READING DISABILITIES IN SPANISH:
AN ENGLISH-SPANISH COMPARISON

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Abstract

The current study examined the identification of reading disabilities in Spanish, a regular language as compared to English, an irregular language. In study one, a sample of 66 Spanish-speaking children was compared with two English samples on a language equivalent measure of word and nonword decoding. Also, a discrepancy score between those two measures was obtained to examine differences in the mastery of orthographic and decoding skills. The two English samples were exposed to two different methods of reading instruction: Phonics (n=63) and Whole Language (n=44). The results showed a language impact on the achievement for word identification (WI), no differences on word attack (WA), and a greater discrepancy between these two measures for Spanish. Spanish children obtained high scores on WI, even the reading disabled group, as classified by a nonword measure. The use of WI as the measure for identifying a reading disability in Spanish is questioned. Method of instruction showed an impact on the development of decoding skills in English. In study two, the Spanish reading profile was further examined by a 3 groups match: (1) A group of 7 reading-disabled children (RD), (2) A comparison group of 15 normal readers matched in chronological age with the reading disabled (CA), and (3) A reading level matched group of 12 younger normal readers at the same reading level as the reading disabled (RL). Measures of decoding, fluency, reading comprehension, spelling, phonological processing, language and memory tasks, were administered. The RD group performed more poorly than the RL group on nonword reading and one minute nonword reading. However, RD children obtained average scores on word identification. The CA children were superior in all the tasks except for the language and memory tasks on which both RD and CA children performed at the same level. Overall, both studies showed that a more sensitive measure, such as nonword reading or timed nonword reading is necessary to identify a reading disability in a regular language such as Spanish.
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to the memory of my

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Introduction

Definition of Reading

"Reading is the product of decoding and comprehension. Decoding, or the ability to decipher the words represented by print, is certainly not the whole of reading. Comprehension—the ability to use background knowledge and linguistic knowledge to make sense out of a message—takes place in addition to ciphering or mapping the print onto speech. For the beginning reader, no matter what age, the first and most important task is learning to decipher the print with sufficient ease and fluency that meaning can be accessed. Reading for meaning depends on being able to read the words on the page. The necessity of decoding accuracy and fluency in proficient reading at all levels has been confirmed by multiple studies. In addition, research has converged across disciplines and methodologies to demonstrate that critical prerequisite abilities enable children to learn word recognition skills. The most pivotal of those abilities is phonological sensitivity, for children and adults" (Moats, 1998 p.369).

Definition of Reading Disability

Following Moats' definition of the reading acquisition process, it is important to clarify what differentiates normal from poor readers. Research conducted with English speaking individuals has shown that proficient readers develop phonological awareness skills at a young age, and attain a level of automaticity in decoding much faster than non-proficient readers do. This enables them to read text of different complexity levels, which allows for better comprehension, and subsequently better school achievement. On the contrary, poor readers do not develop phonological awareness at the same level and as a result lack automaticity in decoding. This has an impact on their comprehension of written material. Such difficulties in phonological abilities are often accompanied by spelling difficulties (Siegel, 1999). As a result of reading and spelling problems, poor readers fall behind in other academic areas, given that a significant
amount of reading is required on a daily basis after the primary years. Hence, the profile of a reading disability becomes more and more complex as the child develops.

This overall profile of normal and reading disabled individuals (often called 'dyslexics') is common knowledge and can be observed by teachers and school psychologists. In research, for identification and diagnostic purposes, the most commonly used measure of decoding is word identification, and the typical measure of phonological abilities is nonword (or pseudoword) reading. Traditionally, researchers identify poor readers by word identification measures (WI) and examine word attack (WA) as a dependent variable (as a measure of pure phonological decoding). This research design can be found in studies conducted in regular (consistent grapheme-phoneme-correspondences-GPC) and irregular languages (inconsistent GPC) (e.g. Jiménez & Hernández, 2000; Rodríguez & Jiménez, 1999; Siegel, 1993; Siegel & Ryan, 1988; Stanovich 1988; Stanovich & Siegel, 1994). However, languages differ in orthographic depth, and the fact that children are identified as good and poor readers by word reading measures might be not effective in detecting poor readers of a language in which the GPC are easier to acquire. Research in both regular and irregular languages has shown that RD children, as defined by WI scores below the 25th percentile, also show low WA scores (which it is said to be 'the best measure of phonological abilities' –Siegel, 1994). Spanish is a regular language, hence, word identification is easier to acquire than in an irregular language such as English. Given the differences in orthographic transparency, it might be the case that by using the criterion used in research conducted in English, many RD children in regular languages will remain undetected. Thus, if word identification is easier to acquire on regular languages, RD children in regular languages may be fairly accurate in measures of word decoding, although deficient on more phonologically demanding measures (such as nonword reading), given that only the phonological route can be used for reading nonwords, whereas other strategies such
as orthographic skills (lexical route) can be used for recognizing words even in a transparent language such as Spanish (Defior, Justicia, & Martos, 1996; Rodrigo López & Jiménez González, 1999). Thus, for a child with a RD who learns to reading in a regular language, the evidence of the phonological deficit may only be reflected in nonword tasks (as a more phonological demanding task) as compared to high accuracy on WI measures (on which the reader can also apply orthographic strategies for word recognition). On the contrary, for reading in English, the irregularities of the orthography will make harder the process of acquiring orthographic skills at grades 2 and 3, and English-speaking RD children at these grades will show difficulties in recognizing words as well as nonwords (the terms nonword and pseudoword were used interchangeable).

In the first study it is hypothesized that in a regular language such as Spanish, where grapheme-phoneme correspondences (GPC) are easy to acquire, a word identification measure might not be the most appropriate measure for identifying a reading disability as compared to nonword reading. For this purpose, English and Spanish children at grades two and three will be compared in an equivalent standardized measure. If the results do not support the hypothesis, and indeed WI is an appropriate measure for regular languages, then Spanish-speaking children classified as RD by scoring below the 30th percentile in nonword reading will also show low WI scores. If on the contrary, this hypothesis is correct, Spanish-speaking RD children (classified as RD by a nonword measure) will score in the average range or near to average in WI. It is also hypothesized that the differences in WI-WA will not be significant in English at these grade levels due to the irregularity of the language.

In the second study we will analyzed the reading profile in Spanish speaking children in grades 2 to 5, classified as good and poor readers following the criterion that will be proposed in study 1 (nonword reading). Studies on regular languages indicate that we should use a different
criterion for reading achievement classification and suggest a different profile for the phonological deficit in languages with more transparent GPC. Therefore, the second study will analyze the criteria as well as the reading profile in Spanish-speaking children in light of the previous findings in other regular languages (Jiménez, Álvarez, Estévez, Hernández, 2000; Jiménez & Ortiz, 1994; Landerl, Wimmer, & Frith, 1997; Maryinger & Wimmer, 2000; Porpodas, 1999; Wimmer, 1993; Wimmer, 1996; Wimmer & Hummer, 1990). A reading level match design was used to examine the phonological-core deficit theory in the Spanish language, as well as the general profile of reading disabled readers at grades 4-5.

**Literature Review**

**Factors that have an impact on the reading profile: Language and Age of acquisition**

The first factor that has a significant impact on reading acquisition is language. The language in which the child is being taught to read has unique characteristics that may influence reading acquisition. Specifically, the orthography of the language is important to consider. Languages differ in regularity of grapheme – phoneme correspondences (GPC). Languages that have one to one grapheme-phoneme correspondences are called 'transparent', which means that they have a high level of regularity of GPC (e.g. Spanish), thus, GPCs are easier to acquire. On the other hand, languages that have more than one phoneme per grapheme are known as 'opaque', due to irregular GPC (e.g. English). In irregular languages, the process of learning the associations between the written and the spoken form of the language may take longer than in regular languages, due to the numerous exceptions in grapheme phoneme associations and the lack of consistency in rule application.

The other factor that has an impact for the reading profile and how a disability is identified is the age/grade level when the reading skills are assessed, in that the reading profile will change as the child develops and the curriculum demands increases (de Jong & van der Leij, 1999;
Wagner et al., 1997). In the first years of schooling, decoding seems to be the most important skill for measuring reading, whereas reading comprehension plays a secondary role until the child acquires some fluency in decoding. Research conducted in regular and irregular languages has shown that phonological awareness assessed in kindergarten is the strongest predictor of reading achievement in the subsequent years. After the child has been exposed to some reading experience, word decoding and nonword decoding are the two main skills that will be relevant for the mastery of reading in the first years of schooling. Once the child gains some experience in decoding, other factors start to play a role in reading. For instance, the child's vocabulary, comprehension, spelling, and fluency skills will be required given the complexity of tasks, and these skills will also affect achievement. Among other skills, reading comprehension and decoding fluency might be the most relevant variables to take into account if examining reading in children older than second or third grade—depending on the language—(de Jong & van der Leij, 1999; Landerl, Wimmer, & Frith, 1997; Siegel, 1994; Wimmer, 1996). As the child gets older, the detection seems more complex because there are more factors involved.

Reading profile across languages

Most of the evidence for the phonological processing deficit focuses on English orthography, which is a limitation for the generalization of the concept and pattern of a reading disability in other languages with orthographies that have different levels of regularity than English. Languages differ in orthographic depth. The majority of the alphabetic languages are quite transparent in their orthography and do not have as many irregularities in the grapheme-phoneme-correspondences (GPC) to the same extent as English. Studies conducted in transparent orthographies are also supportive of the phonological core theory of reading disabilities (Defior, Justicia & Martos, 1996; Jiménez & Hernández, 2000; Rodriguez & Jiménez, 1999; Mayringer & Wimmer, 2000; Wimmer, 1993-1996; Wimmer & Goswami, 1994). However,
the results suggest that phonological abilities affect reading acquisition in a different pattern than that of English. These differences in the reading profile are centered on how fast decoding is acquired and how decoding difficulties will show up in a child with a phonological deficit. Also differences in the diagnostic procedure might be applicable for languages with different levels of orthographic consistency.

As suggested before, an individual's reading profile may be sensitive to the language in which he or she is being taught to read. Thus, the profile of a reading disability may reflect the language of instruction. Most of the findings related to dyslexia, its causality and typical profile, have been based on English speaking readers. Research findings on English speaking individuals are supportive of the theory that phonological processing abilities are the core deficit of reading disabilities (Siegel, 1993; Stanovich 1988; Stanovich & Siegel, 1994; Wagner & Torgesen, 1987; Wagner, Torgesen, Rashotte, Hecht, Barker, Burgess, Donahue, & Garon, 1997). Stanovich and Siegel proposed that dyslexia is a specific disability independent of the IQ - reading achievement discrepancy, with a specific deficit for phonological processing abilities. Rodrigo Lopez and Jiménez Gonzalez (2000) also found the same results in a Spanish sample. They demonstrated the independence of IQ in the definition of a reading disability and explain the differences of good and poor readers by measures of phonological recoding. Phonological processing abilities are defined as the use of phonological or sound structure of oral language when one processes oral and written language (Wagner & Torgesen, 1987, 1997).

Reading words and pseudowords: strategies and development of these skills across languages

In studies conducted with English samples, researchers categorize children in good and poor readers examining their performance on word recognition measures, whereas pure phonological processing abilities are assessed by nonword reading tasks (i.e. Stanovich & Siegel, 1994). The selection of nonword reading for assessing phonological processing abilities is based on the fact
that in this task, children will only use phonological decoding, because they can not rely on orthographic strategies to decode a nonword. To do so they must have a good grasp of the GPCs, grasp that is generally weak for reading disabled children (e.g. Siegel & Faux, 1989). Normal readers have such a mastery of the GPC that they are able to read words and nonwords with high levels of accuracy compared to reading disabled children (Jiménez & Hernández, 2000; Rodriguez & Jiménez, 1999; Siegel, 1993; Siegel & Ryan, 1988; Stanovich 1988; Stanovich & Siegel, 1994).

For reading words one needs to use the lexical or orthographic route, thus the visual priming of the word is recognized and associated with its respective meaning (which makes the decoding easier depending on the familiarity with that particular orthographic pattern). Ehri (1997) theorized that in word recognition, sight-reading is a strong strategy used by normal readers of an alphabetic system. In her theory, she describes three phases of development. In the “pre-alphabetic phase”, children do not use letter-sound relations in their reading, but remember words by their visual attributes or visual cues (e.g. “the word yellow by the tall posts in the middle” –p. 173). This phase can also be matched to the one described by Frith (1985) as the ‘logographic phase’ in reading. Ehri’ second phase is called “partial alphabetic phase”, where children tend to rely on some of the visual and phonetic cues of the letters (usually the first and last letters). In this phase, children might be able to recognize certain sound-grapheme correspondences. The difference between this phase and the full alphabetic phase is that in this phase, children are not able to segment a word into its compounds sounds. Another difference is that readers might not be able to distinguish between words of similar spelling (e.g. “want and what” p. 175). In the full alphabetic phase, a full connection between letters and phonemes is made: “This is possible because readers know how graphemes symbolize phonemes in the conventional spelling system, and because they can segment pronunciations into phonemes....
One advantage of representing sight words completely in memory is that word reading becomes much more accurate" (Ehri, 1997, p.176). Ehri and Wilce (1983) tested English normal and disabled readers in first, second, and fourth grades. Children were exposed to familiar words and unfamiliar words (nonwords) and latency was measured. Normal children read familiar words much faster than nonwords. Disabled readers read words more slowly than normal readers and did not reach the automaticity reached by normal first and second graders in reading words, until fourth grade (automaticity defined as reading words at the same rate as reading numbers). Disabled readers were very slow and inaccurate in reading nonwords. Siegel and Ryan (1988) analyzed good and poor readers ages 7 to 14 and compared their developmental profile. The data showed that RD children performed more poorly on tasks involving the reading of pseudowords compared to words. The authors justified these findings by suggesting that the children used visual cues when reading words. Also, the proficiency of word reading increased with age and was higher than pseudoword reading. These results demonstrated the specific deficit of dyslexics in phonological processing tasks, as it is the pseudoword reading.

There is a wide body of research in English that shows that for reading words the readers tend to use the visual path or priming or lexical route, as described by Ehri's theory in the previous paragraph. However, for reading pseudowords, the phonological or non-lexical route is the only route to use. Although some analogy strategies can be applied for reading pseudowords, the RD have difficulty applying either grapheme phoneme conversions rules to pseudowords that can be read by analogy or visual strategies as compared to normal readers and thus, have less tools for decoding (Siegel, 1994). These results have also been supported by research conducted with Spanish-speaking children. Although questions have been raised about the influence of the transparency of the language on the reading strategies children will
adopt (i.e.: phonetic decoding in regular languages and sight word recognition in irregular languages), results in Spanish are similar to those of English. Defior et al., (1996) investigated the hypothesis that in a transparent language such as Spanish children will not always use the lexical route for reading words but instead the phonological route, due to the consistency in the GPCs. The lexical route implies the access to patterns of words already stored in memory. Hence, frequency words are generally read by this route, which is generally automatized by sight-reading. On the contrary, the use of the phonological route implies pure decoding of the GPCs. Defior et al, found lexicality and frequency effects in Spanish good and poor readers ages 6 to 12, meaning that even in a regular language such as Spanish, words are also stored by sight and automatized. Whereas for nonwords and low frequency words, the authors found lower reading accuracy than for reading words of high frequency. Similar results were found by Jiménez, Guzman, and Artiles (1997) in a sample of 252 Spanish-speaking children in grades one and two. In this study, the authors examined the reaction time for reading words and pseudowords controlling for their intrasyllabic structure. They found that children were able to read faster those pseudowords containing high frequency syllables, meaning that the lexical route is also a strategy that readers of a transparent language such as Spanish use to increase fluency or automatized decoding.

Based on this theory and research on the development of reading strategies for word identification and word decoding (nonwords), it appears that in both languages readers use orthographic strategies rather than phonological strategies for decoding words. It may be the case that in regular languages sight-reading strategies are employed once the GPCs are fully acquired for automatization purposes (Wimmer et al., 1994). However, for English speakers this sight vocabulary might be needed from the beginning do to the irregularity of the GPC (Goswami, 1999). For nonword reading, phonological strategies are mandatory to use because
children cannot rely on familiarity or visual recognition strategies. Thus, achievement across different languages in word attack measures should be relatively similar if the measure is been adjusted in complexity. Therefore, since word identification depends more on exposure to reading, and nonword decoding to phonological processes, although instruction in phonics is necessary but not sufficient, it is hypothesized that a discrepancy in word and nonword decoding should be expected in young normal readers not exposed to phonics and in children from a regular language as well for a child with a RD. This discrepancy will occur given that young children and RD children will rely on non-phonological reading strategies for reading words, and will be slower at reading nonwords (due to poor exposure to phonics or to a specific reading disability). The orthographic strategies used for recognizing words will not be applicable for nonword reading, producing this discrepancy between these two measures in beginning readers until GPCs are fully automatized and sight vocabulary is large enough to recognize irregular words. One hypothesis is that English is such an irregular language, that the sight vocabulary might not be large enough to acquire fluency until there has been a certain amount of exposure to text. We will explore this by examining two methods of instruction in English reading acquisition. Another hypothesis is that the discrepancy might be greater for regular languages than for irregular languages at the younger years. After a certain exposure to reading and GPCs (for decoding unfamiliar words), this discrepancy will disappear. There is evidence that suggest that in English, the phonological knowledge is not reached until the end of grade three, around 9 years of age (Ehri & Wilce, 1983; Geva & Siegel, 2000; Siegel & Ryan, 1988; Wagner et al., 1997). On the contrary, evidence in regular languages shows that this knowledge is acquired between the first and second grade of reading instruction (Cuetos, 1989; de Jong & van der Leij, 1999).
Siegel and Ryan (1988) studied the development of the ability to read words and pseudowords in normal and disabled readers ages 7 to 14. They found that by the age of nine, normal readers were quite proficient in reading up to three syllable pseudowords. On the other hand, RD children performed poorly in pseudoword reading even at the age of 14, and were quite similar in word reading to the normal readers. The discrepancy between word and nonword reading was much larger for the RD group, as compared to the normal group.

In another study, Geva and Siegel (2000) showed that bilingual children learning to read in both English (L1) and Hebrew (L2), first acquired better decoding skills in Hebrew (L2) – a regular language- than in English (L1) even in first grade. They attributed this to the fact that in this case, “...L2 is associated with an orthography such as Hebrew, which is less demanding for decoding.... Acquiring sufficient knowledge of GPC rules is more demanding in English because there are many more rules, analogies and exceptions to the rules to learn” (p. 24). In their study, children showed a great "improvement" in English reading skills from grade to grade (age effect), whereas in Hebrew the "developmental trajectory" associated with basic reading skills was "fairly monotonic" (p. 23), meaning that decoding skills were acquired in the first two years with high accuracy levels. Also, the accuracy of Hebrew reading was higher at every age level. These results suggest that in regular languages decoding skills (automatization of grapheme/phoneme associations) are acquired more easily or ‘faster’ than in languages with a more inconsistent GPC. The authors also reported that in English, children scored higher in pseudoword reading compared to their word reading. On the contrary, in Hebrew, pseudoword decoding (nonword) was lower than word decoding. The scores obtained in Hebrew reading were higher than the English scores in both word identification and nonword reading until grade 4. In grade 5, both languages showed same reading profile, with no significant differences. These differences among word identification and word attack skills are not commonly reported,
but are critical to consider in the identification of reading disabilities in more regular languages such as Spanish. However is important to note that in this study, the measure used for Hebrew reading was not a standardized test.

Wagner et al. (1997), in a longitudinal study with English speaking children demonstrated that decoding accuracy seems to be reached after a much longer period (around 3rd to 4th grade) than for speakers of more regular languages. Over a 5 years period, Wagner et al. demonstrated that in English "the influence of individual differences in phonological awareness is not developmentally limited to beginning reading but in fact extends at least through fourth grade" (p. 476). On the other hand, research conducted in regular languages found that children acquired decoding abilities between 1st grade and 2nd grade (De Jong & van der Leij, 1999; Geva & Siegel, 2000; Frith, Wimmer & Landerl, 1998; Landerl et al., 1997). In a longitudinal study with Dutch children de Jong and van der Leij (1999) showed a different profile for the incidence of phonological abilities (measured as phonological awareness) for this regular language: "...the importance of phonological abilities for learning to read appeared to be limited to the first year of reading instruction" (p.467); "...after this year, as reading ability became more stable, the additional effects of these abilities diminished and further individual differences in reading acquisition could be accounted for by reading ability at the end of Grade 1" (p.471).

Findings comparing English and German samples (e.g. Frith, Wimmer & Landerl, 1998; Landerl Wimmer, & Frith, 1997; Wimmer & Goswami, 1994) demonstrated an orthographic and age effect on the acquisition of reading. By the age of seven, German children had acquired accurate level of decoding, whereas English-speaking children did so at the age of nine. German children demonstrated accurate decoding for both words and nonwords, whereas English children made many errors when reading words and nonwords. Also, the German sample (normal and disabled readers) showed an advantage over the English sample in reading.
speed (Landerl, Wimmer, & Frith, 1997). Frith, Wimmer, and Landerl, (1998) examined English and German samples of 8 and 12 year olds. By the age of 8, the accuracy of the English was low compared to the German-speaking children. By the age of 12, both language groups had reached the same level of fluency for word and nonword reading. However, in these studies the measures used were non-standardized, thus, the failure to find poor accuracy in RD children of the regular language might be reflective of the measures used.

Oney and Goldman (1984) in their study examining US (English-speaking) and Turkish students attending first and third grade showed that Turkish children read pseudowords faster and more accurately than US children. The difference in accuracy was large in grade one (English 38% - Turkish above 88%) and there was a decrease on the difference in grade three (English 75% - Turkish above 90%). The authors did not find significant differences in accuracy in the regular language, and argue that the changes from first to third grade reside in increased speed of decoding. On the contrary, for English-speaking US students, both accuracy and speed of decoding increase from grade one to grade three. In both German and Turkish studies, pseudoword lists were of the experimental type and not standardized for equivalency in both languages.

Goswami, Gombert and Barrera (1998), in a study examining the interaction between language (English, French and Spanish) and age (7, 8, and 9 years olds) in nonword reading, found that the Spanish children at the age of 7 were significantly more accurate in reading nonwords compared to French children, who were also more accurate than the English children. In analyzing the Spanish children results alone, they found that nonwords were read accurately. However, since the measure was an experimental task, the author attributes these results to possible ceiling effects.
Studios conducted in Spanish with good and poor readers, demonstrated poor nonword reading accuracy in RD children as well as slow reading -higher reaction time for decoding isolated words and nonwords- (Defior, Justicia, & Martos, 1996; Jiménez González, & Ortiz González, 1994; Rodrigo & Hernández Valle, 2000; Rodrigo & Jiménez, 2000; Rodrigo & Jiménez, 1999; Valle Arroyo, 1989). In these studies, authors used experimental tasks controlling for lexicality, syllable frequency and length of the stimuli. In the Spanish language, there are not many developmental studies in normal reading acquisition. However, as a regular language, the GPCs are considered easy to acquire. Cuetos (1989) examined children ages five and six, and found that the alphabetical knowledge in Spanish develops quickly.

The differences in the regularity of the English and Spanish orthographies might account for the differences in the age children are fluent at word identification and phonological decoding (pseudowords). These differences might be also true in the presence of a reading disability, where RD children of a regular language might be at an advanced level of decoding compared to those of an irregular language, due to the phonological demands of learning to read in a language with inconsistent GPCs. Thus, although differences among word and nonword decoding might be true in both languages due to the strategies involved in reading the two types of words, a comparison of two languages in the equivalent (standardized) measure might show that the readers of the regular language (Spanish) will score at higher levels in word identification compared to the readers of an irregular language (English), as demonstrated in research comparing German and English samples. However, due to the high regularity of the language the same might be true with pseudoword reading, depending on the sensitivity of the measure used. These differences might affect the criteria researchers will use to identify a reading disability.
Role of word identification and word attack measures in the identification of a reading disability

After considering the skills involved for word and nonword reading, and the strategies with which reading is approached in each language, it is clear that there are advantages of using nonword reading tasks as the measure of phonological processing. Nonword measures are definitely important in categorizing good and poor readers when comparing two languages with different regularity levels. Despite the fact that in every language some kind of deficit is observed in the RD nonword reading (reading speed for German and Dutch samples; accuracy in Spanish and Hebrew samples), educational psychologists in everyday practice, and researchers have not incorporated 'nonword tasks' for diagnostic and identification purposes. Also some researchers use only reading comprehension measures, however, word identification measures are still the primary task for discriminating between good and poor readers.

The literature shows that in regular languages word identification is acquired and mastered earlier in development (grades 1 and 2) than in irregular languages such as English (third grade). Consequently, word recognition might not be as effective as nonword decoding in identifying those poor readers for whom their native language is transparent, given that they will learn to decode words much faster. This early mastery of word decoding will allow them to build up sight vocabulary before readers of irregular languages do. However, for a child with a specific reading disability, even in a regular language, sight vocabulary will not be enough to master text reading according to his/her age or grade level. These specific difficulties are detectable by measures of phonological decoding. If the measure is sensitive to the orthography of the language, it will be sufficient for detecting a disability in reading.

Literature that examined decoding skills in reading disabled individuals shows that nonword reading measures are more phonologically demanding in every language. Research in English has shown that poor readers make a great amount of errors while reading nonwords, scoring far
behind the normal readers and reading-level matched peers (Gottardo, Chiappe, Siegel, & Stanovich, 1999; Siegel, 1993; Siegel & Ryan, 1988; Stanovich 1988; Stanovich & Siegel, 1994). On the other hand, studies conducted with German speaking samples (German is a regular language), found accurate word and nonword decoding, with low error rates. Wimmer, Frith and Landerl in several studies (Frith, Wimmer & Landerl, 1998; Landerl Wimmer, & Frith, 1997; Wimmer & Goswami, 1994), have shown that although poor German speaking readers scored higher than matched English readers on those measures, they showed slower reading rates than age and reading achievement matched groups of the same language. Oney and Goldman (1984) also found that Turkish students attending to grades one and three, were far more accurate and faster than US students in measures of pseudoword decoding. Studies conducted in Spanish samples have found word and nonword reading as effective measures for distinguishing good from poor readers, when the stimuli was highly controlled for frequency, length and intrasyllabic structure (Defior, Justicia, & Martos, 1996; Jiménez & Hernández Valle, 2000; Rodrigo López & Jiménez González, 1999; Rodrigo López & Jiménez González, 2000).

In research conducted in English, the classification measure to identify good and poor readers has been the use of word identification measures with a certain cut-off score (usually below the 25th percentile) (Siegel, 1999). These cut-off score is an arbitrary number that classifies 7% to 8% of the population as reading disabled (Siegel, 1999). This arbitrary classification criterion has been based on research conducted with English samples. As discussed in the previous paragraphs, in regular languages, children reach automaticity in word recognition skills during the first two years of exposure to reading. Consequently, that cut-off score for word recognition might only capture those severe dyslexics that are still struggling at word decoding. However, most of the Spanish-speaking RD children score within the average range on measures of word reading. Defior, et al. (1996) examined Spanish-speaking children,
and demonstrated that poor readers (reading achievement two years below their chronological age) read words with a 59% level of accuracy. Only in the nonword category, RD achieved 30% correct. On the contrary, normal readers obtained a 74% level of accuracy in word reading and 51% on the nonword category. Both normal and RD children obtained accurate word reading, although RD scores were lower. The only measure on which the RD children struggled the most was on nonword reading. Also, Rodrigo López and Jiménez González (1999) examined the word naming errors of normal readers and reading disabled children in Spanish. They found that RD children were able to decode familiar words fairly accurately, however they made more errors in nonwords, low frequency words and longer words. Based on these studies conducted in regular languages that showed that children tend to read words fairly accurately, it is hypothesised that word recognition might not be as adequate for differentiating good from poor readers in other languages as it is in English, (Defior, et al., 1996; Wimmer, 1993, 1996; Wimmer & Goswami, 1994, Landerl et al., 1997).

In terms of classification measures used in regular languages, most researchers have been following the tradition of research used with the English language. Recently, some researchers in regular languages have taken into account the impact of language on the acquisition of decoding skills, and started to use other measures for diagnostic purposes. The literature in languages with a more consistent GPC for decoding (Greek, German, Hebrew, Spanish, Dutch), shows a wide variety of criteria for reading achievement classification, that range from word identification measures to reading speed, and accuracy in spelling (see Table 1). In many studies, the authors report a primary selection by teachers' judgements, followed by a second selection of subjects based on an assessment using standardized measures (if available) of word reading. For most of language comparison studies, experimental lists of words and pseudowords are developed, trying to control for length, frequency, intrasyllabic structure or
equivalency between the two languages' stimuli. In only in two studies conducted with Spanish children, a standardized measure of nonword reading was used as the classification measure for differentiating good from poor readers (Jiménez et al., 2000; Jiménez & Ortiz, 1994).

Other researchers have compared performance in reading across languages or within a language without looking at the profile among good and poor readers. In these language comparisons, the main focus was the reading profile at different age and grade levels, including both good and poor readers (de Jong & van der Leij, 1999; Frith et al., 1998; Oney & Goldman, 1984; Wimmer & Goswami, 1994).

The research with disabled readers in English has consistently shown that RD children have weak decoding skills (nonword reading skills) and are slow and sometimes inaccurate at reading words by sight (word recognition skills) (Ehri & Wile, 1983; Rack, Snowling, & Olson, 1992; Siegel & Ryan, 1988; Stanovich & Siegel, 1994). This evidence is based on readers that are also weak at word recognition skills, as word identification was the measure used to classify good and poor readers. English as an irregular language has inconsistent GPC, therefore, it is hypothesized that poor readers will show low levels of accuracy at either word or nonword decoding. In regular languages, the evidence varies among studies conducted in German and studies conducted in Spanish. As described before, studies conducted in German showed that RD children had accurate word and nonword decoding, but slow reading. Studies conducted in Spanish show low accuracy levels in nonword reading measures as well as slow reading in children also categorized as RD by word identification measures (Defior, et al, 1996; Rodrigo & Jiménez, 1999).

The literature in reading disabilities across languages has not widely examined the differences in word identification in languages with different orthographies. Although researchers have examined nonword or pseudoword profiles based on RD children with low
word identification scores, there is not much history of comparing the profile of word identification based on a nonword categorization measure of reading achievement. It is surprising that nonword reading has not yet been established as “the diagnostic measure” of a RD, given the robust evidence for the phonological processing deficit and that pseudoword reading is considered to be “the best measure of phonological processing skills” (Siegel, 1998, p.141) and “the most significant measure of phonological processing” (Siegel, 1993). For diagnosing a reading disability, “a pseudoword reading test constitutes the most accurate test of a reading disability…and word recognition tests are the next best alternative” (Siegel, 1989, p.476). In another paper (1999), Siegel asserted that for English, “both pseudoword reading and word reading assess the basic problem in dyslexia” (p.309), but pointed out that the pseudowords do not confront the individual with familiar words (that can be read by sight), forcing the reader to use the phonological route (which is at the core of the deficit). The fact that in English both word and nonword reading assess the basic problem of dyslexia, might no be true of Spanish, where only a sensitive measure such as pseudoword reading may reflect the phonological deficit.

**Table 1. Criteria used by researchers of regular languages in examining NR and RD between or within a language.**

<table>
<thead>
<tr>
<th>Study</th>
<th>Language</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valle Arroyo, 1989</td>
<td>Spanish</td>
<td>Teacher’ judgement alone</td>
</tr>
<tr>
<td>Wimmer &amp; Hummer, 1990; Wimmer, 1993; Maryinger &amp; Wimmer, 2000; Rodrigo &amp; Jiménez, 1999; Rodrigo &amp; Jiménez, 2000 Jiménez &amp; Rodrigo, 1994</td>
<td>German</td>
<td>Teacher’ judgement plus other standardized measure of reading and/or spelling (below the 25th percentile for poor readers) and normal IQ</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>Poor readers Below 25th percentile on word reading Good readers: above 75th percentile on at least 3 measures of a battery that includes letter, syllable, word reading, spelling and reading comprehension.</td>
</tr>
</tbody>
</table>
Impact of the orthography and method of instruction on the developing of reading skills

Research in reading disabilities also suggests that method of instruction might have an impact on the development of reading skills. Although method of instruction has been mentioned as an important factor on reading acquisition, researchers that conducted studies across languages have not yet compared the interaction between method of instruction and different orthographies. The language and the culture will influence instruction promoting the development of certain skills. For instance, in English, orthographic recognition is more encouraged than phonetic analysis because it provides the child with a pattern for word recognition based on rhymes and spelling patterns (Goswami, 1999). On the contrary, in transparent languages, phonetic analysis is encouraged from the beginning, presumably because the GPCs are more straightforward and easy to learn. Furthermore, in languages with transparent GPCs, early phonetic instruction appears to be irrelevant for normal reading instruction given that basic reading skills are rapidly acquired, although it might be beneficial for disabled readers. De Jong and van der Leij (1999) referred to this issue in their study: “In the
Dutch school system, reading and reading related skills are not taught in kindergarten.... In the
Netherlands, formal reading instruction starts in Grade 1"(p. 472). These might be due to the
fact that transparent languages are straightforward to learn, and children acquire the basic skills
without that much effort. Whereas in English, in order to have good reading skills, children need
to master a great number of unpredictable rules and exceptions, due to the irregularity of the
language. There are two main approaches to teach reading: phonics and whole language.
Phonics emphasises GPC and Whole Language do not makes explicit the GPC. In Canada,
reading acquisition generally starts at grade 1. In terms of method of instruction, there are some
schools that emphasises phonics, as well as other schools that implement a whole language
approach for reading instruction. It is of interest for this study to compare these two approaches
on the acquisition of decoding skills (word and pseudoword recognition) in English, as well as to
compare them with the acquisition of reading skills in a regular language such as Spanish. For
the purpose of this study, we gathered two samples of English-speaking children, one instructed
by a phonics approach and the other by a whole language approach. Also we compared them
with Spanish-speaking children, a regular language that is straightforward to learn and is taught
with an emphasis on the grapheme phoneme correspondences (phonics).

STUDY 1: AN ENGLISH-SPANISH COMPARISON

The goal in study 1 was to examine the profile of reading in word identification (WI) and word
attack (WA) skills in Spanish and English samples, at the second and third grade levels. The
study was designed to examine whether it is effective to use a word identification measure for
categorizing good and poor readers in a regular language such as Spanish or whether is better
to use a pseudoword reading measure. The profile of the language groups was compared on
each measure, and the discrepancy (between WI percentile and WA percentile) and range on
those measures was examined to observe if the skills in decoding word and pseudowords
profiles across and within the two languages. Differences among the English samples were also observed, to see potential differences of method of instruction in the development of reading skills, and to make comparisons with the Spanish group. Finally, a categorization of reading achievement by a pseudoword reading measured was conducted to examine the profile in word identification of those considered poor readers. Contrary to what has always been used in reading achievement studies, in this study the independent measure used was pseudoword reading (also referred as nonword reading), and the dependent measure was word identification. Grade was introduced as another factor to observe possible interactions across language, reading achievement and grade.

Decoding was measured by standardized word and nonword reading lists that are equivalent across the two languages (Woodcock & Johnson 1989; Woodcock & Muñoz-Sandoval, 1996). It was hypothesised that there would be a difference across languages in word identification, with Spanish speaking children scoring better than English readers on this measure, due to the regularity of Spanish grapheme-phoneme correspondences (GPC). Individuals were classified as poor readers if they fell at or below the 30th percentile on a standardized measure of nonword reading (Jiménez González et al., 2000). Pseudoword reading measures have shown to be accurate in the identification of phonological processing deficits in many languages (Jiménez & Hernández, 2000; Rodriguez & Jiménez, 1999; Siegel, 1993; Siegel & Ryan, 1988; Stanovich 1988; Stanovich & Siegel, 1994). However, most of the investigators do not use pseudoword reading as the independent measure for classification. The cut-off score was chosen based on Spanish studies that employed a cut-off score of 30th, given that Spanish is a very regular language (e.g. Jiménez et al., 2000; Jiménez & Ortiz, 1998).

This study was designed to demonstrate the fact that in a regular language a higher level of accuracy is expected for word identification as compared to pseudoword reading (also referred
as nonword or word attack skills). As a result, it is expected that Spanish-speaking RD children, as classified by pseudoword reading (as a measure of the phonological deficit in dyslexia) will show average or near to average word identification skills. It is expected that English speaking RD children, as classified by a pseudoword reading measure, will still show poor word recognition skills due to the irregularity of the language and to the fact that the sight vocabulary needed for dealing with the irregularities of the English orthography will not be large enough at grade 3 to compensate for their phonological deficit to decode words. Therefore, we propose that the categorization measure for reading ability in regular languages should be pseudoword reading tasks instead of word reading measures as it is in English.

Method

Participants

In the Spanish sample there were 66 Spanish-speaking children from Buenos Aires - Argentina in grades two and three. Some of the children were from a middle class private school, while others came from a psychoeducational assessment clinic in the same city. All children were attending the same type of schools. Children were tested individually by educational psychologists. Normal and disabled readers came from both sources. Children with neurological problems, severe behavioral deficits, and sensory deficits were excluded from the sample. The mean age of the sample was 7.9 years (M=95.9 months; SD=8.21). Children in grade two were 7.5 years old (M=90 months; SD=6.59) and children in grade three were 8.5 years old (M=102 months; SD= 4.84). The children came from different schools, but were instructed on the GPCs. A complete description of the means for age and standard deviations can be found on table 2 (p. 24).

In the first English sample (exposed to phonics instruction) there were 63 Canadian English-speaking children from a middle class public school. Children were tested between in the spring
of 2000 (grade 2) and 2001 (grade 3). The mean age of the sample was 8.2 years (M=99 months; SD= 6.76). Children at grade two were 7.8 years old (M=94 months; SD=4.25). Children at grade three were 8.7 years old (M=105 months; SD=3.4). The children belonged to a district with a direct instruction of the GPCs (phonics instruction).

The second English sample (Whole Language) was composed of 44 Canadian English-speaking children from two middle class public schools. The mean age of the sample was 8.1 years (M=97.6 months; SD= 8.13). Children at grade two were 7.6 years old (M=92 months; SD=4.74). Children at grade three were 8.8 years old (M=106.7 months; SD=3.77). Children attending these schools belonged to a district with a philosophy of whole language reading instruction (with a non explicit GPCs instruction).

The two language samples were matched on grade and age level.

**Table 2. Study 1 - Sample Descriptives**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Spanish</th>
<th>English Phonics</th>
<th>English Whole Lang.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Grade 2</td>
<td>Grade 3</td>
</tr>
<tr>
<td>Age (months) M</td>
<td>90.0</td>
<td>94.0</td>
<td>92.0</td>
</tr>
<tr>
<td>SD</td>
<td>6.5</td>
<td>4.2</td>
<td>4.7</td>
</tr>
<tr>
<td>NR (n)</td>
<td>25</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>RD (n)</td>
<td>11</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

NR= normal readers; RD= reading disabled.

The first goal was to assess the profile on word identification and word attack across languages. The second goal was to assess word identification in RD children, therefore we classified children as reading disabled (RD) following the criteria used by Jiménez et al (2000) in
a study conducted with Spanish-speaking children. Children were considered RD if scoring below the 31st percentile on a pseudoword reading measure that is equal for both languages (Woodcock & Johnson, 1989; Woodcock & Muñoz, 1996). Children scoring above the 30th percentile were considered normal readers (NR). The descriptives of the sample are shown in table 2 (page 24).

Measures

In order to be able to compare the same ability in two languages, a standardized measure equivalent for English and Spanish in item complexity and norms was used (Woodcock & Johnson, 1989; Woodcock & Muñoz-Sandoval, 1996).

English Measures

- Woodcock Johnson Psycho-educational Battery - Revised (Woodcock & Johnson, 1989): Word Identification. This subtest is made up of a word-reading list of increasing difficulty. Each child was presented with four to six words at a time. The task was discontinued after 6 consecutive failures. Sample words included: when, about, shoulder, experiment.
- Woodcock Johnson Psycho-educational Battery - Revised (Woodcock & Johnson, 1989): Word Attack. This subtest is made up of a pseudoword-reading list of increasing difficulty. Each child was presented with four to six pseudowords at a time. If the child failed to read the word within 5 seconds, the examiner pointed to the next word. Syllabic reading was explicitly not allowed. The task was discontinued after 6 consecutive failures. Sample words included: nan, zoop, snirk, quantric.

Spanish Measures

- Woodcock Johnson Psycho-educational Battery in Spanish- Revised (Woodcock & Muñoz-Sandoval, 1996): Word Identification. This subtest is made up of a word-reading list of increasing difficulty. Each child was presented with six words at a time. If the child failed to read the word within 5 seconds, the examiner pointed to the next word. Syllabic reading was explicitly not allowed. After 6 consecutive failures, the task was discontinued. Sample words included: de, luz, niño, silueta, perjuicio.
- Woodcock Johnson Psycho-educational Battery in Spanish- Revised (Woodcock & Muñoz-Sandoval, 1996): Word Attack. This subtest is made up of a pseudoword-reading list of increasing difficulty. Each child was presented with four to six pseudowords at a time. If the child failed to read the word within 5 seconds, the examiner pointed to the next word. Syllabic reading was explicitly not
allowed. After 6 consecutive failures, the task was discontinued. Sample words included: dul, ep, crullo, distrum, honrultar.

Results

Word identification, pseudoword decoding, and word-pseudoword discrepancies across languages/method of instruction and grade level.

The means obtained on word identification, word attack and the discrepancy between these two measures are described in tables 3 to 5 (pp. 29 and 31-34).

A 3 x 2 (language/method of instruction by grades two and three) analysis of variance (ANOVA) was conducted between English and Spanish. We split the English sample in two groups [Spanish, Phonics (English) & Whole Language (English)], according to the method of instruction the children were exposed to. Spanish-speaking children were exposed to GPC instruction (similar to phonics) and had the advantage of the transparency of the orthography in learning to decode it. For this study we did not have two different instruction approaches for Spanish, however, Spanish contrasted with English in terms of the inherent regularity of the Spanish orthography. The results revealed a main effect for language/method, for word identification (WI), $F(2, 173)=4.99, p<.01$, and for the word identification-word attack discrepancy (WI-WA), $F(2, 173)=22.97, p<.001$. There was no significant effect for word attack (WA), which shows that the two languages (and English in the two instruction approaches) did not differ in word attack skills at this stage of reading acquisition (i.e. grades two and three). A Tukey multiple comparison test indicated that Spanish children achieved significantly higher than Phonics $(t = 13.23; p = .025)$ and Whole Language children in WI $(t = 1.83; p = .013)$. All the groups differed in WI-WA discrepancy. Spanish showed the greatest WI-WA discrepancy [(from Phonics, $t = 21.16; p < .001$; from Whole Language, $t = 10.03; p = .008$], followed by English-Whole Language, and then English-Phonics instruction (that was below Whole
Language as well). The means for English (2 approaches) and Spanish are plotted in Figure 1. The differences between Phonics and Whole language were not significant either for WI and WA, when the two grades and good and poor readers were combined (see Table 3 and fig. 1).

Figure 1.
Mean Scores on Decoding Measures and WI-WA discrepancy

A main effect of grade in WI-WA difference was observed. Therefore, separated ANOVAs for grade by language/method of instruction were conducted to observed on which grade and approach the differences on WI-WA discrepancy and on WI occurred.

The ANOVA on Grade 2 by Language/ Method of instruction revealed no effect for WI and a main effect for WI-WA, $F(2, 97) = 8.592, p<.001$. Tukey's Post Hoc tests indicated that Spanish speaking children had a greater WI-WA than English-Phonics ($t = 16.44; p=.001$), but not from the Whole Language group.

The ANOVA on Grade 3 and Language/ Method of instruction indicated a main effect for WI, $F(2, 75)= 6.95, p=.002$ and for WI-WA, $F(2, 75)=17.37, p<.001$. There was no significant effect for WA skills. Tukey's post hoc tests indicated that Spanish-speaking children in grade 3 were significantly different from English-speaking children in WI for both educational groups: Phonics ($t = 23.52; p = .004$) and Whole Language ($t = 24.33; p = .013$). However, Spanish speaking children significantly differ on WI-WA discrepancy only from English-Phonics ($t = 27.56; p=.001$).
The difference in WI-WA was not significant for Whole Language \((t = 10.28; \ p = .169/\text{ns})\). Also, the Whole Language group showed a greater WI-WA discrepancy than the Phonics group \((t=17.28, \ p = .008)\).

To further examine possible differences within language/method of instruction and grade, T-tests within Language/method of instruction and grades 2-3 were conducted. The results revealed a significant difference between grades in the Spanish sample in WI, \([t (65)= 2.47, \ p = 0.16]\), and in WI-WA, \([t(65)= 2.34, \ p = .022]\). Analyses of the means indicated that both the WI and WI-WA increased for Spanish from grade 2 to grade 3. Further analysis of the Spanish sample indicated that these differences were significant for the RD group (further analyzed in the next paragraphs). For the English samples, there were no significant differences for the Phonics group. However, as in Spanish, a greater WI-WA was found for the Whole Language third graders group \([t(44)=2.47; \ p=.016]\). As in Spanish, these differences were in the RD group (further analyzed in the next paragraphs). No differences were found in WA skills between grades and approaches/languages.

**Table 3. English and Spanish Mean Scores on WI, WA, & WI-WA**

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Spanish</th>
<th></th>
<th>English-Phonics</th>
<th></th>
<th>English-Whole L.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Word Identification Percentile</td>
<td>70.49</td>
<td>(31.12)</td>
<td>58.02</td>
<td>(30.92)</td>
<td>55.87</td>
<td>(23.64)</td>
</tr>
<tr>
<td>Word Attack Percentile</td>
<td>50.30</td>
<td>(27.88)</td>
<td>56.10</td>
<td>(31.07)</td>
<td>44.49</td>
<td>(26.64)</td>
</tr>
<tr>
<td>WI-WA Discrepancy</td>
<td>20.53</td>
<td>(22.31)</td>
<td>-.63</td>
<td>(12.99)</td>
<td>11.37</td>
<td>(16.24)</td>
</tr>
</tbody>
</table>
In order to examine possible interactions between reading achievements between and within language/method and grade, we divided the sample in normal and disabled readers. We used WA as the categorization variable, as it has been shown to be the most stable variable across languages in that no differences in word attack were found between Spanish and English (both approaches). Children were classified as reading disabled using the criteria outlined before (page 20). ANOVAs for WI and WI-WA discrepancy were conducted.

Word Identification across language/method of instruction, by grade & reading achievement

The results of a 3 x 2 x 2 ANOVA (language/method x grade x reading achievement) on Word Identification (WI) revealed again a language/method of instruction effect, $F(2, 173)=9.87$, $p<.001$. Tukey's Post hoc tests on language/method of instruction showed that Spanish differed from both English groups (Phonics and Whole Language) on WI. Spanish-speaking children obtained the highest performance in WI compared to the other two groups. The differences between Phonics and Whole language were not significant; however, they became significant in the presence of reading achievement (further analyzed in the next paragraphs). There was also a significant main effect for grade, $F(2, 173)=13.65$, $p<.001$ and for reading achievement, $F(1, 173)=133.41$, $p<.001$.

As there was a three way interaction (language/method x grade x reading achievement) [$F(2, 173)=5.01$, $p=.008$], we run 3 two-ways ANOVAs by language/method, to examine the differences. Also T-tests were carried out to compare reading groups at different grade levels on each approach.
Word Identification in English-Phonics vs. English-Whole Language

A 2 x 2 ANOVA (grade x reading achievement) for both Phonics and Whole Language, revealed no effects for grade within approaches of instruction. Main effects on reading achievement were found in both English approaches [Phonics $F(1, 62)=71.37, p<.001$; Whole Language, $F(1, 43)=26.28, p<.001$]. As expected, RD children performed more poorly than normal readers on measures of WI. Analysis of the means by grade in the Phonics group revealed that RD children at both grade levels were below the 30th Percentile in WI. Within the Whole Language group, RD children at grade three obtained higher WI scores (mean: 40th Percentile) than the RD at grade two (20th Percentile). T-Test for equality of means indicated that RD third graders in the Whole Language group were significantly better on WI skills [$t(14)=3.47, p=.004$] than the Phonics group. The means for the two English approaches at grade 3 are presented in table 5. There were no significant differences between second graders between the two approaches.

Although WA scores were used as the reading achievement classification variable, an analysis of WA skills was conducted between English Phonics and English Whole Language across the normal and reading disabled children. T-tests revealed an advantage for the normal readers in the Phonics group as compared to the normal readers in the Whole Language group at both grade levels [Grade 2, $t(43)=2.15, p=.037$; Grade 3, $t(28)=2.36, p=.025$]. Differences in WA skills were not significant for the RD group (as the same criteria was used in the classification).
Table 4. Mean Scores on WI, WA and WI-WA by Language/method of instruction and Reading achievement at grade 2.

<table>
<thead>
<tr>
<th>Language / Instruction Method</th>
<th>Normal Readers</th>
<th>Reading Disabled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spanish</td>
<td>E-Phonics</td>
</tr>
<tr>
<td>Tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WI Percentile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 80.44</td>
<td>69.52</td>
<td>62.68</td>
</tr>
<tr>
<td>SD 21.65</td>
<td>22.09</td>
<td>24.35</td>
</tr>
<tr>
<td>WA Percentile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 60.84</td>
<td>69.13</td>
<td>56.27</td>
</tr>
<tr>
<td>SD 22.00</td>
<td>21.04</td>
<td>18.90</td>
</tr>
<tr>
<td>WI-WA discrepancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 20.00</td>
<td>0.39</td>
<td>6.40</td>
</tr>
<tr>
<td>SD 20.72</td>
<td>15.12</td>
<td>13.11</td>
</tr>
</tbody>
</table>

NR= normal readers  RD= reading disabled.

Word Identification in Spanish

The 2 x 2 ANOVA for the Spanish group revealed a main effect for grade \( F(1,66)= 20.38, p<.001 \], as well as for reading achievement \( F(1,66)= 51.92, p<.001 \]. A grade x reading achievement interaction was detected \( F(1,66)= 8.95, p=004 \]. The results of a t-test comparing normal and disabled readers revealed that the differences in WI occurred in the RD groups \( t(18) = 3.95, p<.001 \]. Analysis of the means indicated that word identification skills were higher in the Spanish RD group at grade 3 than in the RD group at grade 2. Spanish RD children in
grade three obtained an average percentile of 65th on WI, although their WA scores remained at the 30th percentile (as the classification measure used selected those scoring below the 31st percentile). The means are presented in tables 4-5 (pp. 31, 34).

Compared to the two English groups, Spanish RD children showed better WI skills at grade three, achieving a score in the average range whereas their counterparts in the English-Phonics and English-Whole Language groups obtained lower scores [Phonics, $t$ (19) = 4.63, $p = .001$; Whole Language, $t$ (15) = 1.910, ns]. The Phonics RD group was below the 30th percentile and Whole Language RD group was below the 44th percentile.

**Discrepancy on Word Identification -Word Attack scores across language/method of instruction, by grade & reading achievement**

The discrepancy score (WI-WA) was obtained by subtracting word attack percentile scores (WA) from word identification (WI) percentile scores. As word identification is more related to orthographical decoding and word attack to specific phonological decoding, we expected that these scores would reveal the discrepancy between orthographic and phonological decoding skills. A large positive score on WI-WA would mean that the group is more skilled in orthographic skills than phonological skills, or that orthographic skills are widely beyond the phonological decoding skills. A negative score will indicate that the group is more skilled on WA skills. A neutral WI-WA score will mean that there is no difference between WI and WA skills. We wanted to observe differences in this new score, considering grade, reading achievement and language / method of instruction. As noted before, it was expected a greater discrepancy in the Spanish sample at these grade level (2-3).

**Discrepancy on Word Identification and Word Attack scores: Spanish**

The 2 x 2 ANOVA (grade x reading achievement) for Spanish revealed a grade effect [$F(1, 66) = 13.50, p < .001$] and an a grade x reading achievement interaction [$F(1, 66) = 13.30$, $p =$
p<.001]. As previously described, WI scores increased from grade two to grade three, therefore the WI-WA discrepancy scores increased as well [t= 2.34, p=.022]. The WI-WA discrepancy in Spanish was greater than English Phonics at both grades and reading groups [Grade 2, t = 3.717 p=.001; Grade 3, t= 4.175, p=.001]. Spanish generally showed positive differences indicating a better mastery of WI skills over the WA skills. As compared to the Whole language group, the WI-WA scores were greater for Spanish only as compared to normal readers at grade two, (t= 2.644, p=.011). The means for Spanish are presented in tables 4 and 5.

Word Identification - Word Attack Discrepancy scores: English Phonics vs. English Whole Language

A 2 x 2 ANOVA for English-Phonics, revealed no effects for grade and reading achievement. A grade effect was found for the Whole Language group. T-test for equality of means indicated that children at grade 3 showed a greater difference as compared to those in grade two (t (44)=2.51; p=.016). T-Tests comparing the two approaches by grade and reading achievement revealed that RD children in the Whole Language approach had a greater discrepancy between WI-WA at both grade levels than those of the Phonic approach [Grade 2, t (14)= 2.38, p=.032; Grade 3, t (14)=4.03, p =.001]. However, the standard deviation showed a greater variation, and an individual analysis of the scores also revealed that a great number of English-Phonics children had a negative difference (better word attack than word identification skills). In the Whole Language approach, the difference was generally positive but still lower than in Spanish due to the lower scores of the Whole Language approach on WI and at the relatively similar scores on WA skills. The means for the two English approaches are presented in tables 4 and 5.
Table 5. Mean Scores on WI, WA and WI-WA by Language/ method of instruction and Reading achievement at grade 3.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Language / Instruction Method</th>
<th>NR</th>
<th>RD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NR</td>
<td>RD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spanish</td>
<td>E-Phonics</td>
</tr>
<tr>
<td>WI Percentile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>88.95</td>
<td>77.75</td>
<td>67.30</td>
</tr>
<tr>
<td>SD</td>
<td>(16.42)</td>
<td>(24.35)</td>
<td>(14.46)</td>
</tr>
<tr>
<td>WA Percentile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>68.30</td>
<td>77.35</td>
<td>54.30</td>
</tr>
<tr>
<td>SD</td>
<td>(21.68)</td>
<td>(22.73)</td>
<td>(29.54)</td>
</tr>
<tr>
<td>WI-WA discrepancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>20.15</td>
<td>0.40</td>
<td>13.00</td>
</tr>
<tr>
<td>SD</td>
<td>(16.91)</td>
<td>(12.7)</td>
<td>(18.46)</td>
</tr>
</tbody>
</table>

NR= normal readers RD= reading disabled.
* score in the average range.

Discussion

Languages with a different Orthography: identification of a reading disability at grades 2 and 3

The present study demonstrated that there were language differences for word identification performance using a standardized language equivalent measure (Woodcock & Johnson, 1989; Woodcock & Muñoz, 1996). Although an equivalent measure to English was used, the Spanish-speaking children (both normal and RD children) obtained a higher mean in WI than their English-speaking peers at grade 3. This was also true of the discrepancy between WI and WA scores, demonstrating that Spanish-speaking children show on average, a better mastery of WI skills over WA skills. Spanish children were significantly different than English children in WI
skills but not in WA skills, on which both language groups performed at similar levels. The results for word identification skills are consistent with the results obtained in other regular languages using experimental tasks (Defior, et al., 1996; Landerl et al., 1997; Oney & Goldman, 1984; Wimmer, 1993, 1996; Wimmer & Goswami, 1994). In these studies, either within a language or comparing it with English, children showed high levels of accuracy in measures of word and pseudoword reading. Contrary to the findings of study 1, studies that compared German with English speaking children found differences in pseudoword reading across languages. The similar performance in WA skills found in this study may be due to the fact that in this case we used a language equivalent measure with standardized norms (Defior et al., 1996; Jiménez et al., 2000; Rodrigo & Jiménez, 1999, 2000; Valle Arroyo, 1989).

An important finding within the Spanish group was the fact that third graders with RD as defined by a pseudoword measure were achieving average scores in the identification of real words. Contrary to what we expected and to previous studies in regular languages, we found poor word identification achievement in the RD Spanish group at grade 2. The differences across grades in the mastery of word identification skills might reflect a developmental effect. Although the data do not allow us to imply growth because we use a cross sectional design, we used a standardized measure that suggest that RD third graders might have had more strategies to decode and to approach words by sight than second graders, due to more exposure to reading. On the contrary, in the English groups (non longitudinal data as well), no differences were detected on average from grade 2 to grade 3. However, considering reading achievement (good vs. poor readers), RD children in the Phonics group obtained low scores in WI at both grades levels. The opposite was found in the Whole language approach, on which RD at grade three obtained higher scores on WI. Given that the data were not longitudinal, is not possible to hypothesize neither flat growth in the WI skills for the phonics approach, nor an
increase of WI skills in the Whole Language approach. However, compared to Spanish, the data showed that the RD English-speaking children never reach the level of accuracy in WI skills as the RD children of the Spanish group did, demonstrating language effects. The differences observed in the English children appeared to be related to method of instruction and reading achievement.

The differences in word identification skills across languages supports the hypothesis that word identification may not be an accurate measure in the identification of a reading disability in regular languages as compared to an irregular language, such as English, at this stage of reading acquisition. If children in regular languages at grade 3 are performing at higher levels than English-speaking children, it is clear that we cannot use the criterion developed and commonly used in English, to identify RD children in a regular language such as Spanish. On the contrary, pseudoword reading (WA) has been shown to be a measure reflecting similar achievement levels at grades two and three between English and Spanish speaking children, given that no significant differences were observed in reading pseudowords (WA skills).

Therefore, the pseudoword reading of a standardized language equivalent measure such as the Woodcock, demonstrated to be a good measure of phonological decoding for the comparison of languages. Also, it demonstrated that for Spanish, the RD children as classified by this measure as poor decoders still obtained average scores in the WI task, which shows the language effect on word decoding.

**Method of instruction**

In study 1 we compared Spanish children instructed on phonics, with English children exposed to two different methods of instruction. The results showed that, indeed, method of instruction has a significant impact on the development of word identification and word attack skills in English. However, neither method of instruction reflected the profile observed in the
Spanish group. We detected significant differences in word identification by examining the performance in normal and reading disabled readers. The difference between WI-WA was significant between groups.

The Phonics normal group showed better decoding skills in both WI and WA compared to the normal readers in the Whole Language approach. In the Phonics group, normal readers at both grades scored above the average level for both WI and WA. However, a score at average level (close to 50th percentile) was observed in the Whole Language approach. These results show that the normal readers of the phonics group were more skilled at decoding both words and pseudowords as compared to children in the Whole Language group. However, in the reading disabled groups, differences were found by grade level. In the Phonics approach, RD children score low on WI measures at the two grade levels, suggesting relatively poor mastery of sight word recognition compared to the Whole Language children. In the Whole language approach the RD group at grade three had a better mastery of word recognition skills compared to the Phonics group. The differences between grades in the Whole language group are similar to those obtained in the Spanish children. One possible explanation is that the children from grade 2 were from a different school than grade 3, and differences might be also due to implementation of the method. Another possible explanation is that the exposure to sight-reading for another year of instruction enabled them to acquire more strategies for recognizing words, although pseudowords were poorly decoded.

Since the reading disabled children were classified by WA scores, differences in WA skills for these groups were not significant. Also, normal readers of the Phonics group performed higher than Spanish normal children in WA skills. Although surprising, these results were consistent with the findings of Geva and Siegel (2000) comparing normal children learning to read Hebrew and English. These children were exposed to a balanced combination of decoding-oriented and
meaning-based method of reading instruction. Geva and Siegel (2000) reported a better mastery of WA skills in English (using also the Woodcock for English) than the achieved in the WA experimental task in Hebrew (a regular language). The authors reported that these differences across languages disappeared by grade 5.

In terms of WI-WA differences, in our study, the Phonics group obtained a score close to zero. No differences were found between good and poor readers. Examination of the range of scores, indicated that a large number of children in the Phonics approach had indeed a better mastery of WA skills over the WI skills (reflected in the negative scores), and pushed the mean of the WI-WA discrepancies close to zero.

In Spanish, achievement in WI was highly superior than both English groups, when grades 2 and 3 and good and poor readers scores were combined. However, considering these two variables, Spanish normal readers showed as high scores in WI as the Phonics group did. At the same time, normal Spanish-speaking children’s WA scores were close to those of the normal readers in the Whole Language approach (in the average range) but lower than the Phonics group. Compared to the Whole Language approach, Spanish had a similar difference between WI-WA in the RD group at grade 3. Although the difference between measures was similar, the range was completely different. The means in WI and WA were much higher for the Spanish children, reflecting better accuracy in decoding for the Spanish RD children. Therefore, the Spanish group did not resemble any particular group of instruction in English.

Future research may examine the percentage of children that do and do not overcome their reading disabilities under these two approaches by conducting a follow up study in two large districts exposed to these two different methods of instruction. This would provide insight as to the benefits of the two approaches for a child with a reading disability. In the meantime, it is beneficial to employ a balanced method for reading instruction that will meet the needs of the
different individuals in the class. By using both methods, readers will gain automaticity with orthographic strategies and master decoding of unfamiliar words by using phonics strategies. More insight may be gained into the interaction of the language x method x reading achievement x success, through future research.

STUDY 2: A SPANISH READING PROFILE

Literature in transparent languages not only shows an age effect on the profile of reading acquisition, but also an effect on how reading disabilities are identified across languages (accuracy in decoding, reading fluency, etc.). Based on the research conducted in regular languages such as Dutch and German, findings suggest that in a transparent orthography, readers older than grade 2, tend not to show a poor accuracy in nonword reading as a result of the underlying phonological deficit, but do show slow nonword reading (de Jong & van der Leij, 1999; Landerl, Wimmer, & Frith, 1997; Wimmer 1993, 1996; Wimmer & Goswami, 1994). Therefore, researchers in regular languages have started to introduce other identification measures in order to detect reading disabilities. In German and Greek, for example, fluency and spelling are some of the important identification measures alongside word reading (Landerl, Wimmer, & Frith, 1997; Porpodas, 1999; Wimmer, 1996). In Spanish, nonword reading has started to be used as the categorization measure in some studies (Jiménez, Álvarez, Estévez, Hernández, 2000; Jiménez & Ortiz, 1998). Jiménez Gonzalez and Hernandez Valle (2000) examined Spanish RD children (mean age 8 years 9 months), and found a speed deficit in that RD children show longer reaction times for both word and nonword reading. In an irregular language such as English, phonological deficits have usually been measured by pseudoword reading and the measurement of reading speed or reaction time for reading seems to add information to the reading profile but is not considered critical in the identification of reading
disabilities. Landerl et al. (1997), and Wimmer and Goswami (1994) found that the "speed factor" for word and non-word reading was an important variable in measuring phonological abilities in a regular language (comparing English and German sample with equal measures), due to the high accuracy levels of the German sample. In their studies, English-speaking children at all ages and reading levels were always slower than the children reading in a regular language. The only measure that significantly differentiated good from poor readers in German was reading latency in nonword reading. In two reading level match studies, Wimmer (1993, 1996), found that older readers (grade 4) show accurate nonword reading but slow reading compared to the younger reading level match. In both studies, the criterion used for identifying the dyslexic was slow reading speed on the subtests of word and text reading, plus normal IQ. Reading speed was used given that children read the words fairly accurately. 

Studies conducted in Turkish, Greek, German, Dutch and Hebrew samples (Geva & Siegel, 2000; Oney & Goldman, 1984; Porpodas, 1999; Wimmer 1993, 1996; Wimmer & Goswami, 1994;) also found a lower incidence of phonological mistakes in word and nonword reading and they attributed this to the transparency of the language. Landerl et al. (1997) showed that in a regular language such as German, even dyslexic children were found to read accurately (fewer errors) compared with English peers, as long as their reading time was unlimited. These findings suggest that it is easier to decode words in languages with transparent orthographies, unless time is constrained or if another measure that demands strong phonological skills is employed (Landerl, 1997). Therefore, for this group of researchers reading disabilities in a regular language are reflected in a "reading speed deficit", and not so much as a word - nonword decoding accuracy deficit. Wimmer (1996) in a study with 10 year old dyslexic children, emphasized that after 3 years of schooling (phonics instruction), children tend to overcome the difficulties in accuracy presented in grade 1. Research conducted in Spanish-speaking samples
with samples at ages 9 to 10 years old suggests that poor readers not only show longer latencies on measures of word and nonword decoding, but also commit more errors in nonword reading than normal readers (Rodrigo López & Jiménez González, 1999, 2000).

The differences on these two groups of researchers might be accounted by various factors. First of all, the first group of researchers (mostly in German) supported most of their statements in language comparisons (with English samples). When comparing two languages with such different regularity as German and English, the differences in accuracy appear to be greater. For instance, the German samples read far more accurately than the English sample and their latencies were shorter compared with the English children. Secondly, the apparent accuracy on the reading of experimental tasks used may have resulted in ceiling effects for the German sample. In a cross-sectional study, Oney and Goldman (1984), also showed that Turkish students read faster and more accurately on the decoding task than English speaking US children at the first grade level. By the third grade, the accuracy level was equivalent in the two languages but Turkish students read faster than English speaking US students. In contrast, the Spanish researchers have focused on the analysis of a single language (Spanish) and controlled for intrasyllabic structure of the stimuli presented. This might explain the contradictory findings on reading accuracy between studies conducted in German and Spanish RD samples on measures of word and pseudoword reading.

The main goal of this study was to examine the reading profile in a regular language such as Spanish and compare it to the profile found in other regular languages. Based on the literature in other regular languages that outlined the need for using diagnostic measures that are language appropriate, accuracy and fluency in word and pseudoword reading measures were examined. We wanted to observe the reading profile of high accuracy but low speed on decoding tasks suggested by Wimmer and colleagues for a RD for other transparent languages
such as German, is applicable to Spanish. A reading achievement match was designed to
investigate whether reading disabled children will show accuracy and/or nonword reading speed
deficit as compared to younger normal readers reading at the same level. Also, we are
interested in other features of the reading profile such as spelling, reading comprehension,
working memory and language skills.

Method

Design
A three-group reading achievement design was used in this study.

Participants. Thirty-four Spanish-speaking children from Argentina participated in the study.
Part of the sample came from a middle class private school in the city of Buenos Aires. The
other part of the sample came from an Argentinean private clinic dedicated to assess and treat
individuals with developmental, behavioral, attention and / or learning difficulties. Children were
tested individually by educational psychologists. Normal readers in grades 2 - 3 and grades 4-5
were selected and compared with reading disabled children in grades 4-5. The children were
classified into three groups according to reading achievement: (1) An experimental group of 7
reading-disabled children (RD) (age, M =122 months – 10.1 years;- SD = 8.2); (2) A comparison
group of 15 normal readers matched in chronological age (CA match) with the reading disabled
(age, M = 119 months – 9.9 years;- SD = 8.2). A T-test indicated that the mean age between
RD-CA was no significantly different-; (3) A comparison group of 12 younger children matched
in reading age (RL match) with the RD children (age, M = 94 months – 7.8 years;- SD = 9.9).
The RD and RL were matched according to the reading age equivalent based on their raw score
in the nonword reading subtest (Word Attack) of the Woodcock & Muñoz-Sandoval
Psychoeducational Battery (1996). The reading age equivalent is based on standardized norms
(Woodcock & Muñoz –Sandoval, 1996).Younger children scoring at a higher reading age were
excluded from the sample (5 in total). Children scoring above the 30th percentile in the nonword task were considered normal readers (NR) and children scoring below the 30th percentile were considered reading disabled.

Table 6. Study 2 - Sample Descriptives

<table>
<thead>
<tr>
<th>Groups</th>
<th>RD</th>
<th></th>
<th>RL</th>
<th></th>
<th>CA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age in years</td>
<td>10.1</td>
<td>(0.48)</td>
<td>7.8</td>
<td>(0.72)</td>
<td>9.9</td>
<td>(0.76)</td>
</tr>
<tr>
<td>Chronological age (months)</td>
<td>122</td>
<td>(6.7)</td>
<td>94</td>
<td>(9.9)</td>
<td>119</td>
<td>(8.2)</td>
</tr>
<tr>
<td>Reading age level (months)</td>
<td>98</td>
<td>(8.27)</td>
<td>98</td>
<td>(8.47)</td>
<td>230</td>
<td>104</td>
</tr>
<tr>
<td>N</td>
<td>7</td>
<td></td>
<td>12</td>
<td></td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

RD= reading disabled; RL = reading age level matched; CA= chronological age matched.

A pseudoword reading measure was used for the reading achievement classification for three main reasons: 1) Only one of the reading disabled children scored below the 30th percentile in word identification; 2) The results of study 1 showed a high accuracy level of RD Spanish-speaking children at the early stage of grade 3 on the word identification measure; and 3) there are previous studies conducted with Spanish speaking children that also used this criterion (Jiménez et al., 2000). Children were considered RD if they scored at or below 30th percentile in a pseudoword reading measure (Woodcock & Muñoz-Sandoval, 1996).

A battery with decoding, fluency, reading comprehension, spelling, memory and language measures was administered individually by educational psychologists. We expected the RD group to perform below the younger readers at the same reading achievement while exposed to phonologically demanding (i.e. pseudoword reading) and fluency tasks.
Measures
(for a complete description see appendix I pp. 74-80)

Decoding:

- **Woodcock Johnson Psycho-educational Battery in Spanish-Revised (Woodcock & Muñoz-Sandoval, 1996): Word Identification.** This subtest is made up of a word-reading list of increasing difficulty. Each child was presented with six words at a time. If the child failed to read the word within 5 seconds, the examiner pointed to the next word. After 6 consecutive failures, the task was discontinued. Sample words include: *de, luz, niño, silueta, perjuicio, vitivinicultura.*

- **Woodcock Johnson Psycho-educational Battery in Spanish-Revised (Woodcock & Muñoz-Sandoval, 1996): Word Attack.** This subtest is made up of a pseudoword-reading list of increasing difficulty. Each child was presented with four to six pseudowords at a time. If the child failed to read the word within 5 seconds, the examiner pointed to the next pseudoword. Syllabic reading was explicitly not allowed. After 6 consecutive failures, the task was discontinued. Sample pseudowords include: *dul, ep, crullo, distrum, honrultar, querpostonious.*

- **Word reading:** The child was asked to read 10 words aloud in a non-timed condition. Sample items include: *sopa, abuelo, elección, participación.*

- **Pseudoword reading:** The child was asked to read 10 pseudo-words aloud in a non-timed condition. Sample items include: *vina, relela, exprosa, oncidn.* Pseudowords were derived from words by adding, omitting or changing a letter from a real word.

Comprehension:

- **Woodcock Johnson Psycho-educational Battery in Spanish, (Woodcock & Muñoz-Sandoval, 1996): Reading Comprehension:** This subtest has the structure of a cloze task (paragraphs with one word missing). The child was asked to read the paragraph in silence and say aloud the word that would go in the blank space. After six consecutive failures, the task is discontinued.

- **Reading Comprehension:** as measured by Test de Análisis de Lectura y Escritura (TALE). The test consists of a paragraph followed by 10 literal questions. The child was asked to read it aloud. The test has a paragraph for each level of reading that corresponds to the grade level of the child. Therefore, the number of words increases from grade level 2-3 to grade level 4-5.
Fluency:

- **Text Reading fluency**: the performance on this task was the time (in seconds) of reading aloud the text for reading comprehension from the TALE. The number of errors committed was taken as accuracy in reading (fluency errors).
- **Accuracy in Text reading**: number of errors committed in text reading fluency (Text from Test de Análisis de Lectura y Escritura).
- **One minute word reading**: (word list from TALE – Test de Análisis de Lectura y Escritura). In this task the child was presented with a list of words of increasing difficulty and asked to read as many words as possible within a one-minute time period. The list includes some pseudowords. Sample words include: *clavel, dragón, primavera*.
- **One minute nonword reading**: In this task the child was presented with a list of pseudowords of increasing difficulty and asked to read as many pseudowords as possible within a one-minute time period. Sample pseudowords include: *bordel, lacion, enmorar, causecientemente*. Pseudowords were created by adding, changing or deleting a letter from a real word. (see appendix pp.74)

Spelling (appendix pp. 75):

- **Word spelling**: the 10 words were dictated to the child and he/she was required to write them.
- **Pseudoword spelling**: The child was dictated the 10 nonwords previously read and had to write them.

Phonological Processing and language measures (appendix pp. 76-79):

- **Phoneme deletion**: The child was asked to repeat a word and say it again without a certain sound (initial or final). Sample items include: initial: *barco (arco)*; final: *gasa (gas)*.
- **Phoneme deletion and substitution**: The child was asked to repeat a word and substitute a certain sound for a given other (initial – middle-final). Sample items include: initial: *prisa (risa) – rima (lima)*; middle: *caliente (cliente)-camino (casino)*; final: *ratón (rato)-sol (son)*.
- **Syntactic Awareness**: An oral cloze task (a Spanish adaptation of the task designed by Siegel & Ryan, 1988) was administered to each child. In this task, children were asked to supply the missing word for each of the 12 sentences read to them. Sample item: *Juana_______ su hermana fueron a nadar a la pileta (y) / Juana_______ her sister went to swim at the pool. (and).*
- **Working memory for words** (Siegel & Ryan, 1996 – Spanish adaptation). The children were presented orally with sentences that were missing the final word. The children were required to provide the missing word and then repeat all the missing words from each set. There were three trials within each set of increasing sentences (2, 3, 4, 5). To minimize word-finding problems, the sentences were chosen so that the word was virtually predetermined. The children did not experience any difficulty in supplying the missing word. The task administration was discontinued when the child failed all the
items at one level. Examples of sentences: *Mis manos tienen diez ____ (dedos) / My hands have ten ____ (fingers).*

**Results**

Analyses of variance (ANOVAs) for one factor (reading disabled vs. normal readers matched in age vs. younger normal readers) were conducted using decoding measures (WJ Word Identification- 1 minute word reading- 1 minute nonword reading – word reading (10) – nonword reading (10)), fluency (seconds on text reading), reading comprehension (WJ RC – Reading comprehension (10)), spelling (word and nonword): accuracy (number of errors in the fluency task), phonological processing (phoneme deletion, phoneme deletion and substitution), memory and language experimental tasks, as dependent variables.

**Decoding measures**

Given than RD and RL were matched in reading achievement, we considered that a comparison of raw scores on WA and WI skills was important to avoid confounds with percentile norms. In order to obtain a reading age level match, children scoring at higher levels in WA were excluded from the reading achievement match, whereas for the CA group, children scoring at higher levels in decoding remained in the sample. Excluding the highly able decoders from the younger group to obtain the reading age level match, caused non significant differences in WI between RL and RD group, whereas the contrary was found if those children were left in the sample.

The ANOVA on WJ Word Identification Raw score revealed significant differences \(F(2, 34) = 24.05; p<.001\) among groups. Tukey's post hoc tests indicated that RD children were performing at the same level as the RL; however both of them were significantly lower than CA children, as expected. For the WJ WI Percentile score, RD children also obtained average scores as the RD children (which is reflective of the fact that the skilled decoders of the RL
group were excluded) but both groups significantly differed from the CA children \(F(2, 34)=9.10; \ p<.001\). However, it is important to note that the RD group was performing at the 50th percentile on WJ skills, which is in the average range.

The ANOVA on WJ Word Attack Raw score revealed no differences between RL and RD group, assuring that the reading level match on this measure was accurate. Both groups scored significantly below than the CA peers \(F(2, 34)= 34.16; \ p<.001\).

Also, the ANOVA on Nonword reading (experimental task) revealed significant differences \(F(2, 34) = 8.30; \ p< .001\) between the groups. Tukey's Post Hoc Tests indicated that RD children performed more poorly than the RL and CA groups on this measure. There were no significant effects for word reading.

![Figure 2. Decoding Measures -- Standardized Tasks Woodcock-Munoz](image)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Wiper</th>
<th>WAper</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
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<tr>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RD | RL | CA

One-minute word and nonword reading were included as part of the decoding measures given that the scores were based on words read correctly, although in a timed condition. In one-minute word reading differences were observed \(F (2, 34)= 17.46; \ p< .001\), and Tukey's post hoc tests indicated that CA children scored higher than both RD and RL children on this measure. RD and RL children did not show significant differences on this measure. On the
contrary, there was a significant effect for one minute nonword reading, which clearly differentiates the RD group from the other two groups [$F(2, 34)=26.12; p<.001$]. The reading disabled children performed more poorly than the RL and CA groups. Furthermore, the CA children performed better than the RL group, showing a developmental difference.

Fluency and Fluency errors

As shown in the decoding measures, RD children did not differ from RL in 1-minute word reading. However, they did show a significant difference on 1-minute nonword reading, demonstrating a specific deficit in this phonologically demanding task [$F(2, 34)=26.12; p<.001$].

Since different texts were given to the two grade levels, in order to be able to compare the text reading fluency, we computed the number of words read in one minute by dividing the total words of the text by 60 (seconds) and multiplied it by the total seconds. The ANOVA on one-minute for text reading revealed a significant effect [$F(2, 34)=5.85; p=.007$] and Tukey's post hoc analysis indicated that the RD group was slower than CA. However, the RD children did not differ from RL group. In terms of accuracy (errors committed), a significant effect was found
Tukey's post hoc tests indicated that the RD group made more errors than both the RL and CA children. The RL group did not differ from CA group in errors.

**Reading Comprehension:**

ANOVA conducted on the WJ reading comprehension scores between groups were significant [raw: $F(2, 34)= 24.05; p<.001$; per: $F(2, 34)= 6.14; p<.01$]. RD children achieved the same raw score than RL children in reading comprehension, which indicates that their reading comprehension was equal to their reading achievement in nonword reading. The raw scores of the RD children did not significantly differ from those of the RL group as examined by Tukey's post hoc tests. However, RD children performed below the 18th percentile and significantly differed from both RL and CA children in the percentile scores. Tukey's post hoc test indicates that RL and CA did not differ in percentile scores. In the reading comprehension experimental
task no significant differences were found between the groups.

Figure 5. Reading Comprehension Measures

![Reading Comprehension Task](image)

Spelling:
The ANOVA on word and nonword spelling revealed significant differences \( F(2, 45) = 5.43; p = .008 \) / \( F(2, 45) = 3.23; p = .049 \). Post Hoc tests indicated that RD and RL children scored significantly lower than CA children in word dictation \( t = 2.54; p = .01 \). Also the RL group obtained significantly lower scores than the CA group in nonword dictation. Reading disabled children did not significantly differ from their CA peers in the nonword spelling but were equal to the RL children in the word spelling measure. These differences might be related to the criteria use for scoring words and nonwords. For nonwords phonetic pronunciations were accepted as correct, whereas for words, rules for stress use and exceptions were necessary.
Phonological Processing tasks:

ANOVA’s conducted on these experimental tasks showed a significant difference for phoneme deletion initial \( F(2, 34) = 5.67; p<.01 \), phoneme deletion total \( F(2, 34) = 4.64; p<.05 \), phoneme deletion and substitution (PDS) initial \( F(2, 34) = 6.09; p<.01 \), PDS middle \( F(2, 34) = 6.71; p<.01 \), and PDS total \( F(2, 34) = 6.93; p<.01 \). Tukey’s Post hoc tests indicated that RD children did not significantly differ from the RL children. However both RD and RL were different than CA children. Given that these tasks has only a maximum of 6 to 8 items each, these results might reflect ceiling effects, meaning that the tasks were not as demanding for the older children as they were the nonword reading and 1 minute nonword reading tasks.
Table 7. Means and Standard Deviations in each Task with significant effects

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<tr>
<th>Tasks</th>
<th>Groups</th>
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<td>(max. 12)</td>
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<td>Oral cloze (max. 15)</td>
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<td>11.1</td>
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<td>13.1</td>
<td>(1.1)</td>
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RD= reading disabled group; RL= reading age comparison group; CA= chronological age comparison group.

* Means represent number of correct responses

Discussion

The results obtained in the current study allow us to discuss the identification of a reading disability in Spanish-speaking children by comparing the performance of RD children with children matched in chronological age. However, the reading level match also allows us to draw conclusions about the specificity of the deficit and its interactions with the language of study.

Reading disabled children identified by nonword reading in a standardized measure, achieved at the same level as the RL matched on all those measures related to decoding.
fluency, reading comprehension and phonological processing (phoneme deletion and substitution). Differences in word and nonword spelling were also observed, RD children scoring at the same level as RL on word and nonword spelling and below the CA group. No differences were observed on the language and memory tasks, on which RD children performed at the same level as their chronological age peers.

Reading disabled children at grades 4-5, differed significantly from their CA matched peers in the WJ word identification, demonstrating a poorer mastery of orthographic / phonological skills. However, it is important to note that their percentile scores on the WJ WI task, were in the average range, whereas CA children scored at the above average range. This difference is critical importance; if diagnostic decisions are made based on word identification scores, many reading disabled children in Spanish, would not be detected. Therefore, language sensitive measures should be introduced in clinical practice. In Spanish, children also showed a deficit in nonword reading and in timed word and nonword reading as compared to the CA group. As Spanish word reading is relatively “easy to decode”, it is believed that by the age of 10 years old (corresponding to 4th to 5th year of schooling), disabled readers will “compensate” their decoding problems and instead, have fluency and reading comprehension problems. However, our RD children showed a phonological deficit as measured by non-timed pseudoword reading, as well as a low reading speed as measured by timed pseudoword reading.

The RD group that we studied also showed low achievement on reading comprehension measures as compared to non RD-RL matched. Stanovich (1988) noted that in a reading level match it its expected that RD children will show a specific deficit on phonological decoding skills, although a “similar overall level of comprehension ability presumably because the dyslexic children use these other skills and knowledge sources (i. e. vocabulary) to compensate for seriously deficient phonological processing skills” (pp.592). The raw scores of the RD group
were similar than those of the RL group, suggesting that their comprehension was at their reading level. In the oral reading (used for text fluency) followed by 10 literal questions, differences between RD and RL were not statistically significant.

In terms of fluency, differences were found in the one-minute word and nonword reading tasks, as well as differences in reading speed for text reading. Children in the RD group were much slower at decoding the same text and also made a large number of errors (omissions, substitutions and additions) as compared to the CA-NA group who made almost no errors. Given that RD children performed more poorly in phonological demanding tasks (such as the nonword experimental task -that appeared to be more sensitive than the measure used for matching-, and in the one minute nonword reading) and that they performed at the level of their matched RL in word reading, one-minute word reading, and one-minute text reading fluency, we interpret the results of fluency in terms of a particular profile of a reading disability in a regular language such as Spanish. This profile reflects the specific phonological deficit and not as a specific deficit in reading speed (fluency). This interpretation is based on the fact that RD children showed a specific deficit in phonologically demanding tasks, and a delayed pattern compared to their CA in measures of word reading fluency.

Reading disabled children showed poorer word spelling than the CA group. Their nonword spelling not significantly different from the CA children. It would be interesting to conduct further research on spelling with a larger RD sample to compare the correlation of spelling with reading at different grades. Nonword reading might be relatively easy provided that there are no “rules” for spelling beside the phonetics (which is simple for Spanish writing). However, the few irregularities of Spanish orthography are reflected in word writing more than reading. Therefore, a RD child might have trouble memorizing these few rules and applying them correctly (given that the GPC is not clear and stress on certain syllables is used). Consequently, as children get
older, although their word decoding might improve, their spelling might still be behind the chronological age peers.

The experimental phonological processing measures, were designed so that children would have to manipulate sounds in their working memory and were able to differentiate good and poor readers at the same age. However, no differences were found with the RL group. These results are not consistent with the research in regular and irregular languages that has consistently shown differences in phonologically demanding tasks. Therefore, we attributed these findings to lack of sensitivity of this experimental measure. In particular, most of the children obtained high scores on the phoneme deletion task. The phoneme deletion and substitution measure was more sensitive in differentiating good from poor readers when the child was asked to manipulate a sound in the middle of a word.

Compared to the younger readers matched in nonword reading age level –RL– (2 years and 5 months younger), the RD group significantly differed from RL in nonword reading, timed nonword reading, reading speed and errors committed. On the measures that differentiated the RD from the CA readers, the reading disabled group was achieving at the level of the RL group. These results are consistent with previous research in that demonstrated that although RD reading was delayed about 2 years, for the RD children a specific deficit was detected in phonologically demanding tasks. However, this profile differs from the one usually reported in studies conducted in English speaking samples, where word decoding is also delayed. Here we demonstrated that RD children although scoring below the CA in WI, were reading words at the 50th percentile in relation to norms based on age and grade. These results also confirmed previous findings in Spanish and other regular languages where regular language readers tend to show high levels of accuracy on word recognition (Defior et al., 1996; Jiménez & Rodriguez, 1999, 2000; Frith et al., 1998; Wimmer, 1993, 1996). Contrary to the findings of Wimmer and
colleagues who did not find differences on nonword reading between RD and reading achievement matched younger readers, we found a lower level of accuracy for nonword reading in the RD group. However, we did find the slow nonword reading in the RD as compared to the RL and described by Wimmer in his studies (1993; 1996).

These findings suggest that there is an impact of the language on the profile of a reading disability. Thus, for identifying a reading disability in a regular language such as Spanish, word identification measures are not as sensitive as nonword reading and timed reading measures. Furthermore, the reading achievement match showed that there is in fact a specific deficit in some phonological demanding tasks.

**General discussion**

In languages such as Spanish and German, the grapheme phoneme correspondences are regular, predictable and relatively easy to learn. Therefore, the method of instruction employed in reading acquisition is usually based on phonics instruction, which emphasizes this GPC. On the contrary, in languages with an opaque orthography such as English, where GPCs are irregular, global methods are also employed to provide the reader with strategies for word recognition based on sight-reading or contextual clues. As Goswami (1999) noted out in a review of phonological awareness and orthographic representations across languages, onset-rime awareness as an index of global word recognition is more related to reading in English in the first years of reading acquisition than it is for other languages with a more transparent orthography such as German. In a follow-up study with German children, Wimmer et al. (1994) found that the performance on an oddity task (onset and rime awareness tasks) at age 6 was only minimally related to reading at the age of 7-8, but was more related when the children were 9 years old. These results suggest that, in a regular language such as German, the
development of orthographic skills for word recognition is related to later decoding, and presumably aids in acquiring automaticity in decoding.

The differences we found in this study between the mastery of word identification and word attack skills across the two instruction approaches are relevant in terms of how a child with RD will benefit from these different approaches. Since RD children show a specific deficit in phonological processing reflected by poor accuracy in decoding and slow reading speed, decisions on which will be the best method of instruction for them to overcome the deficit are significant. Such decisions will have to take into account the interaction between language and method of instruction. The literature has shown that once the disability has been detected, training in phonics and sight vocabulary helps English-speaking children to overcome the disability. However, it is important to note that many children are not identified until late in the process of reading acquisition, and that their only source of learning compensatory skills lies in the method of instruction they receive at school.

This study showed that the method by which children are taught to read has an impact on their achievement in word and nonword decoding. Furthermore, it could be hypothesized that since English is an irregular language, the method of instruction will have an impact on the compensatory strategies a reading disabled individual would be able to learn from classroom instruction. As Spanish is a regular language, the interaction with method of instruction will occur only at the beginning of reading or it will be significant in the case of a reading disability, in which case, the individual will not be skilled enough to deduce GPC easily and gain the fluency of their peers of the same age. In English, this interaction will be more significant for RD children, in that the GPCs are not as transparent as in Spanish. Ideally, it seems that for English a combination of the two approaches may be more effective for reading instruction. As Ehri (1997) described, sight-reading is a strong strategy used by normal readers of an alphabetic
system to acquired automaticity. Sight-reading is important for the acquisition or reading skills in an irregular language such as English. Whole language provides English learners with orthographic skills that will increase the reading accuracy and/or gain automaticity for the recognition of the irregular sounds and words. However, a phonics approach will allow the reader to decode unfamiliar words, skill that is critical for later reading and for approaching complex texts for comprehension purposes, especially for children with a reading disability.

Literature on instruction methods in English clearly shows that global approaches such as Whole Language do not emphasize the GPCs, and that children exposed to those approaches adopt sight word reading strategies (Bradley & Bryant, 1985; Sowden & Stevenson, 1994). On the contrary, phonics approaches emphasize the GPCs, and encourage children to adopt decoding strategies. However, given the interaction between language and method of instruction, we know that English cannot be completely ‘decoded’ for its irregularities and lack of GPC. Therefore, phonics instruction in English should not be as pure as it is in transparent languages such as Spanish or German, given that some sight vocabulary is also needed to deal with the irregularities of the English orthography.

Since we did not find two different instruction approaches for our Spanish-speaking sample to observe the language by method interaction in Spanish, we refer to the findings reported by Jiménez, Guzman and Artilles (1997). The authors compared Spanish-speaking children learning to read by the two different approaches to reading instruction. Children under the global method were good at sight-reading (familiar words) but less skilled at decoding unfamiliar words, and thus committed more errors than the phonics group. The children exposed to phonics instruction during early reading acquisition were more skilled than those readers who were trained in the global approach. However, these differences were not as large as those found in research conducted with English-speaking children. One explanation for these findings is that
the inherent transparency of the language allows the reader to deduce the GPCs, and that for a normal reader intensive explicit instruction in these correspondences might not be as necessary. This is not applicable to English, because explicit instruction in the irregularities of the written language is necessary given that the GPCs are harder to deduce. If taking into account the fact that RD children have a specific deficit in phonological decoding and that they benefit from explicit instruction, a whole language approach might only partially help in the case of English and might be obstructive in the case of Spanish instruction, given that it will make the reading acquisition process more complex for beginner readers (Jiménez et al., 1997).

The differences on word identification across languages and grade demonstrate that the orthography of the language has an impact on the age at which children achieve mastery in word recognition. In Spanish, the acquisition seems to be acquired faster given the high level of regularity in GPCs that allows the children to recognize and decode words just by remembering 30 sounds that are consistently associated with their graphemes. This regularity results in higher scores on the word identification task. In English, more than 46 phonemes have to be mastered with all their unpredictability depending on the context as well as the spoken rules. This inherent irregularity of the language makes the process of acquiring reading decoding skills much more difficult. These differences across orthographies suggest that the same criterion (i.e. accuracy in word identification) for the identification of a reading disability at the early stage of grade 3 may not be transferable from one language to the other.

After conducting the comparison between English and Spanish in decoding measures, it is clear that there is an interaction between language an instruction and that instruction practices should be language appropriate. An interaction between language and reading profile was detected. Study 1 demonstrated that there is variation on the profile for English and Spanish speaking normal and reading disabled children. The high accuracy for word decoding found in
study 1 for grade 3 of the Spanish sample was also true for the RD Spanish sample of study 2 at grades 4-5. Furthermore, the specific profile examined in study 2 on other reading measures, may shed light on how to detect reading problems in a RD child reading in a regular language such as Spanish.

Fuchs, Fuchs, Hosp, & Jenkins (2001), noted that oral reading fluency is an indicator of reading competence. We consider that reading is a complex task that involves simultaneous activities to perform it effectively. Skills such as decoding, fluency, vocabulary and comprehension will contribute to the specific reading profile. As shown in the reading achievement match study, RD children at grades 4 and 5 showed accurate word reading (although below the percentile achieved by the CA normal readers), low fluency and low reading comprehension achievement as compared to chronologically age matched. However, they showed an even lower performance in phonologically demanding tasks such as nonword reading and timed nonword reading as compared to younger normal readers matched in reading achievement. Based on high levels of accuracy for word and nonword recognition for German children, Wimmer et al. (2000), concluded that in a regular orthography where phonics is implemented for reading instruction, phonological coding seems to be less affected in the early phases of reading acquisition. However, during later phases of reading acquisition, this deficit will impede the acquisition of orthographic memory and fluency for decoding. Thus, RD children will be behind their peers on other skills related to reading. In light of this language specific profile, we conclude that although our RD children showed a specific phonological deficit, in order to overcome their problems and achieve at a level closer to the normal age matched children, they require training in the other skills involved in reading on which they also demonstrate difficulty. At this point, fluency and reading comprehension strategies for intervention are critical.
Wolf and Cohen (2001) described a Fluency Intervention Program (RLVE-O) applied to 200 English-speaking children at grades 2-3 with severe reading problems as defined by a discrepancy criterion for reading disability on the Woodcock Reading Mastery Tests (Woodcock, 1987). The program emphasized rapid recognition of words (accuracy and automaticity), vocabulary development, fluency in word identification, word attack, connected text, comprehension, and engagement with language. In this article the authors described preliminary results that indicated significant gains in word attack, word identification, oral reading rate and accuracy, and passage comprehension. The authors interpret these results as a starting point in the investigation of the treatment of severe processing speed deficits in individuals with reading disabilities. This first piece of research, in reading fluency intervention seems very promising in that it seems to combine both type of strategies encouraged by the two instruction methods previously described (phonics and whole language). A combination of decoding, sight-reading, fluency and comprehension strategies, will help readers of both irregular and regular languages to improve on their reading skills. As noted before, the fact that Spanish is a regular language with high levels of GPCs, does not mean that children would not use orthographic strategies for reading. Readers of regular languages such as Spanish have shown the use orthographic strategies or lexicality effects while reading words (Defior et al., 1996). The difference with English may rely on the fact that orthographic strategies are critical for beginning reading while for regular languages, orthographic strategies are acquired presumably to gain automaticity/fluency in reading (Wimmer, 1994). As Paulesu et al. (2001) showed in their study with adults with dyslexia in three different languages (i.e. English, French and Italian), the phonological deficit shares the same biology across languages although decoding seems to be easier for languages with a more regular orthography (e.g. Italian). Furthermore, referring to reading comprehension problems, Runyan (1991) demonstrated that
university learning disabled students (English-speaking) showed improvement in their reading comprehension scores after giving them more time for the task, suggesting that fluency and comprehension are a subsequent result of their phonological difficulties in decoding and processing phonological demanding tasks.

In terms of the relationship between reading, fluency and comprehension, Wolf and Katzir-Cohen (2001) described how the sight vocabulary of beginner readers will fall behind the level of average readers. This inferior mastery of sight vocabulary will bring attached problems on vocabulary, fluency and comprehension. "Although many dyslexic children begin with adequate to superb vocabularies, their vocabulary falls behind the level of average readers who are reading increasingly sophisticated texts with words unavailable in oral discourse" (p.231). They suggest that children might know the word when reading, and might know the meaning of the word, but "they simply may not be able to allocate more time for processing more than one meaning to a known word, thus affecting later reading comprehension" (p.231). This particular profile described by Wolf and Cohen, is similar to the one we found in our Spanish sample (study 2). Although our 4 and 5 grade RD children had average word recognition skills, they were significantly delayed compared to their peers, who reached the 90th percentile in word decoding. This finding suggests a poorer mastery of sight vocabulary skills. The Spanish RD children also show a phonological deficit as measured by nonword reading and slow nonword reading. Although the authors present this intervention program as a piece of research that will contribute to the "understanding of fluency-based reading problems in children", we still interpret the results as a unique profile a phonological deficit will present in a regular language such as Spanish. It is important to note that reading at the beginner years is a matter of decoding (also referred as "accuracy"). However, the same construct of reading develops as the child grows, and by the time children reach grades 4 and 5, more factors are involved in the process of
reading. For instance, fluency and comprehension become key elements in reading. A reader lacking in decoding strategies such as sight recognition or phonetic analysis, with a limited vocabulary due to lack of exposure to age-appropriate texts, will indeed show fluency and comprehension problems by the age of 10 years old. Wolf and Katzir-Cohen (2001) in their theoretical paper on reading fluency, synthesised the interaction of skills involved in reading, or better, how fluency interacts with reading:

"In its beginnings, reading fluency is the product of the initial development of accuracy and the subsequent development of automaticity in underlying sublexical processes, lexical processes, and their integration in a single-word reading and connected text. These include perceptual, phonological, orthographic, and morphological processes at the letter, letter-pattern, and word levels, as well as semantic and syntactic processes at the word level and connected-text level. After it is fully developed, reading fluency refers to a level of accuracy and rate where decoding is relatively effortless; where oral reading is smooth and accurate with correct prosody; and where attention can be allocated to comprehension" (p.219).

In a child with a RD, this connection or interaction between skills, will not go as smoothly as described for normal readers. The question becomes why this occurs. Based on our findings, we think that a specific phonological deficit at the very beginning of the reading process affects these interactions, not only slowing down the process of learning to read but also the reading to learn process, in that the deficit will remain there, although showing its effects in different ways. Clearly, reading fluency becomes an important factor for later reading skills. The profile that a disability will present will depend on the regularity of the language, and on the specific treatment
the individual has received. As for intervention programs, the one proposed by Wolf and Katzir-Cohen (2001), appears to be very promising in that it covers all the areas involved in the process of reading, what will allow the child with a RD to start reading to learn. It is as a very integrated approach that will be helpful for children learning to read English as well as Spanish. Once the basics of the irregularities of English are learned (after grade three) and the basic regularities of Spanish acquired (after grade 2), it seems that both RD groups need to work on sight vocabulary, accurate decoding, fluency and reading comprehension strategies. Future research should compare this method with a phonics-approach or a whole language-approach for reading intervention. Also, a longitudinal comparison across regular and irregular languages would be interesting to examine the time at which RD children of each language can overcome or compensate their difficulties under a similar balanced approach (to avoid the language / method interaction).

In summary, the findings around language differences on decoding measures will contribute to more efficient detection of individuals with a reading disability in a regular language such as Spanish, on which RD children tend to perform at higher levels on word identification measures as compared to normal readers of the same age and to peers learning to read in an irregular language. However, word attack measures (nonword reading) demonstrated to be sensitive to the Spanish language, allowing an English-Spanish comparison on the basis of a matching on this measure for classifying good and poor readers. Furthermore, the specific profile examined in Spanish allowed us to understand other areas affected in reading disabled children of this regular language. Reading fluency, reading comprehension, and sometimes spelling, are some of the areas also affected as a pattern of their main phonological deficit. These other skills affected are also important to consider for intervention purposes. For intervention, integrated programs should be provided in schools, to address not only the specificity of the deficit but also
the other areas that are involved in the process of reading. Interventions should be language appropriate and provide the disabled reader with different sort of strategies on which he/she will rely for compensating the disability. For English, a combination of global and synthetic strategies might be appropriate from the early phases of reading acquisition, given the irregularity of the orthography. For Spanish, a combination of decoding, fluency and comprehension strategies from the beginning also appears to be appropriate given the fact that GPC are easily acquired. Our results do not allow us to make statements on the methods of instruction or intervention programs that are more adequate for each language. However, these results have raised many questions on this matter that should be further investigated.
References


Cuetos, F. (1989). Lectura y escritura de palabras a través de la ruta fonológica [Reading and spelling using the phonological route]. Infancia y Aprendizaje, 45, 71-84.


Appendix I Instruments

Experimental Tasks
One minute nonword reading – Lectura de pseudopalabras en 1 minuto

"Ahora yo te voy a decir unas palabras que no son palabras de verdad pero suenan como palabras. Te van a parecer raras. Yo quiero que escuches atentamente y repitas cada palabra después de mí, exactamente como yo la diga".

1 ta
2 afe
3 feno
4 nosa
5 tima
6 sieta
7 paste
8 birsa
9 bordel
10 fresor
11 cueno
12 lación
13 diente
14 elredor
15 brenar
16 acter
17 enmorar
18 coccenir
19 octubrir
20 postrum
21 mosreir
22 fraccio
23 trecticante
24 pluritativo
25 fraglante
26 glendisivo
27 aguintero
28 gentativo
29 habentamiento
30 sortenidamente
31 causecuentemente
32 conmerusable
### Reading and Spelling – Lectura y Dictado

<table>
<thead>
<tr>
<th>Word list – Listado de palabras</th>
<th>Nonword list – Lectura de pseudopalabras</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. sopa</td>
<td>1. tora</td>
</tr>
<tr>
<td>2. mamá</td>
<td>2. olo</td>
</tr>
<tr>
<td>3. gusano</td>
<td>3. garde</td>
</tr>
<tr>
<td>4. nueve</td>
<td>4. vina</td>
</tr>
<tr>
<td>5. invitación</td>
<td>5. relela</td>
</tr>
<tr>
<td>6. abuelo</td>
<td>6. quina</td>
</tr>
<tr>
<td>7. ciudad</td>
<td>7. ciudad</td>
</tr>
<tr>
<td>8. alumno</td>
<td>8. gigono</td>
</tr>
<tr>
<td>9. elección</td>
<td>9. mampúa</td>
</tr>
<tr>
<td>10. participación</td>
<td>10. onción</td>
</tr>
</tbody>
</table>
Phoneme deletion – Sustracción de fonemas

**Fonema inicial**

Items de ejemplo

<table>
<thead>
<tr>
<th>las</th>
<th>mal</th>
<th>ves</th>
<th>peste</th>
</tr>
</thead>
</table>

Test Items

1. baño  
2. ven  
3. pera  
4. fama

| 5. plata  
| 6. mora  
| 7. casa  

Puntaje: _____ / 8

**Fonema final**

Items de ejemplo

<table>
<thead>
<tr>
<th>golf</th>
<th>las</th>
<th>red</th>
<th>ser</th>
</tr>
</thead>
</table>

Test Items

1. masa  
2. puma  
3. sur  
4. solo

| 5. ven  
| 6. oso  
| 7. cono  

Puntaje: _____ / 8

Puntaje Total: _____ / 16
Ahora vamos a hacer unos ejercicios con unas palabras parecidos a los que hicimos antes (tomar después del de sustracción de fonemas). Yo te voy a decir una palabra vos la vas a repetir y luego te voy a pedir que le quites o le cambies un sonido.

Por ejemplo:

<table>
<thead>
<tr>
<th>Palabra</th>
<th>Acción 1</th>
<th>Palabra</th>
<th>Acción 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>plana</td>
<td>(quitar p)</td>
<td>pino</td>
<td>(cambiar p x v)</td>
</tr>
<tr>
<td>fruto</td>
<td>(quitar f)</td>
<td>juego</td>
<td>(cambiar j x l)</td>
</tr>
</tbody>
</table>

**Fonema inicial (PDS inicial)**

<table>
<thead>
<tr>
<th>Palabra</th>
<th>Acción 1</th>
<th>Palabra</th>
<th>Acción 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>boca</td>
<td>(quitar b)</td>
<td>junto</td>
<td>(cambiar j x p)</td>
</tr>
<tr>
<td>rata</td>
<td>(quitar r)</td>
<td>rima</td>
<td>(cambiar r x l)</td>
</tr>
<tr>
<td>prisa</td>
<td>(quitar p)</td>
<td>puerta</td>
<td>(cambiar p x h)</td>
</tr>
</tbody>
</table>

**Fonema final (PDS final)**

<table>
<thead>
<tr>
<th>Palabra</th>
<th>Acción 1</th>
<th>Palabra</th>
<th>Acción 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>del</td>
<td>(quitar l)</td>
<td>sol</td>
<td>(cambiar l x n)</td>
</tr>
<tr>
<td>cono</td>
<td>(quitar o)</td>
<td>mas</td>
<td>(cambiar s x r)</td>
</tr>
<tr>
<td>malón</td>
<td>(quitar n)</td>
<td>voy</td>
<td>(cambiar y x s)</td>
</tr>
</tbody>
</table>

**Fonema medio (PDS middle)**

<table>
<thead>
<tr>
<th>Palabra</th>
<th>Acción 1</th>
<th>Palabra</th>
<th>Acción 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>liso</td>
<td>(quitar s)</td>
<td>dedo</td>
<td>(cambiar e x a)</td>
</tr>
<tr>
<td>tender</td>
<td>(quitar d)</td>
<td>telar</td>
<td>(cambiar l x j)</td>
</tr>
<tr>
<td>caliente</td>
<td>(quitar a)</td>
<td>camino</td>
<td>(cambiar m x s)</td>
</tr>
<tr>
<td>carreta</td>
<td>(quitar una r)</td>
<td>cocina</td>
<td>(cambiar c x b)</td>
</tr>
</tbody>
</table>

Puntaje / 20

Total
Oral Cloze - Completamiento oral de oraciones

Te voy a leer unas frases u oraciones incompletas y quisiera que me dijeras cuál es la palabra que falta. Donde falte una palabra, yo diré "espacio", entonces vos me responderás con la palabra adecuada. Por ejemplo, "la luna brilla en el ________ ". ¿Qué palabra crees que falta? Es la palabra "cielo". Si te vuelvo a leer la oración con la palabra que dijiste, dirá "la luna brilla en el cielo". Bien, vamos a completar otra oración. "Los niños ________ con sus juguetes". ¿Cuál es la palabra que falta? "Los niños juegan con ________ sus juguetes".

Ahora vamos a completar más oraciones:

1  En clase los ninos estudian, en el recreo los ninos ________ .
2  Escuchamos con los oidos, miramos con los ________ .
3  El café es negro, el ________ es blanca.
4  El durazno y la naranja son dos ________ .
5  Los autos casi siempre tienen cuatro ________ .
6  Los hambrientos perros se ________ toda la comida.
7  Juana ________ su hermana fueron a nadar a la pileta.
8  Santiago puso la lámpara en el escritorio para poder ________ .
9  Papá le ________ una carta a Sofía la semana pasada.
10 Era un día soleado con un cielo ________ .
11 Ayer, mamá y papá ________ a caminar.
12 El timbre sonó una vez y luego otra vez. El timbre sonó dos ________ .
13 La madre es alta, la niña es ________ .
14 Pedro buscaba su pelota de fútbol. La encontró ________ de la cama.
15 Luisa es la madre de Lucía y de Enrique. Luisa tiene dos ________ .
Instructions / Instrucciones:
Ahora te voy a decir unas frases, en las cuales omitiremos una palabra al final de cada frase. Quisiera que me dijeras cuál es la palabra que falta. Vamos a completar una. Para el desayuno, la niña tomó jugo de __________ (naranja, manzana). Ahora voy a leerte dos frases. Dime que palabra falta al final de cada frase. En seguida de haberme dado tus respuestas, me vas a decir las dos palabras que dijiste, y en el orden apropiado. Vamos a practicar. Nos ponemos traje de baño cuando vamos a ________ (nadar).
Los automóviles tiene que parar cuando la luz del semáforo está de color_______(rojo).
(importante: indicarle al niño cada vez que se haga un cambio a un nivel más avanzado, por ejemplo, en cuanto terminen con dos frases y antes de empezar con tres, y anotar las palabras en el orden en el cual el niño/a llas haya dicho).

2A
1. Durante el juego de baseball, el pitcher lanza la __________ (pelota).
2. Mis manos tienen diez __________ (dedos).
Respuesta: __________________________ (pelota, dedos).

2B
1. Durante el otoño, se barren las hojas que caen de los _________ (áboles)
2. Cuando nos enfermamos vamos al __________ (hospital).
Respuesta __________________________ (árboles, hospital).

2C
1. Un elefante es enorme, un ratón es __________ (pequeño, chiquito).
2. Con la sierra cortamos la ______________ (madera).
Respuesta __________________________ (madera, leña).

3A
1. Corremos rapidamente y caminamos __________ (lentamente).
2. En la biblioteca leemos __________ (libros).
3. Las manzanas son rojas, las bananas son __________ (amarillas).
Respuesta __________________________ (lentamente, libros, amarillas).

3B
1. El sol brilla durante el día, y la luna durante la __________ (noche).
2. Durante la primavera el granjero ara la __________ (tierra).
3. El niño pequeño tiene el cabello de color castaño y ojos de color ________ (marrón, azul).
Respuesta __________________________ (noche, tierra, marrón/azul).

3C
1. Las tardes de verano son muy __________ (calurosas).
2. Vamos a ver a los orangutanes al __________ (zoológico).
3. Durante la comida, a veces comemos pan con __________ (manteca).
Respuesta __________________________ (calurosas, zoológico, manteca).
4A
1. Porfavor, pasa la sal y la ________ (pimienta).
2. Cuando se nos enfrian las manos nos ponemos los ________ (guantes).
3. Al pasar por el buzón de correo, camino a la escuela, mandé una ________ (carta).
4. Después de nadar, sali empapada de la ________ (pileta).
Respuesta: ________________ (pimienta, guantes, carta, pileta).

4B
1. La nieve es blanca, el carbón es ________ (negro).
2. Habiendo terminando las clases, los niños caminaron a sus ________ (casas).
3. Un pájaro vuela, un pez ________ (nada).
4. En el granero, el granjero ordeño a las ________ (vacas).
Respuesta: ___________________________________ (negro, casas, nada, vacas).

4C
1. En el otoño las hojas caen de los ________ (árboles).
2. Tomamos la sopa con una ________ (cuchara).
3. En días muy calurosos voy a la pileta a ________ (nadar).
4. Nos cepillamos y nos peinamos el ________ (cabello, pelo).
Respuesta: ___________________________________ (árboles, cuchara, nadar, cabello).

5A
1. Para la fiesta, la niña compró un vestido de color rosa muy ________ (bonito).
2. El algodón es suave y las rocas son ________ (duras).
3. Una vez a la semana, la cocinera lava el piso de la ________ (cocina).
4. En el invierno cae la ________ (nieve, lluvia).
5. Cuando tiro la pelota hacia arriba, enseguida se viene hacia ________ (abajo).
Respuesta: ___________________________________ (bonito, duras, cocina, nieve, abajo).

5B
1. El caracol es lento, la liebre es ________ (rápida).
2. En la fiesta de cumpleaños, comemos helado y ________ (torta).
3. La lija es aspera, pero el vidrio es ________ (liso).
4. En el jardín los trabajadores juntaban las ________ (flores).
5. Por los campos, la niña montaba su ________ (caballo).
Respuesta: ___________________________________ (rápida, torta, liso, flores, caballo).

5C
1. Para cortar carne se necesita un ________ (cuchillo).
2. Durante el día hay luz, y en la noche hay ________ (obscuridad).
3. Los perros tienen cuatro ________ (patas).
4. En la verdulería, compramos ________ (verduras).
5. Un hombre es grande, un bebé es ________ (pequeño).
Respuesta: ___________________________________ (cuchillo, obscuridad, patas, verduras, pequeño).