The Characteristics of Children who are Referred On from Reading Recovery.

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Abstract

This study investigates the hypothesis that children who are Referred On (RO) from Reading Recovery (RR) may share certain learning and behavioural characteristics. These characteristics were investigated and compared to those identified by the researcher based on experience as a classroom teacher, and to seven characteristics identified by Al Otaiba and Fuchs (2002) in their meta-analysis of 23 studies which had focused on children unresponsive to literacy interventions.

Schools that use Reading Recovery as an early intervention programme were invited to participate in the research. Reading Recovery teachers, as well as students who had been through the programme, but had been RO, provided qualitative and quantitative data, to enable common characteristics to be identified, correlated and discussed, with reference to current literature and research around reading difficulties.

This study does not offer any suggestions as to the remediation of children who are RO or unresponsive to intervention programmes. However, it does uncover some unexpected correlations that implicate the need for further research, particularly in the area of gender differences, within a sample group of RO students.

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CHAPTER 1: INTRODUCTION

Research Topic

The case study research reported in this thesis, investigated the characteristics of children who had been involved in the Reading Recovery (RR) early intervention programme, but had not been successful in attaining an appropriate level of proficiency, and were, therefore, Referred On (RO) for further assistance. The research involved the testing of a group of children, from seven primary schools in the Waikato region, all of whom had been RO and were still experiencing reading difficulties. Reading Recovery teachers from the same schools were also consulted through a survey and interview, to gather qualitative evidence that was then analysed and triangulated with quantitative data from testing. Together, the research took the form of a small-scale correlational case study (Cohen et al., 2000).

Significance and Need for the Study

The research had its genesis in the author's experience, over several years, teaching children who had completed the RR programme and had subsequently been RO, and by the observation that they all appeared to share similar cognitive, behavioural, and in some cases, physical characteristics. These cognitive and behavioural characteristics had also been noted by Chapman et al. (2001), in their six year examination of "the relation between

the development of phonological-processing skills and the effectiveness of Reading Recovery (RR) in a whole language instructional context"(p.141). However, the physical facets were observed by the researcher and colleagues in the teaching profession.

Through experience with the general classroom teaching/assessing/planning process, it became evident that these students required assistance over and above the requirements of other students in the class, and a desire to solve the mystery of their struggle emerged.

The ability of these students to make the transition from learning to read, to reading to learn was imperative, but seemingly insurmountable, as they were having trouble decoding and recoding, which Pressley (2006) states is a major cause of poor reading comprehension. This is because the reader uses available working memory capacity to decode, and, as a consequence, the meaning of sentences, let alone paragraphs is lost.

Research suggests that phonological awareness, and specifically phonemic awareness, or lack of it, is responsible for children having difficulty learning to decode written words (Adams, 1990; Adams et al., 1998; Blachman, 1997; Chapman et al., 2001). A preliminary examination of the skills developed in the RR programme at the school where the researcher was working, suggested that these children had possibly entered the programme with poor phonemic awareness, and subsequently left the programme without having improved their phonemic awareness.

Recent data from the Ministry of Education pertaining to the number of children requiring additional help with reading, through the Resource Teachers indicates an increase (Holland, 2006). For example, in 2003, 2,012 children required assistance, with 2,459 children being assisted in 2004 (p.11).

Further investigation revealed that there was an increasing number of children who were being RO from RR in New Zealand, and that at a cost of approximately NZ$4000 for each child to take part in the programme, it appeared to be an inefficient use of government and taxpayer money, when the programme was probably not addressing their learning needs. These numbers have increased from 4% of those taking part in the programme in 1988 (Clay & Tuck, 1991), to 11.6% of those entering the programme in 2005 (Ng, 2006).

In Shanahan and Barr's (1995) evaluation of RR as an early intervention programme, it was reported that in the U.S. and New Zealand, the collecting and reporting of data was unreliable, inconsistent and seemingly biased by proponents of the programme. Thus, the number of children reported as failing to make adequate progress after receiving RR was often incorrectly reported. Shanahan and Barr (1995, p. 965) note that:

> the percentage (of students) discontinued (successfully) that was reported for the 1991-92 sample, for example, is 84%. Yet if we were to consider the total number of students served, including those with fewer than 60

> lessons, only 62% of the total would be found to complete the program successfully.

More recently, Tunmer and Chapman (2004) cited the meta-analysis of Elbaum, Vaughn, Hughes, and Moody (2000), who stated that;

> Typically, about 30 percent of students who begin Reading Recovery do not complete the program and do not perform significantly better than control students. As indicated in this meta-analysis, results reported for students who do complete the program may be inflated due to the selective attrition of students from some treatment groups and the use of measures that may bias the results in favour of Reading Recovery students. Thus it is particularly disturbing that sweeping endorsements of Reading Recovery still appear in the literature. (p.617)

In addition, Denton et al., (2006) questioned the testing methods (the Observational Survey) pertaining to RR, and found that "caution is needed in the interpretation of the OS, particularly when results are aggregated for groups of students" (p.33), and they advise the use of different tests should be used to assess a child's responsiveness to reading intervention. They also suggest further research should be done into the validity of the sub-tests of the OS.

Statistics and research such as this, make research aimed at describing the characteristics of children who are failing to acquire age-appropriate reading skills despite intensive intervention, imperative. It is the aim of this research

to gather information regarding the distinctive characteristics of RO children and to compare this information with current research on the characteristics of other poor and fluent readers, thus producing a profile that could facilitate the implementation of researched based programmes relevant for these children.

The Research Question and Purpose of the Study

In order to adequately provide intervention programmes for RO struggling readers, there is a need to create a profile of the characteristics typical of this group of learners. Hence the research question is:

What are the characteristics of children who have been Referred On from Reading Recovery?

In essence, the purpose of the study is to establish if there are certain cognitive, physical or socio-economic characteristics common to children who have been RO from RR, and if so, are these characteristics typical of other children who are struggling readers and are seemingly unresponsive to reading intervention programmes, as defined by current research from around the world, and in particular the results of a meta-analysis by Al Otaiba and Fuchs (2002)?

If an alignment exists between the characteristics of children who are RO and those identified by Al Otaiba and Fuchs (2002), this may facilitate recommendations that could impact on the learning outcomes for children, in that early detection of those who could be at risk of experiencing reading

difficulties may be possible. Subsequently, money spent on providing RR for children who may not be responsive to that particular form of intervention, could be used for other forms of appropriate intervention, and other children who may be more responsive to RR, may then get a chance to take part in the programme.

Research Questions

The research question and purpose of the study raises a number of subsidiary questions. These questions reflect issues discussed in the literature review (see Chapter 2), and, in particular the work of Al Otaiba and Fuchs (2002). Others are based on 'hunches' resultant upon the author's experience working with RR and RO children. These subsidiary questions were separated in to those pertaining to cognitive issues, physical issues and behavioural/socio-economic issues.

Cognitive Questions

1. Is there evidence that RO children scored poorly on their Observational Survey (OS), Clay, (1993)
2. Do RO children display poor decoding skills?
3. Are RO children low in levels of phonemic awareness (PA), and if so, are any particular PA tasks more difficult for them than others?
4. Is there evidence that RO children, have poor recall of prior learning?
5. Is there any particular hand dominance in RO children?

6. Do RO children display low levels of verbal intelligence (IQ)?
7. Do RO children have poor orthographic skills?
8. Is the entry test for RR, the OS, predictive of children who are most likely to be RO?
9. Is sight word vocabulary, and ability to rapidly name words, low in RO children?

Physical Questions

1. Are RO children predominantly boys or girls?
2. Is there any evidence of late (global) development in RO children?
3 Are the gross and fine motor skills of RO children below that of their cohorts?

Behavioural and Socio-economic Questions

1. Are RO children predominantly from one ethnicity more than another?
2. What percentage of RO children are from low decile rated schools?
3. Does decile rating affect learning outcomes for children who are RO?
4. Do RO children display any behavioural disorders or conditions?

Before the research began, hypotheses to these questions were made, based on personal observations and knowledge of the research at the time. These are listed below;

Cognitive Hypotheses

For all the subsidiary cognitive questions, the hypothesis was that RO children would display these characteristics, that they would display poor orthographic ability, have low levels of verbal intelligence, have low sight word vocabulary, be slow at rapid naming tasks, and so on. For the question pertaining to hand dominance, the belief was that there would be a predominance of right handedness.

Physical Hypotheses

Observations, together with some current research (Al Otaiba & Fuchs, 2002; Chapman et al., 2001; Pressley, 2006)) had suggested that more boys are unresponsive to reading intervention programmes; therefore the hypothesis was that there would be more boys RO than girls.

With reference to late (global) development and motor skills, the hypothesis was that there would be a deficit, but not necessarily a large one.

Behavioural and Socio-economic Hypotheses

Through personal experience, the hypothesis was made that there would be more Maori children RO from RR. The hypothesis pertaining to decile rating of the schools that RO children attended, was that more children will be RO from lower decile rated schools and that attending a low decile rated school can have a direct affect on the learning outcomes for children RO from RR.

There will be some evidence of behavioural problems or issues for children RO, particularly the boys, based on personal experience.

Current research in the area of unresponsiveness to intervention, theories pertaining to learning to read and a review of literature surrounding reasons for reading difficulties will be explored in the following literature review.

CHAPTER 2: LITERATURE REVIEW

The Scope of the Problem

Globally, there have always been a percentage of children who, for seemingly unknown reasons, are unable to learn to read proficiently (Spear-Swerling & Sternberg, 1996). In the absence of any medical or scientific evidence, such readers were considered to be 'either lazy or what is euphemistically called "slow"' (p.xiii). While some countries suffered from high levels of such poor readers, New Zealand gained a reputation for 'being world renowned in literacy achievements' (Oliver, 1999, p.2) and, in 1993, international surveys reported that New Zealand had 'more very good readers than any other country' (p.2).

However, in a more recent international survey carried out by P.I.S.A. (2003), results indicated the largest difference between the highest and lowest performing readers in New Zealand compared to other economically similarly placed countries such as Canada. While it is accepted that there could be a number of reasons for this type of disparity, such as Socio-Economic Status (SES), living in a print rich environment and phonemic awareness (Nicholson, 1997a; Oliver, 1999), efforts to remediate the problem have historically been fraught with the inability of educators to reach a consensus as to the most effective pedagogy to facilitate early reading success, and the best way to address the problem of detecting and initiating appropriate intervention programmes that prevent reading failure. The basis of any such programme is

a clear understanding of the reading process, and in particular, decoding and vocabulary acquisition.

In 2007 the New Zealand Government recognized the cognitive impediment dyslexia as a real cause of problems in some children's literacy development. Hence funding will become available to provide specific research based interventions for these children. However, this does not encompass all possible reasons for reading failure and the absence of student-specific programmes that address the needs of remedial readers, can facilitate or exacerbate on-going reading failure. As a consequence, research suggests (Chapman et al., 2001; Nicholson, 1997a) there will still be a percentage of New Zealand children who will fail to succeed in reading. Such failure to acquire adequate reading skills can impact on children's beliefs about themselves (Nicholson, 1997a; Pressley, 2006; Spear-Swerling, 1996; Stanovich, 1986) during their school years and in later life.

Self-belief and Self-esteem

Children's beliefs, particularly their negative self-belief, perpetuate the problem of reading failure. Thus behaviours pertaining to their own reading ability can influence the number of texts a child chooses or has the ability to read. Limited exposure to print retards a learner's vocabulary development creating a negative "Matthew Effect" (Stanovich, 1986). "The concept of Matthew Effects, springs from findings that individuals who have advantageous early educational experiences are able to utilize new educational

experiences more efficiently" (p.381). Thus the negative Matthew Effect, instead of creating a "rich-get-rich" situation, works to perpetuate a "poor-get-poorer" scenario with regard to the learners' skill and their self-belief (Nicholson, 1997a: Stanovich, 1986).

In addition to the impact on a child's self-esteem and the possibility of the learned helplessness of the "poor-get-poorer" scenario, research has shown that throughout the world, adults with limited reading ability are more likely to be unemployed, be unaware of health and social issues for themselves and their families and to be involved in criminal activity (Shanahan & Barr, 1995; Spear-Swerling & Sternberg, 1996). Although definitions of literacy may be evolving (Christie, 1990), there will always be a need for a certain level of ability to enable a person to actively be a part of society in a positive manner, and that requires certain levels of literacy skills. As a result of societal problems such as these, governments throughout the world have attempted to resolve reading difficulties through legislation. For example, in the United States of America the No child left behind (NCLB) Act was passed in 2002 (United States Department of Education, 2008), in an attempt to ensure that all children could read, write and do mathematics to a level that would enable them to participate fully in society.

In 1998 the New Zealand the Labour Government established a National Literacy Taskforce to investigate the country's literacy problems. The bold claim was subsequently made that "By 2005 every child turning 9 will be able to read, write and do maths for success" (Literacy Taskforce, 1999, p.20).

The inclusion of the following sections on the reading process and reading acquisition are predicated on the claim that:

"Current research has shown that basing our instructional practices and policies on converging scientific evidence will result in more students learning to read proficiently" (Lyon & Chhabra, 2004). Thus, an elaboration of current theories and research pertaining to the reading process, reading acquisition, possible causes of reading difficulties and common characteristics of poor readers is the continuing focus of this literature review, and the basis for interpreting results presented in Chapter Four, which are subsequently discussed in Chapter Five.

The Process of Reading

According to Goodman (1976), a psycholinguist wedded to schema theory, "Reading is a complex process by which a reader reconstructs, to some degree, a message encoded by the writer in graphic language" (p.472). Consistent with this definition, learning to read is a challenge that requires the linking of oral language capabilities with a written representation (Goodman & Goodman, 1979; Taylor et al., 1988; Wagner et al, 2003), through the ability to decode (written) words, and the construction of meaning, or a message, from a text (Everatt, 1999; Gough & Tunmer, 1986; Lonigan, 2003; Nicholson, 1997a; Pressley, 2006). Poor readers find it difficult to decode words (Gaskins et al., 1995), and in Gough and Tunmer's (1986) focused view of the reading process, decoding is a vital component that, together with comprehension, creates a fluent or skilled reader. In order to decode words, students must be aware of phonemes, or individual sounds in words

(phonemic awareness), and must subsequently be able to relate them to what is written down (Adams et al, 1998; Blachman, 2000; Brady, 1997; Ehri & Robbins, 1992; Gough & Hillinger, 1980; Juel, 1991; Liberman, 1997; Pressley, 2006; Rack et al., 1992; Savage et al., 2003; Scarborough & Brady, 2002; Vaughn & Linan-Thompson, 2003).

While researchers and theorists would agree that the reason for reading is to make meaning from print (Adams, 1990; Blachman, 2000; Cambourne, 1988; Clay, 1991; Goodman, 1989, Goswami, 2005; Holdaway, 1972; Juel, 1991; Luke, 1992; Pressley, 2006; Shaywitz, 1996, Stanovich, 1986; Taylor et al., 1988), the processes used by beginning readers to recognize individual words within a text can vary. Pressley (2006) believes that, based on brain imagery research, some readers learn to memorise whole words through repeated rote learning (sight word automaticity) as opposed to repeated sounding out (decoding). This is supported by the research of Dolch (1960, cited in Pressley, 2006) and Shaywitz (1996). Neuroscientists and reading researchers agree that all children can learn to read (Shaywitz & Shaywitz, 2004; Valett, 1980) but that "reading reflects language and reading disability reflects a deficit within the [childs'] language system" (Shaywitz & Shaywitz, 2004, p.7) Therefore, measures need to be in place to ensure that reading and reading intervention programmes are pertinent to students' requirements, with the focus being on the area of language that is problematic for the individual.

Reading Acquisition

Proficient reading occurs when, according to Gough and Tuner's (1986) view of reading, a reader is able to simultaneously decode and comprehend a written text. Pressley (2006) refers to this process as a coordination of higher-order processes (comprehension) with lower-order processes (decoding) and claims that "getting meaning from a text very much depends on efficient lower-order processing: Good readers automatically recognize many words and efficiently decode unfamiliar words they encounter" (p.61).

This view of reading would be debated by Valencia et al. (1994) who believe that proficient reading is the result of the interaction of three different processes (p.144), namely "word identification, meaning and fluency" (p.144). However, for the purposes of this review, the beliefs of Pressley and Fingerlett (2006), who maintain that fluency, "accurate and fast reading at the word level" (p.195), is a means of achieving comprehension rather than a separate entity, will be considered to be the more accurate model, as it is based on more recent research.

When reading is viewed as a two dimensional process, decoding and comprehension, it is possible to identify certain characteristics such as phonological knowledge, memory capacity, word recognition, verbal ability, orthographic ability, vocabulary knowledge, attentional/behavioural difficulties and demographic issues, that research (Al Otaiba & Fuchs, 2002) has shown play a part in the acquisition of both decoding and reading

comprehension. Individual differences in these characteristics and capabilities can be attributed to, and affected by, three distinct causes; physical reasons, cognitive reasons and social/behavioural reasons. Physical and cognitive causes are generally considered to be intrinsic factors while social/behavioural causes are extrinsic factors affecting the acquisition of reading.

Intrinsic Factors

Poor readers commonly find it difficult to decode words (Gaskins et al., 1995) because skilled decoding requires phonological knowledge and processing skills (Adams, 1993; Adams et al, 1998; Blachman, 2000; Ehri & Robbins, 1992; Gough & Hillinger, 1980; Juel, 1991; Nicholson, 1997a; Pressley, 2006; Rack et al., 1992; Savage et al., 2003; Scarborough & Brady, 2002; Torgeson et al., 1997; Tunmer et al., 1998; Vaughn & Linan-Thompson, 2003) incorporating letter knowledge, knowledge of alphabetic principles, phonemic awareness and syllable and onset / rime recognition (Goswami, 2005). These particular skills are often referred to as phonological awareness or "an awareness of the sound segments in speech" (Blachman, 2000, p.483).

When a child begins school with the expectation of learning to read, it is difficult to ascertain their perceptions of the sub-lexical components of the words they are speaking. Blachman (2000) proposes that "children have trouble learning to decode because they are completely unaware of the fact that spoken language is segmented – into sentences, into syllables and into phonemes" (p.484), and that because of their lack of understanding of the

internal sound structure of words, they struggle to even learn letter –sound correspondences which historically have been considered vital to decoding (Adams et al., 1998). “Many students find it extremely difficult to induce the words from the code no matter how they are drilled on the individual letters and sounds”(p.18) which implicates the necessity to facilitate their phonemic awareness by directing their attention “to the sounds of phonemes as they produce or listen to speech”(p.19).

Phonemic Awareness

Phonemic awareness is characterized by the ability to identify and manipulate the sounds in spoken language, that is, segmentation, deletion and blending of phonemes. These dimensions can be measured by the *Roper Phonemic Awareness Test* (1984), which asks children to delete a phoneme, for example, “Say top”. “Now say top without the /t/”. Hatcher et al (1994) and Hatcher and Hulme (1999) suggest that phoneme manipulation skills are a unique and powerful predictor of growth in reading acquisition. Unfortunately, developing a child’s phonemic awareness appears to be a difficult task (Adams et.al, 1998; Blachman, 1997; Chapman et al., 1999; Nicholson, 1997) because, as opposed to the simple visual representations of letters (Nicholson, 1997), phonemes are “fused together in the speech stream” (p.392) or are ”co-articulated during speech production” (Blachman, 1997, p.197).

Chapman et al. (1999) used phoneme deletion and segmentation tasks to ascertain that children who entered Reading Recovery (RR) demonstrated

typically low phonemic awareness. One of their findings central to their longitudinal research was that, Referred On (RO) children still demonstrated low phonemic awareness at the conclusion of their programme, and at subsequent testings two and three years later. In comparison, Torgeson and Davis (1996) found that intervention programmes that specifically targeted phonemic awareness through rhyming, blending and deletions tasks delivered significant growth in phoneme manipulation ability.

Phonemic Awareness and Spoken Language

Once a learner is conscious of sound segments within spoken language, they "must come to realize that there are systematic correspondences between the elements of written and spoken language" (Tunmer, 1994, p.150). If, however, they lack this ability, this goes some of the way to explaining "why a poor reader may not have responded to earlier teaching, even teaching using phonic reading schemes" (Nicholson, 1997, p.17). An understanding of why some children struggle to significantly improve their phonemic awareness, and fail to make adequate progress in learning to read, may lie in establishing possible links between these cognitive/intrinsic characteristics.

One possible link is that between phonological skills and verbal ability. In his research to identify and label different varieties of poor readers and sub-types of dyslexics, Stanovich (1988) and Stanovich et al. (1997) found no significant correlation between verbal ability (verbal IQ) and phonological skill ability. In this context verbal ability is considered to be the ability of a

child to ‘explain orally the meaning of a word” (Sattler, 1982, p.175). By assessing their word knowledge through their explanations, it is possible to ascertain…

> their learning ability, fund of information, richness of ideas memory, concept formation, and language development – that may be closely related to the child’s experiences and the educational environment. The number of words known by children likely reflects their ability to learn and to accumulate information (Sattler, 1982, p.175).

However, in their cross-sectional study of Kindergarten and 2nd grade students, Wagner et al. (1993) were able to establish a correlation between verbal ability using the vocabulary subtest of the Stanford-Binet Intelligence scale (Thorndike et al, 1986, cited in Wagner et al, 1993), and measures of phonological awareness. Because of this correlation, Torgesen and Davis (1996) also included the same vocabulary subtest in their research to establish cognitive characteristics that could predict success in phonological awareness based intervention programmes. Their results indicated that general verbal ability, along with invented spelling was the best predictor of growth in analytic (phonemic) awareness.

These studies seem to support the idea that while it is seemingly well-established that low phonological awareness, particularly phonemic awareness, is causally associated with reading failure, the specific reasons for the

phonological deficits are still being investigated by researchers throughout the world.

Working Memory

As discussed earlier, another suggested cognitive/intrinsic reason for reading failure is the working memory capacity of the individual. An interesting link has been established between verbal ability (vocabulary) and a persons working memory (Baddeley & Hitch, 1974), where 'phonological working memory appears to contribute directly to the learning of new words" (Gathercole & Baddeley, 1993, p.45). While this view has generally referred to the growth of a child's vocabulary between the ages of 4-8 years, Gathercole and Baddeley (1993) were able to establish, through a simulation of natural vocabulary acquisition, that "children with poor phonological memory skills took longer to acquire phonologically unfamiliar labels than the children with superior memory abilities" (p.54).

Phonological working memory was also investigated by Wagner et al. (1993). Based on the construct that:

> coding information in a sound-based representation system for efficient storage in working memory during ongoing processing, efficient phonological coding in working memory should provide the beginning reader with an accurate set of phonemes or sounds to blend as well as free the maximum amount of cognitive

> resources for the difficult task of blending the sounds into words (p.84).

Their study concluded that there was a strong correlation between phonological awareness and phonological coding in working memory, and that there was "a single underlying cause of individual difference that accounted for performance" (p.85) on the phonological awareness and phonological coding in working memory tasks. This led them to speculate that the single underlying cause was the ability of the child to keep stimuli active within their working memory. Further to this, they claim that phonological processing abilities are correlated to general cognitive ability and that for this reason they are coherent and stable making them difficult to remediate through training.

Johnston (1993) claims that for children who have difficulties learning to read, write and spell:

> there is persuasive evidence that poor readers suffer from a verbal short-term memory deficit, the fact that they have difficulty retrieving semantic information suggests that they also have a long term memory problem. Furthermore, their slowness to learn to recognise words is also indicative of deficient term learning (p.63).

It is important to note that the use of the terms 'short-term memory' and 'working memory' are not directly interchangeable. Short-term memory is an historical term referring to the ability of a person to hold information for a

short time, to enable then to carry out tasks such as remembering a phone number just long enough to dial it correctly. Working memory is a more recent term that researchers such as Gathercole and Baddeley (1993) use when describing the dynamic process people use to undertake verbal rehearsal and other conscious processing, together with some executive functions devoted to the conscious processing of resources in other component memory systems.

If, as Al Otaiba and Fuchs (2002) review reveals, there is a common thread of poor phonological processing abilities, low verbal abilities, poor working memory ability and deficient long-term memory in children who are unresponsive to reading intervention programmes, it would suggest that referred on (RO) children would exhibit the same or similar characteristics. One characteristic that may be indicative of poor long term memory, is the ability to instantly recognise common words by sight – sight words automaticitiy.

Sight word Automaticity

Ehri, (1997) found that normal readers had a much larger bank of known sight words, a better sight word vocabulary, than dyslexic readers. This is also congruent with the work of Al Otaiba and Fuchs (2002), Dolch (1960), Pressley (2006) and Shaywitz (2004), who all found that children who are unresponsive to reading intervention programmes have poor sight word vocabulary and poor instant recall of common or high frequency words. It is

likely then, from the literature discussed thus far, that they have poor memories; but not conclusive that they all suffer from dyslexia. It may suggest however, that children who are RO from RR will exhibit these same characteristics with regard to sight word automaticity.

Many of the studies in Al Otaiba and Fuchs (2002) meta-analysis, found a link between the lack of ability of children who are unresponsive to reading intervention programmes to rapidly name words, as a form of sight word testing, and the ability to accurately spell words, or orthographic ability.

Orthographic Processing

Further to these characteristics, Al Otaiba and Fuchs (2002) identified three studies that showed a correlation between poor phonological processing abilities, low verbal abilities and orthographic skills (Berninger, 1999; Foorman et. al., 1997; Olson et al., 1997; Torgeson & Davis, 1996). Orthography is the process of spelling words (or non-words) by transferring knowledge of the sounds (phonemes) of English into the orthographic or written representations of the spoken word (morphemes, or units of meaning) (Treiman, 1997). The English language follows the alphabetic principle and there are many orthographic patterns that "reflect the sound patterns of the spoken language" (p.199), thus children, progressing at age appropriate rates in reading and writing rapidly learn the letter patterns in words and are able to apply phoneme-grapheme correspondences. Once they are aware of the morphological irregularities in some words and "their knowledge of the

spelling system grows and deepens they become better and better spellers" (Treiman, 1997, p.200).

However, in the case of children who are unresponsive to reading intervention programmes orthographic ability appears to be both a predictor and an outcome of poor phonological awareness, poor long-term memory and low verbal ability. In Torgeson and Davis (1997) study of variables that seem to predict a child's response to phonological awareness training, they concluded that a child's ability to spell non-words (simple C-V-C) combinations, was the strongest predictor of their ability to learn to segment and blend phonemes. They discussed the possibility that it may not be clear from their analysis;

> whether explicit instruction in spelling skills would better prepare children for training in blending and segmenting as oral language skills, or whether performance on the spelling test is simply the most sensitive indicator that children have a range of instructional experiences and possess a set of abilities that provide good preparation to responds to such training(P.17).

Chapman et al. (1999) used two forms of spelling assessments in their longitudinal study of new entrant children, who subsequently formed four distinct study groups, (i) normally developing readers, (ii) poor readers, (iii) poor readers who received Reading Recovery, and (iv) poor readers who received Reading Recovery, but were Referred On. One test involved a conventional spelling assessment, and the other test allocated credit or points

for any correct phonemes the children had recorded for each word. They were tested five times over three years and on each occasion the children who made up the RO group scored significantly lower than any of the other groups.

When tested prior to receiving RR, the RO group scored a mean of only 3.67 correctly spelt words out of a possible 72. This compares to 39.6 out of 72 for the normally developing group. At the conclusion of the study, a year after being referred on from Reading Recovery, their mean score was 39 as opposed to the normally developing group who had a mean score of 62.15. Thus, Chapman et al. (1999), and Al Otaiba and Fuchs (2002) would most likely agree that poor orthographic abilities are persistent in the case of children who are unresponsive to reading interventions. With this in mind, it is hypothesised that the present research would reveal similar results with regard to orthographic ability.

Insights from Neuroscience

One explanation as to the causes of intrinsic reasons for reading difficulties stems from recent research (Hudson et al., 2007), into how the brain's of children with reading difficulties appear to work compared to their cohorts who are not experiencing reading difficulties. Shaywitz and Shaywitz (2004) explain that 'reading reflects language, and reading disability reflects a deficit within the language system' (p.8), which can be measured using functional magnetic resonance imaging (fMRI). They have identified that there are three key areas of the left side of the brain that are involved in the systemic function

we call reading. The Brocas area (in the left anterior of the brain) is involved in articulation and word analysis and two more posterior areas, the parieto-temporal region and the occipito-temporal region are also involved. The parieto-temporal region is implicated in word analysis, and the occipito-temporal region in reading fluency.

> By employing the use of fMRI technology, studies of dyslexic readers document an under activation of the two systems in the back of the brain, together with an over activation of the Brocas area in the front of the brain. The struggling readers appear to be turning to the frontal region, which is responsible for articulating spoken words, to compensate for the fault in the systems in the back of the brain (Shaywitz & Shaywitz, 2004, p.8).

They also claim that over time, struggling readers actually develop 'alternate reading systems in the front of the brain and in the *right* side of the brain' (p.8).

Hudson et al., (2007) also used fMRI technology to test 6.5 year olds who were considered to be at risk of developing reading difficulties. Hudson et al. (2007) report that, when compared to their cohorts, who were not at risk of developing reading difficulties, the fMRI results indicated that 'there was a lack of engagement of the superior temporal region of the left hemisphere, an area associated with the conversion of print to sound' (p.129). Subsequent comparisons also revealed that there was more engagement of the right side of

the brain, a pattern that was evident in children who had already been identified as having reading problems, and with 'children and adults with severe decoding problems' (p.129).

While this (fMRI) research seems quite compelling, within the scope of this particular research, it would be impossible to determine whether or not children who were RO from RR would display any of the same results. Thus, other possible causes for their reading difficulties will need to be explored.

Other Factors

Research has suggested that there is a possible link between the intrinsic causes of unresponsiveness to intervention and the extrinsic factors involved. Orthographic processing was identified by Foorman et al. (1997) as being associated with demographic factors such as socio-economic status, ethnicity and gender.

Chapman et al. (1999) also reported a link between the self-belief of children who were struggling readers and subsequent behavioural issues in the classroom. These types of issues are deemed to be extrinsic and can have a significant affect on responsiveness to interventions such as Reading Recovery. Al Otaiba and Fuchs (2002) discovered that 5 out of 21 studies specifically identified extrinsic factors such as demographics and behavioural issues that impacted in ability to respond to reading intervention programmes.

Extrinsic Factors

Demographics.

Researchers claim that extrinsic factors including ethnicity, gender and socio-economic status, have an impact on children's ability to acquire literacy skills, and also to their responsiveness to subsequent intervention programmes (Al Otaiba & Fuchs, 2002). Ethnicity was analysed in five of the studies that were part of Al Otaiba and Fuchs (2002) meta-analysis, however, Foorman et al. (1997) were the only researchers to find a correlation with children from a minority ethnic background and instances of unresponsiveness to intervention programmes. They found that poor phonemic awareness, poor spelling, low verbal IQ and being of Spanish ethnicity were the characteristics of unresponsive children.

The 2004 data reported by Anand and Bennie (2004) shows that in New Zealand, in 2002, 'Maori, Pasifica and "Other European" boys and girls in New Zealand were more likely to be in Reading Recovery than New Zealand European children' (p.6). Furthermore, 10.75% of children from these ethnicities were referred on, as opposed to 8.5% of the New Zealand European children.

Other research also indicates that boys are more likely to require intervention than girls (Anand & Bennie, 2004; Gibson, 1993; Nicholson, 1997a). The data from 2002, consistent with previous years, indicates 'two-thirds of the students in Reading Recovery in were boys' (Anand & Bennie, 2004, p.6). The outcomes for boys who enter RR are not as favourable as they are for

girls, with 10.4% of boys being RO as opposed to only 7% for girls. This research will investigate this variable and establish whether there are any significant characteristics pertaining to each gender, and instances of being RO.

As well as ethnicity and gender, there is also a belief that socio-economic status (SES) also affects children's chances, or ability, to reach age appropriate literacy levels (Nicholson, 1997a). In New Zealand, SES can be measured to some degree by the decile rating given to schools, with a rating of 10 being the highest, and 1 the lowest. The numeric value equates to the average income of the families in the suburban or rural area adjacent to the particular school. Therefore, a high rating indicates that the average income of families in the surrounding area is higher than that of a school with a lower decile rating. Al Otaiba and Fuchs (2002) found that children of low SES were also from families where the parents not only had a low income, but were poorly educated and had had less exposure to literacy experiences. This suggests that in New Zealand, we could hypothesise that children attending lower decile rated schools would be from families with low incomes and more poorly educated parents than those attending higher decile rated schools. Subsequently, if the situation in New Zealand reflects that described by Al Otaiba and Fuchs (2002), we would also expect that more children attending low decile rated schools would require intervention programmes such as RR, or those provided by the Resource Teachers of Literacy (RTLit).

Annual reports from the monitoring of RR and the Reading Teachers of Literacy support this notion. For example, in the Resource Teachers: Literacy Annual Report, 2002, Anand, Bennie &Dewar, (2003), state that the data:

> Shows a marked trend, with students in low decile schools being up to three times as likely to have a 'less successful' outcome than their high decile counterparts. In addition, there are disproportionately more students in low decile schools in the RTLit programme (p. 16).

Furthermore, the same research acknowledges that of the 1,873 children involved in the RTLit programme in 2002, some 349 (18.6%), had been RO from RR, but also that 307 (16.4%) of the children had been successfully discontinued from RR.

It is interesting to note at this point, that Schmitt and Gregory (2006), in their research into the Impact of Early Literacy Intervention state that:

> as an early literacy intervention, Reading Recovery is designed to serve the children at the lowest end of the achievement distribution, is expected to increase the numbers of children operating in the average ranges, and most critically, is expected to decrease the numbers of children who require additional assistance (p.4).

In addition, Jones (1997) believes the RR programme to be highly successful, even insightful.

It is, therefore, of concern, that these numbers of children who have successfully completed a RR programme, as well as those that were RO, are still requiring further assistance through the RTLit services.

Data from the Annual Monitoring of Reading Recovery for the same period (Anand & Bennie, 2004) shows that of the 9807 children who received RR in 2002, some 4,750 were from decile 5 or lower rated schools, but more pertinently that 'When the outcomes of student categories are examined some trends are evident. The percentage of students successfully completing Reading Recovery ('discontinued') in 2002, increases by decile' and that ' a child in a decile 1 school is more likely to be 'referred on' to a specialist programme than a child in a decile 10 school' (p.12). An investigation of the characteristics of children RO would, therefore, need to involve participants from schools with a range of decile ratings to allow adequate comparisons with the published data for New Zealand as well as the findings of Al Otaiba and Fuchs (2002).

Nicholson (1997a) found that SES, particularly income, was inversely proportional to phonemic awareness and the ability to succeed in reading. This highlights the need for further research, such as this particular study, to be undertaken, to establish if there are more variables or factors that, when correlated, allow a profile of typical characteristics that could be aligned with children who are RO.

Foorman et al., (1997) believe that there is a correlation between children from low SES and boys, and instances of behavioural and attention deficits

that contribute to poor literacy skills and unresponsiveness to intervention programmes.

Behavioural factors.

Lack of progress and success in reading can be caused by, or due to, attention or behavioural problems, including disorders such as Attention Deficit Disorder (ADD), Attention Deficit and Hyperactivity Disorder (ADHD) and Oppositional Defiance Disorder (ODD). Foorman et al., (1997) established that during whole class and one to one tutoring, behavioural and attention deficits had an adverse affect on learning and contributed to lack of progress. While some of the behavioural problems they identified were due to disorders such as those mentioned above, Foorman et al., (1997) felt that many of the problems were due to the SES of the children and that the types of schools they attended were considered to be "tough schools" because of the areas where they were located.

With respect to children's behaviour, O'Shaughnessy and Swanson (2000), Snider (1997) and Vadesy et al., (1997) all reported that there was a strong correlation between low SES and poor attention ability in children who were unresponsive to reading within the classroom and also in intervention programmes, particularly with children in the 7-9 years age range. This knowledge, which identifies an obvious lack of progress from classroom and intervention programmes, is of great concern to educators and other researchers alike. There is a desire to find evidence-based strategies to facilitate success in developing skilled readers. Hence the importance of this

research into the characteristics of children who are RO from RR, as a way of identifying responsiveness to the RR programme as an intervention for reading difficulties.

Responsiveness.

Early intervention programmes, particularly those with a phonological component, are generally quite effective in providing short term gains in reading ability (Ball & Blachman, 1991; Bradley & Bryant, 1985; Bus & Van Ijzendoorn, 1999). However, there are some children who are seemingly unresponsive to many of these interventions (Lovett et al., 1994; Vellutino & Scanlon, 1987). It is, therefore, imperative to identify the characteristics of these children, to ensure the correct programmes are in place to assist all their needs.

In New Zealand, RR reports indicated a significant increase in the numbers of children being RO, from 4% in 1988 (Clay & Tuck, 1991) to 11.36 % in 2005 (Ng, 2006). There have been previous investigations into the effectiveness of the RR programme, and Chapman et al., (1999) and Tunmer and Chapman (2004), found that RR did not remediate phonological processing difficulties, which is consistent with the findings of Al Otaiba and Fuchs (2002), who identified lack of phonological awareness and phonological memory to be a pertinent characteristic of children unresponsive to intervention programmes. Al Otaiba and Fuchs (2002) reported in their meta-analysis of 23 studies, that 20 of the studies found a significant relationship between unresponsiveness and phonological awareness alone. While Iverson and Tunmer (1993) also

found that RR with an added phonological component provided better overall results in reading improvement, reinforcing the hypothesis that RO children may exhibit poor ability in phonological tasks.

Clay (1993) believed that contrary to previous research, it was possible to identify children who were at risk of reading failure after only one year at school, and when they had already begun to fail, "so Reading Recovery was used to intervene instructionally at this point" (Shanahan & Barr, 1995, p.962). However, it is the belief of the researcher that it is possible to identify children who may be at risk (Flores et al, 1991) of reading failure before they begin formal reading tuition, based on current theories of reading acquisition (Adams et. al., 1998; Berninger, 1999; Blachman, 1997; Chapman et al., 1999; Foorman et al., 1997; Goswami, 2005; Shaywitz, 1996; Stanovich, 1988; Torgeson & Davis, 1996). Thus, it is vital that the characteristics of RO children are investigated and established, to verify if there is a correlation with the characteristics of children who are unresponsive to reading intervention programmes as identified by Al Otaiba and Fuchs (2002). They stated that;

> seven child characteristics have been associated with treatment unresponsiveness: phonological awareness, phonological memory, rapid naming, intelligence, attention or behaviour, orthographic processing and demographics (p.11).

Intelligence was measured as verbal IQ in twelve of the studies, with one (Torgesen et al., 1999) finding that 'verbal ability was not associated with

treatment unresponsiveness once phonological skill and socioeconomic status were entered into the regression equation' (p10).

By defining the characteristics of children who have been RO from RR, it may, therefore, be possible to design interventions which reduce the number of children being RO. There may also be the prospect of subsequently identifying ways in which government and taxpayer money can be more efficiently used to remediate persistent reading difficulties, and children may be able to be identified at pre-school or very early on in their school life as being at risk of reading failure, thereby enabling appropriate interventions before they experience any reading failure and associated self-esteem issues.
Based on the review of the literature, and personal beliefs, the hypotheses, some replicated and some emergent were as follows.

That RO children, would have low levels of orthographic ability, verbal ability, sight word vocabulary and automaticity. They would predominantly be right motor cortex dominant, there would be more boys than girls and that they would show some degree of late global and motor skill development. They would be more likely to come from low decile rated school, and that decile rating of the schools would impact on their responsiveness to the RR programme.

The following chapter describes the method used to explore the research question, subsidiary questions and these hypotheses, thus designed to determine the characteristics of children RO from RR.

CHAPTER 3: METHOD

Overview of the Study

The research method involved the administration of a battery of tests to ascertain the learning and behavioural characteristics of children who had received a Reading Recovery (Clay, 1979) intervention programme, but were unsuccessful in attaining age appropriate reading ability. These children had been Referred On (RO) for further interventions. Results from these tests were collated and analysed to provide correlations and other outputs that were subsequently compared with the characteristics of children who had failed to respond to a variety of reading intervention programmes, identified by Al Otaiba and Fuchs (2002).

Ethical Considerations

The University of Waikato, School of Education Ethics Committee approved all tests and procedures, (see appendix A). Permission was also granted by parents, Principals and Reading Recovery teachers of the participating students. Parents were given information pertaining to the type of involvement their children would have and the expected time out of the classroom. Reading Recovery teachers were also given information pertaining to the expected time and nature of their involvement, (see appendix B). All participants were given the option to withdraw from the study up to the point at which all the data had been analysed.

Participant Selection

All participants were selected after an initial introductory letter explaining the purpose and format of the research was sent to 63 contributing and Full Primary schools within the Waikato region. Twenty three of these schools responded to the initial letter. Seven schools indicated that they were available and willing to take part in the study. Subsequent to receiving a favourable response, the researcher met with the RR teachers, explained the questionnaire (see Appendix C), answered any questions, invited the RR teachers to complete the questionnaire and explained that the next step in the research would involve working with a selection of children whom they had RO from RR. At this initial meeting, RR teachers were also given information and consent forms to forward to possible student participants and their families. On completion of these formalities, dates and times were organised to begin testing. Parents/caregivers were invited to meet with the researcher to facilitate an understanding of the testing process their children would take part in. Only one parent took advantage of this opportunity, and some qualitative information was gained from this meeting.

Participants and Setting

Participants involved in this research were selected using a semi-structured stratified random sample methodology. These participants were:

(i) Fifteen Primary school children comprising seven girls, three girls aged between 7-7.5 years and four aged 8 -9 years, and eight boys, four aged

between 8.5-9 years, three boys aged between 9-10 years, and one aged 6.5 years, who had been RO from RR, from a variety of schools throughout the Waikato Region. The bias towards boys in this study reflects the trend nationwide, but is lower than the percentage of gender difference in enrolments in RR (Anand & Bennie, , 2004) which was 7,650 boys, and 3,820 girls, of this 2002 cohort, 10.4% (796) of the boys and 7% (267) of the girls were RO. These participants had been identified by RR teachers who had made contact with the researcher after initial contact with school Principals

(ii) Five Reading Recovery teachers from the same four schools as the participants, and two from another school agreed to take part, despite the later having no children meeting the criteria at the time, but had had a number of students RO over the past five years.

Schools ranged from decile 2 to decile 10. This range made it possible to suggest whether or not socio-economic status impacts on acquisition of reading and response to intervention as identified in the Literature Review. School rolls ranged from 28-580, and children from three different ethnic backgrounds took part in the study, including one boy who identified as Maori, and another boy of Indian ethnicity. Neither one had English as a second speaking language. Three children were from decile 2 schools, nine children from decile 7, and three children from decile 10 schools.

All testing took place at the participant's schools, primarily in the school staff room or Reading Recovery rooms, during class time and at a time convenient to the classroom teachers and Principals.

Case Study Design

The correlational case study methodology, identified as being in the interpretive paradigm (Cohen, et al., 2001), was selected to obtain a combination of qualitative and quantitative information. Qualitative information was obtained through a questionnaire and face to face interview. Quantitative data was obtained from a battery of tests administered to a group of 15 RO students, including one experimental procedure that required a pre-test/ teaching/post-test format. These tests are described in detail below.

Reading Recovery Teachers Questionnaire

In broad terms the RR questionnaire was designed to gain the information needed to test the research hypothesis and especially the subsidiary questions pertaining to gender, numbers of students RO, skills prior and post RR and the general learning and behavioural characteristics of RR students.

Recovery Teachers were asked a total of 14 questions pertaining to their experiences teaching Reading Recovery (see Appendix C). Teachers were advised to allow 20-30 minutes to complete the questionnaire. Questions 1-3 were background questions referring to the length of time they had been teaching RR, when they were first trained and information regarding ongoing training. They were designed as short answer questions.

Questions 4, 6 and 7 were included to compare with data available through *Annual Monitoring of Reading Recovery,* produced for the Ministry of Education, from 2000-2006. They were designed to profile gender, total

numbers of children taught, and critically, the percentage of children RO by each teacher.

The remaining questions required the RR teachers to think about their experiences testing and teaching children, how they felt about the process, and personal beliefs pertaining to possible reasons for students being RO. To enable an accurate comparison with the data of Al Otaiba and Fuchs (2002), questions 5, 8, 9, 10, 11 and 12 related directly to either (i) results of children's Observational Survey (Clay, 1979) and possible correlations to incidences of being RO or (ii) teachers personal observations of learning and or behavioural characteristics of children they had RO. Answers to these questions relate directly to the original subsidiary research questions regarding cognitive ability.

The final two questions required teachers to express their opinions and focused on whether or not they felt their RO students had actually been ready for the programme in the sense of prior knowledge, and what measures they recommended as follow up work for their RO students.

Student Participant Testing Measures

The children involved in the study were tested and observed to gain data pertaining to physical and cognitive abilities and characteristics. Testing took place over two or three sessions with each child and involved one testing/teaching/re-testing cycle conducted by the researcher.

Set 1. Physical measures.

Children's fine and gross motor skills were tested and compared with their cohorts to establish whether children who were RO had motor skill levels below those expected for children of their age. Gross motor skills were tested by a ball catching activity that involved catching a large ball (15cm diameter) that was thrown by the researcher from a distance of five meters in an underarm action. Ten throws were given and the number of catches was recorded. Prior to the study, a norm was established by completing the same test with 30 children in the same age range from the researcher's place of employment, a local primary school. The subsequent norm developed was 9.99 catches out of 10.

Fine motor skills were recorded by observation of the children's pencil grip during testing sessions. In conjunction with this, the method of production and formation of letters and words was observed and recorded at the same time.

Physical characteristics pertinent to global development were also measured to enable a comparison with the participant's cohorts. A timed maze test was used, and, as with the ball catching test, a norm was first established using the same group of non-participants.

This test involved the participants tracing a path through a commercially produced maze (see Appendix D). The norm was established by timing 30 non-participant cohorts from the researcher's place of employment then averaging the times. The average time to complete this test was 31 seconds.

The final physical characteristic with regard to global development was their height. This was measured and recorded for each participant to compare with child development stature percentiles (National Center for Health and statistics, 2000) for each age and gender. In addition, incidences relating to physical aids such as glasses or hearing aids were also noted to enable an accurate snapshot of each participant's physical development and characteristics.

Set 2. Cognitive testing and observational measures.

Evidence of right or left brain dominance was established by recording which hand each child wrote with during the testing process, which leg they hopped on and which hand they caught a ball with. All other cognitive data was gathered through a series of tests as follows.

Standardised Tests

Bryant Test of Basic Decoding skills.

To assess participant's ability to decode unknown words, the Bryant test of Basic Decoding Skills (Bryant, 1975) was administered. It involved the oral reading of 50 non-words beginning with basic consonant – vowel – consonant (CVC) combinations and progressing to multisyllabic non-words. This test indicates a child's ability to decode individual letter and vowel sounds, instances of long and short vowel sounds, blends, diagraphs, diphthongs, and rules pertaining to double letters. Scores out of 50 were recorded for each child. From these raw scores, basic decoding ability as compared with cohorts is established. A copy of the Bryant test of Basic Decoding Skills can be found in Appendix E.

Schonell Spelling Age Test and Orthographic Memory Test.

The Schonell (1950) Spelling Age Test (see Appendix F) was used initially as an assessment of participant's spelling and orthographic ability. Following the initial test, the last five words that the participant had spelled incorrectly then became the focus of a teaching/re-testing sequence to establish a measure of participants' short term orthographic memory.

The teaching/learning process involved the researcher working with each participant individually for the duration of 20 minutes. The learning process involved:

1. Saying the word out loud
2. Spelling the word out loud
3. Writing the word in crayon on newsprint 10 times while saying the letters
4. Saying the word and then spelling out loud without looking at it
5. Drawing the word in the air with fingers while saying it our loud
6. Testing of each word either in written or oral form (as per the preference of the participant) by the researcher.

Each participant was able to accurately spell each of their words before the session concluded. At the next session with the participant, which was generally 1-2 days after the teaching/learning session, the same words were again tested in written form and the results recorded. This was included to test

their short term orthographic memory, but also to directly gain information with reference to the subsidiary cognitive research question, "Is there evidence that RO children have poor recall of prior learning?", and to compare with the research findings of Al Otaiba and Fuchs (2002) and Gathercole and Baddeley (1993) that link phonological memory and phonological working memory to reading performance.

Peabody Picture Vocabulary Test.

Verbal ability in the form of Verbal IQ was tested using the Form A, Peabody Picture Vocabulary Test 3rd Edition (PPVT-III), (Dunn & Dunn, 1977). This edition retains the original twelve features as designed in the first (1959) and second (1981) editions but includes extended norms and an increased number of test items. This particular test was vital to the research as it was used by many of the researchers included in Al Otaiba and Fuchs (2002) analysis of children who are unresponsive to reading interventions. Therefore the data gained could be directly compared to the data in the research that claims low verbal IQ (Berninger et al, 1999; Torgeson & Davies, 1996; Torgeson et al, 1999), is an important characteristic found in children who are unresponsive to reading intervention programmes.

The PPVT involves the participant identifying (from four pictures presented) the correct picture that correlates to a verbal stimulus word. The test continues until the participant incorrectly identifies 8 out of 10 items in one set. The raw score is converted to an age equivalent band. This is then considered to be the participants Verbal IQ Age.

Gough-Kastler-Roper Phonemic Awareness Test.

Phonemic awareness, both simple and complex tasks were tested using the Gough-Kastler-Roper (GKR) Phonemic Awareness Test (Roper, 1884). To establish the participant's ability in the area was crucial as it was evident in the findings of Al Otaiba and Fuchs (2002), and was an important cognitive question formed as part of the original subsidiary research questions, "Are RO children low in phonemic awareness and if so, are there any particular areas of phonemic awareness that they score most poorly in such as blending, segmenting, deleting, or substitution?"

Official norms for this test have not been established for New Zealand participants, but guideline scores are available with the test (Appendix G).

Rapid Word Naming Task.

The final cognitive assessment measure was a rapid word naming task using the first fifty most common English words (see Appendix H), ranked in frequency order (Fry, Kress & Fountoukidis, 1993). "The first 25 make up about a third of all printed material. The first hundred make up about half of all printed material" (p.23), therefore the words should have been familiar to the participants. A norm was established using 30 non-participant peers from the researcher's place of employment. This involved reading the list of words accurately, from the top of the page downwards, with the time take to perform the task recorded. The times recorded were then averaged, with the average time being 35.8 seconds. Participants completed the same task with the time taken as well as the number of correct words being recorded.

The literature shows that deficits in rapid naming speeds (Al Otaiba & Fuchs, 2002) are associated with reading difficulties and that students need to automatically recognise high frequency words in order to progress with reading and spelling tasks (Fry et. al, 1993).

Test Administration Order

The order in which the testing measures were administered was established for three distinct reasons.

1. Pragmatic reasons: The availability of testing space at the participants' schools, other activities the participants were required to attend on the testing days and school timetables.
2. The testing sessions were broken up in such a way that physical measures were inserted between cognitive tasks to give the participants a break.
3. The non-word reading (Bryant, 1975) was always administered first as a means of gauging the approximate level of the participant and because the humorous nature of some of the non-words created a relaxed atmosphere and rapport between the participant and the tester.

Data analysis procedures.

Together, the battery of tests were administered to profile the physical and cognitive abilities of the RO children, and to provide data that could be compared with international research of similar children.

Qualitative data analysis.

Qualitative information from the RR teachers was analysed thematically and described in narrative form consistent with ethnographic case study methodology (Cohen et al., 2000). Both ethnographic and case study research methods requires the researcher "to specify in advance a set of attributes, factors, characteristics or criteria that the study must address" (p.143), and that the qualitative data gathered is summarised in a manner that identifies key issues, factors and concepts that may require further investigation. Thus, the information gained from RR teachers, from both the questionnaire and face to face conversations was considered together, both in the results and discussion chapters of this research.

Quantitative data analysis.

Cognitive and physical data were analysed firstly using SPSS descriptives and subsequently by running parametric Pearson Correlations and non-parametric Mann-Whitney U tests to ascertain whether there are any significant characteristics of RO children that will support the research hypothesis and can be compared to the findings of Al Otaiba and Fuchs (2002). Correlational research provides a better understanding of elements or factors pertaining to the phenomena being questioned by the research (Cohen et al, 2000), hence the use of Pearson Correlations in this particular study. Mann-Whitney-U tests were included as they are non-parametric, as opposed to standardised tests, and because they are not assumptive, they suit the small sample size in this particular research.

CHAPTER 4: RESULTS

Overview

The first section of the results presents data collected from RR teachers before profiling the physical and cognitive characteristics of RO children. Physical characteristics of age, height, and eye-hand coordination are reported, followed by the cognitive characteristics as measured by a battery of tests. These tests include, phonemic awareness, basic decoding, spelling, orthographic memory, and verbal ability tests.

Initial analysis of mean scores and variance are reported first, followed by correlational analysis between tests of cognitive characteristics. The focus of correlational analysis was to identify significant relationships and to calculate through coefficients of determination, shared variance with other tests. Finally, Mann-Whitney U test results are presented as a non-parametric alternative, given the small sample size.

Descriptive Analysis

Reading Recovery Teachers: The Setting

Reading Recovery teachers provided demographic data describing the schools where they worked and the students they had worked with. Two RR teachers worked at a decile 2 school, which a roll of 28. Three worked at decile 7 schools, two at one school with a roll of 681, and the other with a roll of 263.

The other RR teacher worked at a decile 10 school with a roll of 580. The diversity of sites, which was a deliberate sampling procedure, is evident in this data.

Diversity was also evident among the characteristics of RR teachers. One teacher had been teaching RR for 18 years and received regular ongoing training. Another had nine years experience and regular ongoing training. However, four of the RR teachers were quite new to the RR programme, one having just trained in the year the research was carried out, one the previous year and the other two had worked as RR teachers for three years, one without ongoing training or support. Again, this diversity provided the researcher with a broad range of data sources and information to consider at the correlation and discussion stages of the research.

All the RR teachers reported that they worked with more boys than girls, and the total number of students they worked with in a year reflected the roll size of the schools. In the school with the smallest roll, RR teachers worked with 1-2 and 2-4 students a year. The school with the roll of 263 had 4-5 students a year through RR, the next largest with a roll of 580 had 6-8 students in the programme in a year. The school with the largest roll of 681 had 5-7, with one teacher, and four with the other, per year on RR.

Each RR teacher reported a varying number of their students as having to be RO. Three teachers RO 20% of their students', one teacher RO 25%, another 30%, and the highest number RO was 75%. The school reporting this high

number of RO students was a decile 2 school where the RR teacher had had nine years of experience with constant ongoing support and training. While there was no specific reasons stated as to why they had such high numbers of students RO, it was ascertained through the interview and informal discussions that five out of the seven RR teachers believed that behavioural problems and the lack of assistance from the home played a large part in the ability of these children to succeed in the RR programme.

Four RR teachers stated that some of their RO students had been diagnosed as ADD (Attention Deficit Disorder), or ODD (Oppositional Defiance Disorder), one stating that 15% of her RO students had been diagnosed with one of these disorders by their doctor or the Child Development Centre at Waikato Hospital. This helps explain the research question "Do RO children display any behavioural disorders or conditions?" However, the family background was not raised as a question in this particular study.

Reading Recovery Teachers Beliefs and Opinions

The researcher, through the questionnaire and personal interviews, gathered qualitative information pertaining to their beliefs and opinions about the characteristics of students who have been RO. Five out of six of the RR teachers believed that students who performed most poorly in their Observational Survey (OS) (Clay, 1989) were most likely to be RO. The Observational Survey is designed to test emergent literacy skills such as letter/sound knowledge, concepts about print and sight word vocabulary using

the Burt Wording Reading Test and hearing and recording sounds via a dictated sentence. During personal discussions with the RR teachers at the completion of their interview, 4 of these 5 teachers felt so strongly that those children who performed badly in the OS were almost inevitably going to end up being RO, and that they were manipulating which children they took on, so as to have a degree of success with their students. They felt that the students they didn't offer the RR programme were not ready to receive it, and that they needed to experience more oral language and phonemic awareness activities, possibly in small groups, before the RR programme would be useful for them. They also indicated that to take the very bottom students is a waste of time and money for all involved and that it is better to take on the students that will benefit from the sessions. This indicates a degree of deficit theorising by the RR teachers involved in these discussions, and provides an answer to the first cognitive research question; yes, RO children do predominantly score poorly in their OS.

With reference to the specific results of these individual OS tests, RR teachers identified that RO students had performed particularly poorly in letter/sound knowledge, identifying and writing high frequency words and hearing and recording sounds. Two teachers noted general results at Stanine 1 across all tests as an indicator for referring children on. Other poorly achieved skills identified by individual RR teachers were; oral language skills, memory skills for reading and writing words and difficulty with visual strategies.

RR teachers believed that RO children had long term memory deficits. All RR teachers indicated in the questionnaire that RO students had poor recall of prior learning and that this had impacted on their ability to respond favourably to the RR programme. This information partially answers the fourth cognitive question, "Do RO children have poor recall of prior learning?" Further information, from test results, will help clarify this.

A common theme from the RR teachers that became evident through the questionnaire and through discussions with them in person related to students sight word vocabulary. Five out of the six RR teachers thought that their RO students had poor sight word vocabulary. This indicates that the answer to the first part of the ninth cognitive question "Is sight word vocabulary, and the ability to rapidly name words, low in RO children?', is yes.

Others stated that they believed RO children had developmental problems. Four out of six RR teachers felt that there was a correlation between students who were globally late developers and instances of being RO. All had noticed that the children tended to be quite small for their age. This may therefore indicate that the answer to the second physical research question, "is there any evidence of late (global) development in RO children?", is also yes. Three teachers felt that those who were RO were late in oral language, and especially productive speech, development.

Five of the RR teachers felt that the students who had been RO were not ready for the RR programme. Significantly, they stated that their poor

performance in initial testing, through the OS (letter/sound knowledge, concepts about print, running records and hearing and recording sounds), showed that they were so far behind that they would not benefit from the RR programme at that point. They felt that would have been better off with an intervention to improve their oral language skills and knowledge of the sounds in the English before they were accepted into a RR programme. RR teachers appeared to be sensitive to a constellation of behavioural and cognitive characteristics that indicated whether or not a student would experience success through the RR programme. This particular information is vital in that it clearly answers in the affirmative, the eighth cognitive question, "Is the entry test for RR, the OS, predictive of children who are most likely to be RO?"

RR teachers provided a range of advice to parents, caregivers and classroom teachers with regard to further help for their RO students. Three teachers advised their RO students to seek outside help from private tuition providers such as SPELD, three referred them to RTLB or RTLit services, one referred to the Child Development Centre at Waikato Hospital, and one felt that there was nothing really available to help their RO students. The RR teachers were concerned that they had not been able to assist their students, but felt they were not qualified to assess them further or understand why it was they the students had made no significant progress and had to be RO. There was a consensus that the RO children had a learning disability of some kind rather than just being slower to pick up reading skills as such. There was a sense that

RR teachers were frustrated, reaching out for help and willing to share their concerns with the researchers

Characteristics of RO Children

The characteristics of RO children described by the RR teachers were subsequently assessed by the researcher, and the results are presented below.

Set 1. Physical characteristics.

Eight physical characteristics for the fifteen student participants were recorded through a variety of measurement tasks and testing. The first of these was gender. There were seven girls and eight boys who participated. This is higher than the ratio of boys to girls who entered RR nationally in 2002, which was 1:2.01, and to the numbers RO in 2002, which was a ratio of 1:6.7. There would appear from this data to be more boys attending RR, and consequently more boys being RO. This confirms that the answer to the first Physical research question is yes, there are more boys than girls being RO.

The age of the fifteen participants was also recorded. The minimum age was 6.4 years and the maximum age was 9.9 years. The mean age was 8.35 years with a standard deviation of .99, which signalled a wide variation in their ages. The modal age was 8years 9 months.

Table 1 summarises the findings in respect to participants' height (as compared with stature-for age percentiles, National Centre for Health and Statistics, www.kidsgrowth.com, 2008), and two measures of fine motor skills,

and indicates that the analysis of RO children was consistent with the information about the physical characteristics of RO children obtained from RR teachers. Therefore, it also partially fulfils the physical hypothesis pertaining to the research question, "Is there any evidence of late (global) development in RO children?"

Results from the timed maze test, which measures the participant's ability to scan with their eyes and subsequently transfer visual input into a coordinated movement by drawing a path through a visual maze, were compared with the established norm of 31 seconds. The results suggest that RO students were less able to perform tasks that required rapid eye scanning and hand/eye coordination that their peers. Results from the ball catch test, which tested the ability of each participant to catch a ball, were recorded and compared to the established norm 0f 9.99 catches out of 10. The results show that the mean number of catches for the girls was more than three below the norm, for the boys the mean was two below the norm, and for the whole group of participants, the mean was more than 2 below the norm.

So, taken together, these results suggest that RO children may be slightly smaller and experience more difficulty performing tasks requiring fine and gross motor skills as well and hand/eye co-ordination tasks, than their peers. Thus the answer to the third physical research question, for this sample of RO children is yes, they do display gross motor skills that are at a level below those of their cohorts.

Table 1

Physical Characteristics: Height and Fine Motor Skills

Height

	Max	Min	Mean	50%	75%	<50	>75
Total	1.4	1.19	1.3				
Girls/7	1.27	1.19	1.24	3	2	1	1
Boys/8	1.4	1.21	1.31	-	3	4	1

Fine Motor Skill: Maze Test

	Max (sec)	Min (sec)	Mean (sec)
Total	306	36	132
Girls	205	36	101
Boys	306	47	143

Fine Motor Skill: Ball Catch. No. Of Catches (10).

	0	1	2	3	4	5	6	7	8	9	10	Mean
Girls	-	-	-	-	-	-	2	5	-	-	-	6.7
Boys	-	-	-	-	-	-	-	2	5	-	1	8.0

Observations of physical traits that required physical forms of assistance were recorded during the testing process. Two boys required glasses for reading and one used hearing aids in both ears for all daily activities. The hearing aides were the result of a familial trait, present in all the male children in the participant's family. No girls required physical aids of any kind.

The manner in which each participant held their pencil was also noted, as evidence towards verifying of Late Global Development and fine motor development. Six participants had unusual or awkward pencil grips. Three of these were girls and three were boys. Once more, this indicates that yes, RO children may indeed show late global development, as asked by the second

physical research question, and that for this sample of RO children, they also display poorer fine motor skills than their cohorts.

Set 2. Cognitive measures.

Motor cortex dominance was ascertained by observations taken throughout the cognitive and physical testing process, and by asking the participants to perform a simple hop on one leg. All the male participants presented as right motor cortex dominant. Five and the remaining two female participants were left motor cortex dominant, based on the observation that they hopped on their left leg. This might suggest that with reference to the cognitive research question regarding hand dominance, that there is a predominance of right motor cortex dominance, thus, as with the general population, a predominance of right hand dominance

The second cognitive research question focussed on the decoding skills of RO children.

Standardised tests

The Bryant Test of Basic Decoding was administered to all participants.

Fifty non-words were presented to the participants to read aloud. The maximum correctly decoded was 14 and the minimum correct was 0. The mean correct score was 7.86. Two female participants scored 0 No participants were able to accurately decode non-words of more than one syllable, non-words involving more than the basic CVC combinations such as ‘fute’, non-words involving blends such as ‘smar,’ or diagraphs such as ‘shi’

and diphthongs such as ‘groy’. These results suggest that with reference to the second cognitive question, yes, RO children do have poor decoding skills.

The Shonell Spelling Age test was also administered. This test yields a raw score that is converted to a spelling age using the following formula:

$$\text{Spelling Age} = \frac{\text{number of words correctly spelled}}{10} + 5 \text{ years}$$

The results when compared to the mean chronological age of the participants (8.34) show a mean spelling age deficit of 1.7 years.

Male spelling age ranged from 6.1 years to 7.8 years. The mean spelling age for males was 6.98 years (standard deviation = .551). The mean chronological age of all the male participants of 8.61 years, showed a spelling age deficit for males of 1.63 years.

Compared to the mean chronological age for the female participants of 8.04 years, they had a spelling age deficit of 1.81 years. This indicates that on average, female participants were capable of correctly spelling words that were expected to be spelt by children approximately 22 months younger than themselves. Taken together, this suggests a significant deficit in spelling ability among the sample, which suggests that in answer to the seventh cognitive question, yes, RO children do display poor orthographic skills.

Based on the results from their Shonell Spelling Age Test, participants were taught how to spell the last five words they had spelled incorrectly. All participants left the teaching session capable of correctly spelling all five

words. During the next session with the researcher, they were re-tested on these five words to ascertain their recall of prior learning, and their ability to commit the words to memory. The lowest number of correctly recalled spelling was zero and the highest number was three. This gave a mean score of 1.4 correctly spelled words over all participants with a standard deviation of .91.

Male participants had a minimum score of one and a maximum score of three. The mean score for males was 1.75, (SD = .89). Female participants had a minimum of zero and a maximum of two. The mean score for females was one, (SD = .82). These statistics, describing the ability of RO children to recall prior learning, support the statements of RR teachers who felt that RO students had poor recall and memory skills, and clarifies that, with reference to the sample of children tested, RO children do have poor orthographic memory and poor recall of prior learning as hypothesised.

The Gough-Kastler-Roper Phonemic Awareness test was also administered.
The Gough-Kastler-Roper Phonemic Awareness test (Roper, 1984) comprises six subtests, each scored out of seven, to give a possible total for the test of 42. Results were collected and analyzed in the six different categories, Phoneme Segmentation, Phoneme Blending, Phoneme Deletion (first and last phonemes) and Phoneme Substitution (first and last phonemes). Interpretation of the scores, based on the original norms for students in the USA, was prepared by Tom Nicholson for New Zealand students.

Table 2

Summary of Cognitive tests: BTBD, SSA and G-K-R phonemic Awareness

Bryant Test of Basic Decoding (50)

	Mean
Total	7.9
Girls	5.2 (3.7)
Boys	10.1 (3.2)
Difference	4.9

Schonell Spelling Age Test

	Minimum	Maximum	Mean
Total	1	26	14.9 (6.3)
Spelling Age (yrs.)	5.1	7.8	6.6 (0.7)
Boys	11	26	18.4 (5.4)
Spelling Age (yrs.)	6.1	7.8	7.0 (0.6)
Girls	1	16	10.9 (4.9)
Spelling Age (yrs.)	5.1	6.6	6.2 (0.6)

Gough – Kastler - Roper Phonemic Awareness Test (42)

	Minimum	Maximum	Mean
Total	6	39	24.9
Boys	13	39	29.8
Girls	6	30	20.3

Table 2 indicates that in the G-K-R Phonemic Awareness test, the minimum total score for all participants was five and the maximum total score was 39. The mean score for all participants was 24.86. Using the guidelines for analyzing New Zealand students, this mean is equivalent to five year old

better readers at the end of their first year of school, and/or poor six year old readers at the end of the year.

Male participants had a minimum score of 13 and a maximum score of 39. The mean score for male students was 29.75. The mean result for males also equates to better five year old and/or poor six year old readers at the end of the year.

The minimum score for females was six, and it needs to be noted that this equates to the level of a low pre-reading five year old at the beginning of the year. The maximum for the females was 30, and the mean score was 20.28. This number is almost half way between the descriptors for poor five year old readers (10) and better five year old readers (25), which equates to the level of an average five year old reader at the end of the year. The highest score recorded, 39, is just above the score expected for better six year old readers at the end of the year, of 35.

From these overall results it is possible to see that this sample of RO children had, on average, the Phonemic Awareness ability of students two or more years below their average chronological age of 8.34. This suggests that the answer to the third cognitive research question, "Are RO children low in levels of Phonemic Awareness (PA)?", is yes they are. This leaves the remainder of the question (are any particular PA tasks more difficult for them than others?), to be reported.

Thus, the results were then further analysed for the specific phonemic tasks. These are reported in table 3

Table 3

Phonemic Awareness Tasks

Phonemic Awareness Tasks			
Phoneme Segmentation (7)	Minimum	Maximum	Mean
Total	0	6	4.5
Boys	3	6	4.4
Girls	0	6	4.7
Phoneme Blending (7)			
Total	1	7	4.7
Boys	2	7	4.8
Girls	1	6	4.4
Phoneme Deletion (14)			
Total	0	14	7.9
Boys	5	14	9.7
Girls	0	10	7.0
Phoneme Substitution (14)			
Total	1	12	6.5
Boys	3	12	7.5
Girls	1	8	4.5

This table shows clearly that female RO students scored more poorly than male RO students by 2.72 correct answers in phoneme deletion tasks.

Separating the scores for deletion of first phoneme and last phoneme provided the following results. For all participants, the minimum score for deletion of first phoneme was two and the maximum score was seven. The mean score for deletion of first phoneme for all participants was five out of a possible seven. Male participants had a minimum score of three and a maximum score of seven. The mean score for male participants in deletion of first phoneme was 5.75, (SD = 1.48). Female participants had a minimum score of two and a maximum score of six. The mean score for female participants for deletion of first phoneme was 4.14, (standard deviation = 1.57). So in comparison to male participants, females performed more poorly in deletion of initial phonemes than the male participants.

Results for the deletion of the last phoneme, for all participants produced a minimum score of one and a maximum score of seven. The mean score for deletion of last phoneme for all participants was 3.86. Male participants had a mean score of 4, (SD = 2.5). Female participants had a mean score of 3.71, (SD = 1.88). Once again, females scored more poorly than the males, although not as poorly as in the deletion of initial phonemes.

Some 14 phoneme substitution questions were administered. Seven involved substituting the first (initial) phoneme and seven required the substitution of the last (final) phoneme. These results are also displayed in table 3.

Separating the total scores into substitution of first and last phonemes produced the following results. The mean score for substitution of first phoneme was 4.33. Male participants recorded a mean score of 5.75, (SD =

1.38), and female participants a mean score 2.71, (SD =1.49). This clearly shows a large difference between the male and female participants, with females' mean score being 3.04 points behind the males.

For substitution of the last phoneme, the mean score for all participants was 2.53. Male participants recorded a mean score of 3.75, (SD = 1.83), and female participants had a mean score of 1.28, (SD = 1.11). Again, this indicates that female participants found substitution of final phonemes more difficult than the male participants, with their mean score 2.47 behind the males. Taken all together, this sample of RO students performed particularly poorly with all the phonemic awareness tasks. However, it was the female participants who consistently performed at a lower level than the male participants on all the individual tasks. This suggests that RO female students have lower levels of phonemic awareness than RO male students. With regard to the third cognitive research question, the particular phonemic awareness tasks that RO children in this sample found most difficult were, phoneme segmentation, phoneme blending, deletion of final phoneme and phoneme substitution (initial and final sound).

To investigate sight word automaticity in the form of rapid word naming, a list of the first fifty high frequency words (Fry et al., 1993) was presented to each participant as a list of single words from the top of the page to the bottom. The results are presented in table 4. The norm for this test, reading all words correctly, was 35.8 seconds.

Table 4

Sight Word Automaticity

Sight Word Automaticity			
Time Taken (Sec.)	Minimum	Maximum	Mean
Total	71	319	123
Boys	71	212	147
Girls	88	319	132
Accuracy (50)			
Total	3	44	30.8 (14.3)
Boys	17	44	38.3 (8.7)
Girls	3	40	22.5 (15.1)

The mean time to complete the test was 1 minute, 27.2 seconds slower than the established norm. The mean time for males was 2 minutes, 27 seconds, 1 minute, 51seconds slower than the established norm. The mean time for females to complete the test was 1 minute, 36.2 seconds slower than the established norm. All non-participants who were involved in establishing the norm time had recorded 100% accuracy in naming the words. Accuracy for the participants was also recorded and the results are as follows.

For all participants, the minimum number of correct words was 3 and the maximum was 44. The mean number of correct words was 30.8 with a standard deviation of 14.3. The male score for accuracy was 23.5% lower than the established norm. The female score for accuracy was 55.5% lower than the established norm. This information subsequently provides an affirmative

answer to the second part of the ninth cognitive question: “Is the ability to rapidly name words low in RO children?” In both accuracy and speed measures of the rapid word naming task, females performed at a level below their male counterparts. Once again, this suggests that for females who are RO, they may have lower levels of ability in sight word automaticity.

Because verbal ability has been shown to be linked to response to reading intervention programmes, the PPVT-III (Form A) was administered to establish participants verbal IQ. Results are initially recorded as a raw score, converted to a verbal IQ age and ranked according to percentile and stanine (see Table 5).

The mean equivalent age for male participants was 7.83 years, (SD = 1.56). This is .52 years below the mean chronological age for all participants and .78 years below the mean chronological age for the male participants. The mean equivalent age for females was 7.18, (SD = 1.18). This is 1.17 years below the chronological age of all participants, .86 years below the chronological age for female participants and .65 years below the mean equivalent age for the male participants. However, 50% of the male participants scored moderately low scores (Dunn et, al., 1997) as opposed to only 28% for females who scored in the moderately low range. There were no participants above stanine 7 or the moderately high scoring range, and 53.29% of participants were in the average range.

Table 5

Peabody Picture Vocabulary Test (PPVT-III).

Gender	Age	Raw Score	Standard Score	Percentile Rank	Stanine	Equivalent Age
M	8.1	110	95	37	4	8.0
M	9.7	91	77	6	2	6.1
M	9.1	100	86	18	3	7.6
M	8.1	101	86	18	3	6.1
M	6.4	110	109	73	6	8.0
M	9.9	93	76	5	2	7.0
M	8.7	122	106	66	6	9.0
M	8.9	134	113	81	7	10.8
F	8.5	83	78	7	2	5.1
F	7.0	114	117	82	7	8.1
F	7.5	106	106	66	6	8.0
F	8.4	106	96	39	5	8.0
F	8.9	114	98	48	4	8.0
F	8.9	101	88	19	3	7.1
F	7.1	25	42	45	4	6.0

These results suggest that for students who are RO, there is no marked difference in their verbal ability between them and their cohorts, but that in this particular test, more female participants scored in the average range than male participants, which is a reversal of the results seen on other cognitive tests reported thus far. Therefore, the answer to the sixth cognitive question, "Do RO children display low levels of verbal intelligence?", for this sample of RO children, is, not particularly or obviously lower that their cohorts.

Before reporting the results of the exploratory correlations, it is worth noting that at this stage, that the data from this study does suggest that while there are more male students RO, female students who are RO, have generally presented with lower cognitive skill levels than the male RO students.

Pearson Correlations

Following the descriptive analysis, all sets of data (variables) obtained through the testing and observational stages of the research were analysed using Pearson correlations, to explore for relationships. Significant correlation coefficients for cognitive variables are provided in Table 6. These relationships were considered and described using the criteria indicated below each table. Table 6 indicates many significant correlations between cognitive variables. For example there were strong positive correlations between the BTBD and the Rapid Word Naming Test (r =.87, n=15, p, <.1), with the Phoneme Substitution of initial sound (PSI) test (r=.88, n=15, p <.01) and the Phoneme Deletion of initial sound (r=.83, n=15, p<.01), with high scores on the BTBD associated with high levels on these tests.

Table 6

Correlation of Cognitive Variables

	Spelling Memory Test	Rapid Word Naming	Schonell Raw Score	Schonell Spelling Age
Schonell Raw Score	-	.76**	-	.96**
Schonell Spelling Age	-	.77**	.96**	-
Bryant Test Basic Decoding	-	.87**	.69**	.65**
Phoneme Deletion Initial sound	-	.65*	.70**	.62*
Phoneme Blending	-	.71**	-	-
Phoneme Subs. Initial sound	.60*	.88**	.71**	.67**
Phoneme Subs. Final sound	-	.80**	.64**	.67**

* correlation is significant at < 0.05 level ** correlation is significant at < 0.01 level

Table 6 Continued

Cognitive Variables

	Phoneme Subs. Initial sound$_1$	Phoneme Subs. Final sound$_2$	Phoneme Blending	Phoneme Del. Initial sound$_3$	Phoneme Deletion Final sound
Bryant Test Basic Decoding	.88**	.73**	.62*	.83**	.59*
Phoneme Deletion Initial sound	.77**	-	.58*	-	.57*
Phoneme Deletion Final sound	.58*	-	.64**	-	-
Phoneme Blending	.58*	.54*	-	.58*	.64**
Phoneme subs. Final sound	.72**	-	-	-	-

1 Phoneme substitution of initial sound
2 Phoneme substitution of final sound
3 Phoneme deletion of initial sound
* correlation is significant at < 0.05 level
** correlation is significant at < 0.01 level.

It should be noted that there is a strong correlation between Substitution of initial phoneme, and all the other phonemic awareness tasks, suggesting that a student with poor ability to substitute the initial phoneme, would also have difficulty in all phonemic awareness tasks. This reflects the previously reported answer to the third cognitive research question, where it was shown that RO children in this sample were poor at all phonemic awareness tasks, and particularly poor with phoneme substitution tasks.

Also of note is the strong correlation between phonemic awareness and participants ability to spell, based on the Schonell spelling test. This correlation reiterates the earlier reported findings that show that this sample of RO children

are poor spellers and poor at phonemic awareness tasks, in answer to cognitive research questions three and seven.

Coefficient of Determination

To establish how much variance was shared between two variables that were strongly correlated, a coefficient of determination was calculated. The shared variance between the Bryant Test of Basic Decoding (BTBD) and deletion of initial phoneme was 69%. This suggests the BTBD helps explain 69% of the variance in deletion of initial phoneme.

Further, the results suggest that the BTBD also helps explain 76% of the variance in Rapid Word naming number correct, 77% of the variance in substitution of initial phoneme and 53% of the variance in substitution of the final phoneme.

The Rapid Word Naming Task also provided some results which suggest a relationship and interaction between the number of correctly read (named) words and other variables. For example, coefficient of determination indicates the variance shared with this task and the Schonell Spelling Test was 57%. It also explains 59% of the variance in the Schonell spelling ages allocated, 50% of the variance in the ability to blend phonemes and 64% of the variance in substitution of final phoneme. With instances of shared variance such as these, it is possible to further confirm and help explain the affirmative answers to the cognitive research questions; "Do RO children display poor

decoding skills, orthographic skills, recall of prior learning, phonemic awareness and rapid word naming ability?

Mann-Whitney U Tests

As a non-parametric alternative to the Pearson correlations and T-tests, data showing strong positive correlations was further analysed using the Mann-Whitney U test. This technique is used to test for differences between two independent groups on a continuous measure. The test is appropriate to this research because of the small sample size, and its usefulness when investigating the relationships based on gender. Mann-Whitney U tests were conducted to evaluate the hypothesis that there may be a gender difference where variables have produced strong Pearson correlations.

Results were considered significant where $p<.05$, and very significant, where $p<.01$, are shown in Table 3. In all instances the results suggest that male participants scored more highly, and showed a stronger correlation between the two variables tested, than their female counterparts. The BTBD, RWN and PSI variables produced a very strong exact significance each time they were tested with other significant cognitive variables. This showed that for male participants, there was a very strong correlation in their performance in these tests, as opposed to correlations for their female counterparts. Hence, a significant, and in some instances, a very significant gender difference has been shown in these tests.

Table 7

Mann-Whitney U Tests of Differences between Males and Females across Continuous Variables

Test	Z	Asymptomatic Significance (2 tailed)
PSI_1	-2.09	.005**
Schonell Spelling (Raw)	-2.27	.02*
PSI_1	-2.09	.005**
Schonell Spelling (Age)	-2.09	.04*
PSF_2	-2.46	.025*
Schonell Spelling (Raw)	-2.27	
PSF_2	-2.46	.014*
Schonell Spelling (Age)	-2.09	.04*
RWN	-2.56	.01*
BTBD	-2.51	.03*
PSI_1	-2.81	.005**
BTBD	-2.51	.03*
PSF_2	-2.46	.014*
BTBD	-2.51	.01**
Schonell Spelling (Raw)	-2.27	.02*
BTBD	-2.51	.01**
Schonell Spelling (Age)	-2.09	.04*
BTBD	-2.51	.03**
RWN	-2.56	.01**
Schonell Spelling (Raw)	-2.27	.02*
RWN	-2.56	.01**
Schonell Spelling (Age)	-2.09	.04*

* Exact significance p<.05
** Exact significance p <.01

Cognitive Variables with Negative Correlations.

Some correlations between cognitive variables produced negative correlation co-efficient. The relationship between time-taken in the rapid word naming task produced strong negative correlation coefficients with five other cognitive abilities, as reported in table 8. This means that a slower time taken to complete the rapid word naming task indicated poorer results in the other cognitive tasks, (see Tables 8 and 9).

Table 8

Rapid Word Naming Time with Spelling/Word tasks

	Schonell Raw Score	Schonell Spelling Age	PPVT	RWN Number correct	Bryant Test Basic Decoding
RWN - Time	-.59*	-.63*	-.52*	-.80**	-.64*

* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.

Table 9

Rapid Word Naming with Phonemic Awareness Tasks

	Segmentation	Blending	Deletion Initial	Substitution Initial	Substitution Final
RWN Time	-.57*	-.82**	-.57*	-.63*	-.63*

* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.

Coefficients of determination were also calculated for variables with large significant negative correlations. These indicated that Rapid Word Naming time taken to complete the task, helps explain 64% of the variance in the number of words correctly named (read) in the same task and 67% of the variance in phoneme blending ability. Taken together, these results further confirm the previously reported affirmative answers to the cognitive research questions pertaining to rapid word naming ability, spelling ability and phonemic awareness.

Correlation between Cognitive and Physical Variables

The relationship between actual number of ball catches and the Bryant Test of Basic Decoding Skills was investigated using correlation co-efficient. There was a medium positive coefficient between the two variables [*r*= .49]. This was the only correlation coefficient between physical and cognitive variables that was above Cohen's (1988) small rating, but was not considered to be statistically significant. This suggests that physical characteristics as surveyed in this research, although indicated by RR teachers as being relevant to RO children, and subsequently providing affirmative answers to the physical research questions, have no real influence on the cognitive abilities measured in this research.

Correlations between Cognitive and Socio-Economic Variables

The relationship between school decile rating and Deletion of Final Phoneme was investigated. There was a strong positive correlation between the two variables [*r*=.55], with a lack of ability to delete the final phoneme in a word strongly associated with students from a lower decile rated school.

The relationship between school decile rating and Blending of Phonemes was also investigated. Again there was a strong positive relationship [*r*=.52], with the lack of ability to blend phonemes associated with lower decile rated schools. This data partially answers the third behavioural /Socio-economic research question, in that decile rating may have an affect on the learning outcomes for children who are RO.

Gender Analysis

Taken together the evidence, that there are a higher numbers of boys being RO, both nationally and in this study, but that it appears that the girls are underperforming in comparison to the boys, analysis by gender was undertaken.

Correlations by Gender: Male Participants

Correlations between cognitive variables were also analysed by gender. Table 10 shows the large positive correlations for male participants. Table 10 indicates strong correlations between the BTBD and rapid Word naming ability, with phonemic awareness tasks for male participants, even though previous results have shown that male participants performed more strongly than their female counterparts in these tasks. Of particular interest is the strong correlation between the PPVT and the Spelling Memory test, which was not significant in the data for all participants. This suggests that for male participants, their verbal ability is linked to their memory. This notion will be explored in the discussion chapter (Chapter 5).

Table 10

Cognitive Variables with Significant Positive Correlations for Male Participants

	Spelling Memory test	RWN Number correct	Schonell Raw Score	Phoneme Subs. In. $sound_1$	Phoneme Segmenting	Phoneme Del. In. $sound_2$
Schonell Spelling Age	-	.74*	.98*	-	-	-
BTBD	-	.75*	-	.82**	.70*	.88**
Phoneme Del. In. $sound_2$	-	.75*	-	.93**	-	-
Phoneme Del. Final $sound_3$	-	-	-	.74*	-	.84**
Phoneme Subs. In. $sound_1$	-	.78*	-	-	-	-
Phoneme Substitution Final sound	-	.79*	-	-	-	-
PPVT	.80*	-	-	-	-	-

* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.
[1] Phoneme substitution of initial sound
[2] Phoneme deletion of initial sound
[3] Phoneme deletion of final sound

Coefficients of determination for variables with strong correlation coefficients for male participants were also calculated to establish the percentage of shared variance. As with the correlations for all participants, the shared variance between BTBD and the deletion of initial phoneme was significant at 77%. This suggests that the BTBD helps explain 77% of the variance in deletion of initial phonemes. The shared variance of the BTBD and the substitution of initial phoneme was 67%. The shared variance between substitution of initial phoneme and deletion of initial phoneme was also calculated and was established to be 86%, indicating that the ability to delete initial phonemes

helps explain a significant percentage of the variance in substitution of initial phonemes.

As with the correlations for all participants, the shared variance between BTBD and the deletion of initial phoneme was significant at 77%, the shared variance of the BTBD and the substitution of initial phoneme was 67%, and the shared variance between substitution of initial phoneme and deletion of initial phoneme was also calculated and was established to be 86%. Deletion of the final phoneme and substitution of final phoneme had a shared variance of 67%, which suggests that the ability of males to delete the final phoneme helps to explain 67% of the variance in substitution of final phoneme.

Taken together, this suggests that for male participants, their ability to hear and manipulate phonemes is closely linked to their ability to decode words and non-words and to perform in related phonemic awareness tasks.

Cognitive Variables with Significant Negative Correlations for Males.

The relationship between males' phonological ability to blend, and time taken in the Rapid Word Naming Task was investigated. There was a very strong negative correlation between the two variables [r= -.77], with a longer time taken to read (name) the words associated with a lack of ability to blend phonemes to create a word.

The relationship between time taken in the Rapid Word Naming Task and the number of correctly named words was also investigated. Again there was also a very strong negative correlation between the two variables [r= -.83], with a longer time to read (name) the words being associated with a lower number of correctly named words. The final investigation of cognitive variables for male participants, to produce a significant negative correlation, was the relationship between rapid word naming time taken and phonological substitution of final phoneme.

There was a very strong negative correlation [r=-.82], with a longer time taken being associated with an inability to correctly substitute final phonemes in a word, to produce a new word. This suggests that for male participants, their struggle to blend and substitute phonemes is directly affecting their ability to carry out the word naming task, possibly because if the word they are attempting to read is not automatic for them, they do not have the ability to quickly decode it, based on poor phonemic ability.

Cognitive, Physical and Socio-economic Correlations

Comparison for male participants, of Cognitive variables with physical and socio-economic variables, while not producing any significant correlation coefficients when investigated for all participants, produced some significant positive and negative correlations when analysed for male participants only.

The relationship between correct pencil grip and time taken in the rapid word naming task was also investigated. There was a strong positive correlation

[*r*= .71], with an association between correct pencil grip and the ability to more rapidly read (name) the words.

The relationship between time-taken in the Rapid Word Naming Task was also investigated with the height of the male participants, using the Pearson correlation coefficient. There was a strong positive correlation [*r*=.78], with a shorter time taken being associated with the taller male participants.

The relationship between the school decile rating and boys' ability to delete final phonemes in given words was investigated. There was a strong positive correlation [*r*=.74], with an ability to delete final phonemes associated with a higher decile rated school.

To establish how much variance there was between these sets of variables that were strongly correlated, a coefficient of determination was calculated. This indicated the percent of shared variance between two variables. Thus the percentage of shared variance between Pencil grip and Rapid Word Naming Time was 50%. This suggests that for males, pencil grip helps explain 50% of the variance in Rapid word Naming time taken. The percentage of shared variance between Rapid Word Naming time and Height was 61%. This suggests that height helps explain 61% of the variance in Rapid Word Naming Time Taken to complete the task. Finally, the percent of shared variance between school decile rating and deletion of Final Phoneme was 54%, suggesting that School decile rating helps explain 54% of the variance in deletion of final Phoneme.

There were a number of physical and socio-economic variables that produced negative correlations when analysed with cognitive variables. The following tables (11 and 12) show these correlations.

Table 11

Male Physical, Socio-economic and Word Task variables with Negative Correlations

	BTBD	RWN	Decile Rating
Height	-	-.76*	-
Pencil Grip	-.70*	-	-
Ethnicity	-	-	-.93**

* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.

The coefficient of determination for Ethnicity and School decile rating was calculated and showed a shared variance of 86%. This suggests that school decile rating helps explain 86% of the variance in Ethnicity.

Table 12

Physical and Phoneme Task Variables with Negative Correlations

	Phoneme Subs. In. sound[1]	Phoneme Subs. Final sound[2]	Phoneme Del. In. sound[3]	Phoneme Blending
Height	-	-.83**	-	-
Ball catches	-	-	-	-.54*
Pencil grip	-.78*	-	-.73*	-.67*

[1] Phoneme substitution of initial sound
[2] Phoneme substitution of final sound
[3] Phoneme deletion of initial sound
* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.

The coefficient of determination for Substitution of Final Phoneme and Height was calculated. This indicated a shared variance of 69%. This suggests that height (lack of) helps explain 69% of the variance in Substitution of Final Phoneme.

Taken all together, these results for male participants suggests a profile for RO boys that links their phonemic awareness with their ability to decode and have the ability to rapidly name sight words, such that those with poor phonemic awareness also produce poorer results in decoding and rapid word naming. It also suggests that those male participants, who were taller and displayed better fine and gross motor skills, were able to perform better at phonemic awareness tasks. School decile rating, although strongly correlated with two phonemic awareness tasks for all participants, was only significant

for one phonemic awareness task for male participants. Once again, this will be examined in chapter 5, the discussion.

Correlations by Gender: Female Participants

Table 13 shows the significant positive correlations between cognitive variables for female participants.

Table 13

Cognitive Variables with Positive Correlations

	PPVT	RWN # Correct	Schonell Spelling Age	Phoneme Subs. In. $sound_1$	Phoneme Del.Final $sound_2$	Phoneme Blending
Schonell Raw Score	.72*	-	.91**	-	-	.86*
Schonell Spelling Age	-	-	-	-	-	.77*
BTBD	-	.84*	-	.81*	.83*	.86*
Phoneme Del. Final $sound_2$	-	.85*	-	.91**	-	.83*
Phoneme Blending	-	.94**	-	.81*	-	-
Phoneme Subs. In. $sound_1$	-	.76*	-	-	-	-
Phoneme Substitution Final sound	-	.87*	-	-	-	-

[1] Phoneme substitution of initial sound
[2] Phoneme deletion of final sound
* correlation is significant at < 0.05 level
** correlation is significant at < 0.01 level.

Shared variance between two variables that were strongly positively correlated was established by calculating a coefficient of determination. The shared variance between the Schonell Spelling test raw score and the Schonell spelling age was 83%, and the coefficient of determination Schonell Spelling Test raw score and the phoneme blending task was calculated and produce a shared variance of 74%.

The coefficient of determination for Rapid Word Naming number correct and phoneme blending in female participants was calculated and had a shared variance of 88%, and with Substitution of Final Phoneme of 76%. This suggests that Rapid Word Naming Time helps explain the variance in phoneme blending and substitution in female participants. The shared variance, after calculating the coefficient of determination between phoneme blending and the BTBD for females, was 74%.

The relationships between cognitive variables for female participants also produced a number of significant negative correlations. Those pertaining to word skills can be seen in Table 14. The shared variance between Rapid Word Naming time taken and rapid word naming number correct was 79%, and it also had a shared variance with the PPVT of 79%.

Table 14

Cognitive Variables for Word Skills with Negative Correlations

	Spelling Memory Test	RWN - Time
Schonell Raw Score	-.62*	-.85*
Schonell Spelling Age	-.62*	-.75*
RWN # Correct	-	-.89**
BTBD	-	-.86*
PPVT	-	-.89**

* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.

Cognitive Variables for Females with Negative Correlations

As with the male participants, some of the cognitive variables produced negative correlations. These are shown in Table 15.

Table 15

Cognitive Variables for Phonemic Awareness with Negative Correlations

	Rapid Word Naming Time
Phoneme Segmenting	-.86*
Phoneme Deletion Final sound	-.85*
Phoneme Blending	-.90**
Phoneme Substitution Initial sound	-.95**

* correlation is significant at < 0.05 level
** correlation is significant at < 0.01 level.

As with the word skill tasks, Rapid Word Naming Time (RWNT) results produced two very strong correlations with sound related tasks. The shared variance between RWNT and Phoneme Segmenting was 74%, and a shared variance with Substitution of Initial Phoneme was 90%.

Cognitive, Physical and Socio-economic Correlations for Females

Correlations between Physical and socio-economic variables for female participants were analysed. Relationships with positive correlations are shown in Tables 16 and 17.

Table 16

Physical and Cognitive Variables with Positive Correlations

	Height	Age	Hand Dominance
Maze Test Time Taken	-	.77*	.86*
Maze Test Difference from Norm	-	.78*	.86*
PPVT	.71*	-	-

* correlation is significant at < 0.05 level
** correlation is significant at < 0.01 level

Table 17

School Decile Rating and Cognitive Variables with Positive Correlations

	School Decile Rating
RWN Number Correct	.70*
Phoneme Segmenting	.76*
Phoneme Deletion Initial Sound	.68*
Phoneme Blending	.86*
Schonell Spelling Age	.84*
Schonell Raw Score	.88**

* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level.

The shared variance between the Schonell Spelling raw score and the School decile rating was 77%. School decile rating also produced a shared variance between Schonell Spelling Age of 71%, while the shared variance with Phoneme blending was 74%.

Physical, Socio-economic and Cognitive Variables with Negative Correlations

The analysis of physical, socio-economic and cognitive variables produced some significant negative correlations. These are shown in Tables 18 and 19.

Table 18

School Decile Rating and Cognitive Variables with Negative Correlations

	School Decile Rating
RWN Number Correct	-.68*
Spelling Memory Test	-.57*

* correlation is significant at < 0.05 level
** correlation is significant at < 0.01 level

Table 19

Pencil Grip and Cognitive Variables with Negative Correlations

	Pencil grip
Age	-.78*
RWN Number Correct	-.85*
Phoneme Blending	-.77*
Phoneme deletion Final sound	-.64*
Phoneme Substitution Initial sound	-.80*

* correlation is significant at < 0.05 level
** correlation is significant at < 0.01 level.

Pencil grip had a shared variance between Rapid Word Naming Number correct of 72%, and a shared variance with Substitution of Initial phoneme of 64%. A comparison of the correlations for male participants and female participants shows that for female participants the decile rating of the schools they attend have produced significant positive and negative correlations, whereas for the male participants, there was only one significant positive correlation involving the relationship between school decile rating and other variables, cognitive or physical.

Taken together, the results describe the typical RO student as more likely to be male, but that in contrast to males, females who were RO, presented as having lower cognitive ability. RO children are more likely to be from lower decile rated schools and from lower SES families. However, for females, being at a lower decile rated school had more impact on their performance than it did for their male counterparts. Therefore, with regard to the third behavioural/socio-economic question, it would appear that for this sample of RO children, the decile rating of the school has a more negative affect on the learning outcomes of the female RO students than the male RO students. Thus for males, in all areas aside from one phonemic awareness task, it didn't appear to matter what decile rating their school was, if they were underachieving, they would be likely to underachieve at any school.

RO students all appear to demonstrate a lack of phonemic awareness, which impacts on their spelling and decoding ability. Spelling ability and the ability to recall prior learning is also likely to be low in RO children.

Verbal ability (IQ), while low in some RO children, is not necessarily a strong indicator of any likelihood of a child being RO, but was linked with recall of prior learning in boys. Physical characteristics suggest that more RO children are smaller than their peers and have poorer gross and fine motor skills. They struggle to complete hand/eye coordination tasks such as mazes and to accurately catch a ball as often as their peers although these tasks did not indicate that any child with physical characteristics would be likely to be RO.

The significance and impact of this information and how it relates to the findings of other research into children who are unresponsive to reading intervention programmes, particularly those analysed by Al Otaiba and Fuchs (2002), will be discussed in the following chapter.

CHAPTER 5: DISCUSSION

Overview

In the first section of this discussion, results from the initial testing, and the information from the RR teachers is discussed with reference to the initial hypotheses and the literature review as presented in Chapter Two. The second section compares the correlated results from RO children with the characteristics of children who are unresponsive to reading intervention programmes as described by Al Otaiba and Fuchs (2002) and discusses the extent to which these results support the research hypotheses. The third section outlines the limitations of this research, and proposes some recommendations for future research, and possible applications for schools in New Zealand.

Section One

This study confirms the findings of much of the literature, reviewed in Chapter Two, and supports the researcher's experience, that children who are RO from RR have characteristics comparable with children in other countries, who are unresponsive to reading intervention programmes.

As expected, and as foreshadowed in the research hypotheses, children who were RO were described by their RR teachers as having scored poorly in their OS (Clay, 1979), and specifically in the letter/sound knowledge,

recognizing and writing high frequency words, and in the hearing and recording sounds subtests.

Together with the findings from Chapman et al. (1999) that children who were RO performed poorly in spelling and phonemic awareness tests prior to receiving the RR programme, results from the current research suggest that there could be a need for closer analysis of subtest results before children are offered the opportunity to receive RR. It is argued, based on the findings of this research, which also reflects international research (Al Otaiba & Fuchs, 2002), that students with poor phonemic awareness (have scored poorly in the letter/sound knowledge and hearing and recording sounds tasks), and/or are struggling with their spelling prior to undertaking the OS, should receive other forms of intervention before, or instead of, taking part in RR. This opportunity for evidence based differentiated instruction may reduce the numbers of children being RO.

The RR teachers indicated that RO children performed poorly in the recognition of sight words prior to receiving RR intervention. Reading Recovery teachers also confirmed that after being RO, these children still had poor sight word vocabulary. Results obtained from the administration of the Rapid Word naming task provided the researcher with a means of testing the observations of RR teachers, which were congruent to the findings of Al Otaiba and Fuchs (2002), Dolch (1960), Pressley (2006) and Shaywitz (2004), that children who are unresponsive to reading intervention programmes have poor sight word vocabulary and poor instant recall of

common or high frequency words. Evidence obtained by the present research suggests RR programmes do not improve sight word vocabulary and instant recall (automaticity) for children who are RO. Again, this evidence matches with the findings of Al Otaiba and Fuchs (2002) and appears to characterise children who are unresponsive to reading intervention programmes.

Taken together, the results discussed above, suggest that it might be possible to predict from the OS testing process, children who are likely to be RO from RR.

RR teachers' beliefs and observations, coupled with the results obtained from the present research suggest that those who performed most poorly in the OS were most likely to be RO. The lowest 20 percent of children given the OS are recommended for RR, thus based on RR teachers findings, the results of the current research and the results of the Annual RR data referred to in the literature in Chapter Two, it would appear that approximately 10% of all children given the OS, receive scores that indicate their literacy levels are too low to be remediated by the RR programme.

The fact that RR teachers, as disclosed in their questionnaire and informal discussions, are already picking and choosing students who they feel will or will not be successful in the RR programme, highlights and confirms the need to address the testing process, as discussed by Tunmer and Chapman

(2004), and that taking children who score very poorly in the current testing procedure, is a waste of time and money.

Interestingly, while there are more boys RO, the current research found that the girls, who were RO, recorded the lowest scores and were less responsive to the intervention measures. They also recorded lower levels of cognitive ability as assessed by the researcher. This was not alluded to by the RR teachers, the researcher's own experience, or in previous research such as that of Tunmer and Chapman (2004).This finding will be discussed in more detail in the second section of this chapter.

Results obtained indicating the lack of ability to accurately match letters with their associated sounds, and poor results in hearing and recording sounds as tested in the OS suggested poor decoding ability. This was also identified in the literature review as a typical characteristic of children who are unresponsive to reading intervention programmes (Al Otaiba & Fuchs, 2002). It was, therefore, unsurprising that results from the Bryant Test of Basic Decoding, were significant in this research. This was the first test administered to the participants as the researcher believed it to be a crucial indicator of the overall ability of each participant. As the literature explains, decoding is a vital component of reading, so a poor score on this test could point to other characteristics that may underpin reasons as to why these children had been RO.

As predicted in the research hypotheses, the RO participants had particularly poor decoding skills. This appears to be a significant result that not only supports the observations and testing of the RR teachers, but replicates the findings of Al Otaiba and Fuchs (2002). The result is also consistent with the more rigorous theories of reading acquisition discussed in the literature review (Adams et al., 1998; Blachman, 2000; Ehri & Robbins, 1992; Gough & Hillinger, 1980; Gough & Tunmer, 1986); Juel, 1991; Pressley, 2006; Rack et al., 1992; Savage et al., 2003; Scarborough & Brady, 2002; Vaughn & Linan-Thompson, 2003).

With such poor results on this decoding test, it would be expected that the RO children would also exhibit other cognitive characteristics, related to the lack of decoding ability, which had been identified by Al Otaiba and Fuchs (2002), such as poor phonemic awareness. The only measures pertaining to phonemic awareness included in the OS are the hearing and recording of dictated words, and the Running Record of reading ability. Neither of these tests actually measures a child's ability to hear, verbalise and manipulate the sounds (phonemes) in English in the way that the Gough-Kastler-Roper Phonemic Awareness Test (Roper, 1984) does. The focus of the RR programme and the OS on letter/sound relationships for decoding and recoding, as opposed to phonemes and phoneme manipulation for the same tasks, appears from this research, to be of little use in the remediation of reading difficulties in children who are in the bottom 10^{th} percentile of reading achievement. Of interest at this point is that Elbaum et al., (2000), Shanahan and Barr (1989), and Tunmer and Chapman, (2004), proposed

that the testing measures included in the OS were aligned only to the specific strategies taught in the RR programme, and this current research appears to support their proposal.

Furthermore, it highlights that these tests and strategies are not necessarily beneficial for students who perform poorly on tasks involving knowledge of the sounds in the English language. This would be supported by Denton et al., (2006), who found that some of the OS teats lacked validity, while proposing that other tests may be better suited to children who are experiencing a lack of responsiveness to reading intervention programmes.

Phonemic awareness can sometimes be difficult to develop (Adams et al., 1998: Blachman, 1998; Nicholson, 1997). However, Hatcher and Hulme (1999) suggest that phoneme manipulation skills are a powerful predictor of growth in reading ability. Therefore it was hypothesised that RO children would show poor ability in phonemic awareness tasks. The results did in fact show that the RO children tested had, on average, the phonemic awareness ability of children two or more years below their chronological age. Thus, RR had not helped remediate this deficit; so once again, it is unsurprising that they needed further intervention. The relationship between poor decoding and poor phonemic awareness will be further discussed in the second section of this discussion. However, it is worth noting that the evidence discussed so far, in conjunction with the findings of Chapman et al., (1999) relating to RO children and their prior and post RR programme phonemic awareness levels, and together with the research of Torgeson and

Davies (1996) pertaining to interventions that include phonemic awareness components, indicate strongly that struggling readers in New Zealand schools should be tested for phonemic awareness prior to being involved in a RR programme, as a further and more accurate method of participant selection.

Poor recall of prior learning, due to poor long term memory was another characteristic of children who are unresponsive to reading intervention programmes, as identified by Al Otaiba and Fuchs (2002). It was also reported by RR teachers as a characteristic typical of their RO children. During the process of assessing the RO children's orthographic ability (also an identified characteristic of children unresponsive to reading intervention programmes, (ibid cit.), the ability to recall five spelling words taught to the participants by the researcher, was tested. As the research hypotheses stated, not only did the RO children show poor orthographic skills, with the mean spelling age being almost two years below their chronological age, but the ability of the RO children to accurately recall the five spelling words was poor, with the mean number of correctly spelled words being just 1.4. This not only supports the literature and the findings of RR teachers, it also raises the pertinent question. 'Why do RO children, along with other children throughout the world who are unresponsive to interventions, all share this characteristic?' The scope of this current research did not allow this question to be studied in depth, however, Nuthall (2000) believes that student's memory ability can be affected by two major factors; (i) their school experiences can have a substantial impact on the development of memory,

and (ii) children's memory is directly related to interaction with parents or caregivers when they are pre-schoolers, in culturally related memory activities, such as discussions involving past family events. He also found that it required three to four experiences with new material, for the information to transfer from working to long-term memory in high school aged students. It may be possible to argue that, in this current research, the participants may have needed more experiences learning the words they were required to spell. Further, it may also suggest that demographic factors such as decile ratings of schools' and SES of participants may bear a relationship on the types of experiences that are having both at home and school, with regard to memory related activities.

However, the type of students that Nuthall studied, were not those who had been identified as being unresponsive to reading intervention programmes, so it suggests that the current participants have memory deficits such as a poor ability to recall serial order, thus, as they try to spell phonetically, their poor memory for phonemes and letter/sound relationships means that they are unable to correctly spell the words required of them (Johnston, 1993).

Johnston (1993) also believes there is a correlation between poor long term memory and learning ability, and short term memory deficits. And Gathercole and Baddeley (1993) and Baddeley and Hitch (1974) found that there was a link between phonological working memory and verbal ability, particularly the ability to acquire and retain new labels. This would suggest that the RO children tested may show low levels of verbal ability. The

testing however did not reveal the low levels expected by the research hypothesis. The result is consistent with the findings of Stanovich et al., (1997) who found no significant correlation between verbal ability (IQ) as defined by the vocabulary test, PPVT, and phonological skill ability. These correlations will be discussed in the second section of this discussion.

Motor cortex dominance was investigated as a possible cognitive indicator of brain dominance. This variable has been linked to dyslexia by Shaywitz and Shaywitz (2004) and Denton et al., (2007). While it was established that all but two of the participants were right motor cortex dominant, no conclusions are able to be drawn from this information, and it would require testing with a large sample which is outside the scope of this research, to inform any correlation between motor cortex dominance and instances of being RO.

Physical characteristics were also investigated, despite this variable not being specifically named as typical of children who are unresponsive to intervention programmes (Al Otaiba & Fuchs, 2002). However, the researcher held, based on experience working with RO children, and information from RR teachers, the belief that there was evidence of late global development and poor fine and gross motor skills in RO children. Results indicated a possible link among physical characteristics, and the cognitive and socioeconomic/behavioural characteristics identified in the literature and suggested by this research. Research involving larger numbers of subjects together with the use of factor analysis would be required to confirm this, but the number of children in this study is too small. As

expected, there were more boys RO. Measures of global development revealed that two-thirds of the participants were short for their age, when compared to the growth chart, and almost half had poor fine and gross motor skills when compared to a sample of their cohorts. This finding supported reports from RR teachers and the observations by the researcher. The interaction with other variables tested will be discussed in the second section of this discussion.

A number of behavioural and demographic characteristics were identified by Al Otaiba and Fuchs (2002), and by the RR teachers in this research, as being defining characteristics of children RO, or unresponsive to intervention programmes. RR data from annual reports confirmed that more children were participants in RR in low decile rated schools and that the outcomes for those children were less favourable than from higher decile rated schools. This replicates the findings of Al Otaiba and Fuchs (2002) who found that SES had a negative impact on a child's ability to succeed in reading intervention programmes. RR teachers reported that the home environment of RO children had played a part in the child's progress, along with behavioural problems such as ADD, ADHD or ODD. This is consistent with the findings of Al Otaiba and Fuchs (2002). The direct impact of these findings and any correlations with other characteristics will be discussed in the next section of this discussion.

Section Two

The present research involved both the comparison of results with previous research, and the correlation of results obtained from a range of variables measured as part of the research. Based on initial findings, the researcher expected positive correlations between some key variables. It was predicted that poor scores on the BTBD would correlate with poor scores in phonemic awareness tasks. Pearson correlations revealed that poor scores in the BTBD were strongly correlated to poor scores in five out of seven of the phonemic awareness tasks, and also with rapid word naming, and spelling age as defined by the Schonell Spelling Test. Indeed, the BTBD was able to help explain 68% of the variance in deletion of initial phoneme, 76% of the variance in rapid Word Naming, 77% of the variance in substitution of initial phoneme and 53% of the variance in substitution of final phoneme.

As discussed in the literature in Chapter Two, poor readers find it difficult to decode words because it is a skill that requires specific phonological knowledge, in particular, phonemic awareness. So this correlation reflects the research of Al Otaiba and Fuchs (2002), and previous research regarding the effectiveness of RR programmes to remediate poor phonological knowledge by Chapman et al., (1999) and Iverson and Tunmer (1993), as well as the hypothesis of the researcher. Interestingly, the correlation between the BTBD and rapid Word Naming was not foreseen by the researcher, because the process of decoding (sounding out) words as opposed to instantly recognising words is described within the literature, and

supported by a number of prominent researchers such as Pressley (2006) and Shaywitz, (1996) as requiring two different processes using different areas of the brain. .Sight word automaticity requires instant recall, by sight, of high frequency words that have been memorised and requires the activation of the occipital-temporal region of the brain, that recognises whole words. Phonemic awareness as described by the literature is linked to language awareness, vocabulary and oral/aural language interaction that utilises the Temporal lobe and Brocas (language processing) area of the brain. However, because this research has revealed this unexpected correlation, this may suggest that there is interaction between phonological processes and automatic sight word recognition, which is consistent with the literature review that states that there is no single cause for poor phonemic awareness. Remediation of phonological, (particularly phonemic) awareness may still not be enough to enable RO children to successfully acquire the reading skills of their cohorts.

Gender Differences

With these strong correlations revealed across all participants, correlations between BTBD and other cognitive variables were investigated by gender. For male participants, the BTBD proved to have strong positive correlations with three out of seven of the phonemic awareness tasks; substitution of initial phoneme, deletion of initial phoneme and phoneme segmenting. When the coefficients of variance were investigated, it showed that BTBD helped explain 77% of the variance in deletion of initial phoneme, and 67%

of the variance in substitution of initial phoneme. This suggests, quite strongly, that decoding new words, or non-words, as required by the BTBD, is directly affected by a student's ability to recognise and manipulate phonemes. Male participants find it particularly difficult to decode, because they have poor ability to substitute or delete initial phonemes or segment any or all phonemes. Male participants also displayed a link between some phonemic awareness tasks and the decile rating of the school they were attending, but not as strongly as their correlations with the BTBD. This possibly supports the notion of their RR teachers that RO children received less assistance from home. While the RR teachers did not specify what type of assistance at home would have been useful in facilitating better results for RO children,

For female participants, the BTBD also had strong correlations with three out of seven of the phonemic awareness tasks, however, they were not all the same tasks as for the male participants. The correlations were with substitution of initial phoneme, deletion of final phoneme and phoneme blending. There was only one instance of shared variance for the female participants, with BTBD and phoneme blending. Overall, the data for the phonemic awareness testing showed that male participants scored more highly than the female participants. Taken together, this result suggests that when there are positive correlations between the cognitive variables of BTBD and phonemic awareness tasks, male participants would not only score better than female participants, but they would produce stronger correlations between the variables than the female participants.

The results produced by the Mann-Whitney U non-parametric correlations confirmed this for five out of seven of the correlations between the BTBD and phonemic awareness tasks. However, it should be noted that the BTBD helped explain more of the variances in phonemic awareness tasks for male participants than female participants. This result was not expected and is indeed counter-intuitive. While research and data does show that there are more boys requiring intervention programmes (Al Otaiba & Fuchs, 2002), and that more boys are unresponsive to intervention programmes, there is nothing specific in the research discussed in Chapter Two to suggest that there is a disparity between the cognitive ability of boys as opposed to girls, or that there are any particular differences in the relationships of cognitive variables between boys and girls who are unresponsive to reading intervention programmes. Thus, this research may have revealed an area of concern that could warrant further and prompt investigation.

What the results are suggesting is, that if a basic decoding test is used as a precursor to entry into RR, it would be expected that the males tested who scored poorly, would also have deficits in their phonemic awareness. This research also suggests that while females had particularly poor phonemic awareness, this deficit could not be clearly explained by poor decoding skills alone. There remain some questions as to what variable(s), if any, could help explain the poor performance by female participants in phonemic awareness tasks, and why there could be such a disparity?

Further analysis of the strong correlations among variables for female participants indicated that school decile rating was significant in six of the cognitive variables, in contrast to only one (deletion of final phoneme) for male participants. Female participants had strong positive correlations with school decile rating and Rapid Word Naming, phoneme segmenting, deletion of initial phoneme, phoneme blending, Schonell Spelling Age and raw score results. When correlation coefficients were calculated, it showed that school decile rating helped explain the Schonell raw score, the Schonell Spelling age and the variance in phoneme blending. This information supports Nicholsons (1997a) findings that SES, and income in particular is inversely proportional to phonemic awareness and the ability to succeed in reading. However, this research, suggests additionally, that lack of attendance to speech sounds in the home environment of boys attending low decile schools, who are RO, it is not due to decile rating *per se*.

RR teachers at the lowest decile rated school in this current research, RO approximately 75% of the RR students, which more than supports previous research and the research hypotheses. However, what the evidence suggests, and remains unexplained, is that with regard to reading achievement, instances of being RO, and the critical skill of phonemic awareness, decile rating is more sensitive for girls than boys. What this means for female struggling readers in New Zealand's schools will be addressed in the final section of this discussion.

Al Otaiba and Fuchs (2002) identified that most children who were unresponsive to reading intervention programmes, were poor at rapid word naming. When the results of the data for rapid word naming in this research was correlated with other variables, it was found to have strong positive correlations with seven other cognitive variables. Additionally, the time taken to complete the word naming task had strong negative correlations with five out of seven phonemic awareness tasks and five other cognitive variables. As a measure and possible predictor of the potential for children to benefit from a RR programme, it would appear that their ability to recognize (instantly recall) sight words, and the speed at which that child performs the task, is a sensitive measure of establishing how they will perform in spelling tasks, phonemic awareness tasks, decoding tasks, and verbal ability tasks. For the male participants, rapid word naming had strong correlations with five other cognitive variables, none of which had significant shared variance. Interestingly, when rapid word naming was correlated with physical and SES variables, correlations were mixed. For time taken to complete the Rapid Word Naming task, there was a shared variance with pencil grip and height in male participants.

This seems to suggest that for male participants, the beliefs of their RR teachers are confirmed, and that there is a link between late global development and cognitive ability in RO students, particularly, between height, and fine motor skills for male participants. This may suggest a further link with home background, possibly quality of living conditions, diet, pre-school educational activities, sleep patterns etc., that are sometimes

attributed to poor SES, having a bearing on a child's growth and motor co-ordination, as well as on their ability to acquire adequate skills to enable them to read at an age-appropriate level.

Once again, this correlation with physical characteristics also supports the beliefs of the researcher, but is an observation that appears not to be noted in literature pertaining to response to reading intervention programmes.

Based on the results a gender a profile of the characteristics emerged around children who are RO from RR. While all participants displayed the characteristics identified by Al Otaiba and Fuchs (2002), there are definite differences in the specific skill levels and the strengths of the relationships between different variables for male and female participants.

It has previously been noted, and supported by the literature that there are more boys entering RR, and more boys RO from RR. However, the present research indicates that the boys, who are RO, have a higher level of cognitive skill than the RO girls. Girls deficiencies in phonemic awareness are more often associated just with the decile rating of the school, whereas boys deficits in phonemic awareness are more often associated by their decoding ability, which as has been suggested, may be linked to home environment in those boys who are in low decile rated schools. Boys' ability to rapidly name words is to some extent explained by cognitive ability including spelling age, decoding ability and phonemic awareness, and physical characteristics such as height and fine motor skills (unusual pencil grip).

Decoding is a skill which some research suggests can be addressed through intervention programmes involving direct teaching (Pressley, 2006), therefore this could help explain why the male participants scored more highly than the female participants. Intrinsic, cognitive factors would seemingly be more closely correlated and possibly more vital for the progress of male participants, hence, it is possible that they did display higher skill levels than the girls, because the causes of their problems had been partially addressed by teachers and intervention programmes they had received prior or post RR, but not necessarily by the RR programme.

Girls, while sharing the some of the correlations between rapid word naming, phonemic awareness and decoding, and rapid word time taken, spelling ability and decoding that the boys had, also presented with strong correlations with phoneme segmenting, phoneme blending, substitution of initial phoneme and deletion of final phoneme, that was not evident in the boys. While these are intrinsic issues, phonemic awareness is not a learning issue that is addresses by regular classroom pedagogy in New Zealand, or by the RR programme.

This may help explain why children who have poorer phonemic awareness and are RO, in this case, the female participants, presented with lower cognitive scores than the males, who didn't appear to have the same phonemic awareness issues. However, this does not explain directly, why it should be that the females had poorer phonemic awareness than the male participants. There is the suggestion however, that phonemic awareness, is

directly affected by attention to speech and speaking in the environment that the child lives in. So that, if a child is not surrounded by people who model good speech, and they don't spend much time engaged in reading and speech related activities and games as a pre-schooler, they may be at a disadvantage when it comes to phonemic awareness tasks. Lower SES households, are sometimes considered to be less effective in providing these types of learning related experiences for children.

Along with these differences, females showed significant correlations between hand dominance and an ability to complete the maze test. This indicates a connection between motor cortex dominance and global delay that was not seen in the boys. This was not hypothesised by the researcher, and not indicated by the literature, and therefore poses an interesting question: Is it possible that there are wider instances of motor cortex dominance having a negative affect on reading acquisition, or learning in general, in the female population of New Zealand, or indeed all school worldwide?

Verbal Ability

The issue of verbal ability was identified in the literature as being a characteristic of children who were unresponsive to reading intervention programmes (Al Otaiba & Fuchs, 2002). It was the belief of the researcher that it would have an impact on children who were in RR programmes and would be implicated in children who were RO. As discussed briefly in the

previous section, it was established that, for all participants, there was no significant correlations between the PPVT, a measure of verbal IQ, and other variables. This was an unexpected outcome, as the research strongly suggests that children with poor verbal ability tend to have had less time attending to the English language, which this study, and previous research has shown, can directly impact on phonemic awareness and decoding skills.

However, it is significant to note that there were two isolated instances where correlations with PPVT did occur. For female participants, there was a strong correlation between verbal ability and height, where the shorter female participants had poorer scores, thus a lower verbal ability age than the taller female participants. Both of these variables could be the result of global delays or SES, strengthening the contention that SES, as identified by Al Otaiba and Fuchs (2002) and Nicholson (1997) is vital variable for children who are unresponsive to reading intervention programmes. The suggestion is that girls from lower SES households are perhaps smaller due to poorer living conditions such as nutrition, and that possibly, they display global delay due to the living conditions and the lower levels of positive input with regard to learning, physical activity and nutrition.

For males, there was a strong correlation between PPVT and their ability to recall prior learning, through the Spelling Memory Test. This supports the research discussed in the literature review and the beliefs of the researcher, but was unexpected in that it only occurred for the male participants. It is possible that this is another example of gender difference, in that, boys who

are RO experience difficulty for intrinsic reasons, while the girls appear to be more influenced by extrinsic reasons, such as SES.

SES is perhaps the most crucial variable underpinning achievement among female participants. The research suggests that females, who are RO, have global delays and cognitive deficits, and that they are also from families of lower SES, and attend lower decile rated schools. This association may underpin their ability to respond to intervention, possibly because the associated variables are outside of the control of the teachers or programmes offered to these children. This may also suggest that while teachers and schools can provide extra tuition and help through intervention programmes or RR, they cannot monitor or remediate conditions outside of the school environment.

Closely linked to SES is the effect that self esteem has on children who have experienced reading failure. This is known as the Matthew Effect (Stanovich, 1986). Shanahan and Barr (1995) and Spear-Swerling and Sterberg (1996) note the impact of the Matthew Effect has on children and their parents and the association between that effect and poor reading achievement. This impact may be more severe for the female participants in this study, because most of the variables influencing the outcome of the RO females were due to extrinsic reasons as defined in the literature review.

The impact of these gender differences creates the opportunity to expand on the seven characteristics of children unresponsive to reading interventions as

defined by Al Otaiba and Fuchs (2002), and will be explored in the following section.

Limitations of the Research

While the results appear compelling and consistent with the findings of Al Otaiba and Fuchs (2002), and while the results generally support the research hypotheses, there are limitations pertaining to the study that need to be outlined.

The sample size was small and did not totally reflect the ratios of male/female participants enrolled in RR and those RO as outlined in the RR Annual Reports (Anand & Bennie, 2003; Holland, 2005; Ng, 2006). Further, the study did not include the range of ethnicities described in the same reports. While the results suggest that the issues discussed thus far are indeed characteristics of children who are RO, there is also the opportunity for further research to be carried out with a larger, more diverse sample, to confirm the findings.

It is important to acknowledge that all children come from different backgrounds and have had a multitude of different experiences. The use of test results and information gathered in this study places the research in an empirical paradigm, which essentially excludes the wider consideration of these outside experiences and socio-cultural variables, that in turn may be partially responsible for the children's unresponsiveness. For example, RR

teachers did state that they believed a lack of help from home and home environment had played a part in instances of children being RO.

The nature of the information received from the RR teachers could have been influenced by the differences in the amount of time that each teacher had been teaching RR and also to how much ongoing support and training they had received. A good example of the type of information that could have been subject to limitations, is that which supports the analysis of data relating to the number of children actually RO.

The numbers identified by RR teachers in the study were much higher than those reported in the annual reports, but did support the findings of Shanahan and Barr (1995) and Tunmer and Chapman (2004), who suggest that there are flaws in the methods used to report and record data pertaining to RR. There is also a question as to whether the RR teachers with the least experience, could have referred children on inappropriately, although no evidence of this was found. RR teachers did imply that they were now tending to not include the very lowest children as per the results of the OS, and this could be impacting on the actual numbers of children being RO as reported in the official data.

With regard to SES, in this research, the only measure was the decile rating of the schools involved in the study. To enable any confirmation, or to further strengthen the argument that SES and extrinsic variables are more important for female students who are RO, and for males who do display

some elements of global and motor skill delay, it would be necessary to establish information about the home environment such as parent education, employment and income, as referred to by Al Otaiba and Fuchs (2002), and partly explained by the Matthew Effect (Stanovich, 1986) and the research of Shanahan and Barr (1995) and Spear-Swerling and Sternberg (1996).

The ethnic and gender balance of the sample in this study did not reflect that described in the RR Annual Reports, therefore, this could be construed as a limitation, and future research would need to be considered.

This study has been built around the deficit model, thus the possibility also needs to be considered, that the RR programme is perhaps the 'unresponsive' element. Perhaps one of the main reasons that children are having to be RO, is that the programme itself is not adequate for the needs of these struggling readers. This notion, if it were to be explored would require a far larger, in depth study than was possible within the scope of this present study.

Recommendations

From the results of this study, there is an indication that further investigation should be carried out, with a larger, ethnic and gender balanced sample size, to determine the significance of the following findings.

Phonemic Awareness and Sight Word Automaticity

As discussed early, this research identified a correlation between phonemic awareness and sight word automaticity. This was unexpected, as the literature suggests that the two cognitive abilities are not necessarily related. It appears that there has been less international research conducted regarding this particular correlation, although Shaywitz and Shaywitz, (2004), did find that there was a possibility that interventions that included training in phonemic awareness did help stimulate the occipital-temporal area of the brain, thus helping to improve reading fluency. With this in mind, together with the knowledge that there is no single cause for poor phonemic awareness as defined in the literature review, there would appear to be an opportunity for further research involving RO children, using a larger, statistically appropriate sample size, to ascertain whether this finding in the current research is pertinent to many RO children.

Gender Difference

Considering the significant gender based differences identified in this research, there is a need for further research to be undertaken to establish if this would be replicated with a sample that reflects the profile of RO students. It is crucial to the ongoing learning of these students, and the success of future students, that this finding is explored in more depth. If it proves to be a real issue throughout New Zealand, it could point to the need to not only adopt other testing procedures to establish ability in the area of decoding and phonemic awareness, but also to the need to address how

schools cater for, in particular girls from lower SES families. Perhaps, more needs to be done to include the intervention of outside agencies, to ensure that the influence of such extrinsic variables is minimalised.

Once again, this may directly impact on the number of children, particularly girls from lower decile schools and lower SES homes requiring RR intervention programmes, thus providing openings for children to participate in the RR programme, who have characteristics that allow them to experience success from the programme.

Testing and Interventions

Tunmer and Chapman (2004), in their paper discussing the myths and realities of the RR programme, strongly recommend that changes should be made to the tests children are given prior to receiving RR. Denton et al., (2006) also suggested tat the OS was not valid, and that other tests should be employed when testing children who were unresponsive to intervention programmes. This current research supports this and suggests that the introduction of testing for phonemic awareness, at school entry level, and again as part of the tests carried out with the OS (Clay, 1979), would allow schools to isolate children that are not suited to the RR programme. And more importantly, if a child was identified at school entry, they could be remediated prior to completing their first year at school. Further, as many of the RO participants in this study recorded phonemic awareness scores that rated them around the level of a five year old, perhaps these skills should be

addressed at a preschool level? Phonemic awareness can be remediated through direct instruction, so having this type of instruction included in our preschool educational arenas, may diminish the number of children needing intensive intervention when they reach school. Subsequently, this may be particularly important in lower SES areas

Further, for those children identified as having poor phonemic awareness, and therefore not ready for RR, a different type of intervention would probably be required. This would subsequently free up spaces in the RR programme for children who would benefit from the intervention, ultimately ensuring better cost effectiveness for schools and taxpayers, but more importantly, creating the opportunity for more children to experience success in reading. While Clay (1979) claims that it is possible to identify children who are experiencing reading failure after only one year of school, it is the belief of this researcher, that because phonemic awareness is such a strong early indicator of reading success, it is more pertinent to address this upon entry to school, or indeed before school entry. This may also help prevent low self-esteem and the negative affects of the Matthews Effect.

It is not possible within the scope of this research to propose the correct intervention for these children, but it does point to the recommendation that there is a need for more research into phonemic awareness levels at the preschool level, and a subsequent investigation into the type of intervention that could be implemented in New Zealand's schools or preschools to help remediate these children.

Concluding Statement

The characteristics of children RO from RR are consistent with the characteristics of children unresponsive to reading intervention programmes as defined by Al Otaiba and Fuchs (2002). What was not defined in their meta-analysis was the gender difference, and the correlation between sight words automaticity and phonemic awareness that became apparent in this study. Therefore, there is the hope that the findings of this current research, that has defined the characteristics of these children, may prove instrumental in facilitating understanding and the subsequent preparation of appropriate testing and interventions, to ensure the literacy standards of New Zealand children are once again considered to be among the best in the world.

REFERENCES

Adams, M, J. (1990). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Adams, M.J. (1993). Beginning to read: An overview. In R. Beard (Ed.), *Teaching literacy: Balancing perspectives*. London: Hodder Stoughton.

Adams, M.J., Foorman, B.R., Lundberg, I., & Beeler, T. (1998). The elusive phoneme: Why phonemic awareness is so important and how to help children develop it. *American Federation of Teachers,* Spring/Summer, pp18-22.

Al Otaiba, S., & Fuchs, D. (2002). Characteristics of children who are unresponsive to early literacy intervention: A review of the literature. *Remedial and Special Education, 23*(5), 300-317.

Anand, V., Bennie, N., & Dewar, S. (2003). *Resource Teachers: Literacy Annual Report 2002.* Wellington, New Zealand: Ministry of Education.

Anand, V., & Bennie, N. (2004). *Annual monitoring of Reading Recovery data: The data for 2002.* Wellington, New Zealand: Ministry of Education.

Baddeley, A. D., & Hitch, G. (1974). Working memory. In G. A. Bower (Ed.). *Recent advances in learning and motivation*. New York: Academic Press.

Ball, E., & Blachman, B. (1991). Does phoneme awareness training in kindergarten make a difference in early words recognition and spelling? *Reading Research Quarterly, 26*(1), 49-66.

Berninger, V. W., Abbot, R. D., Zook, D., Ogier, S., Lemos-Britton, Z., & Brooksher, R. (1999). Early intervention for reading difficulties: Teaching the alphabet principle in a connectionist framework. *Journal of Learning Disabilities, 32,* 491-503.

Blachman, B. A., (1997). Early intervention and phonological awareness: A cautionary tale. In B. Blachman, (Ed.), *Foundations of reading acquisition and dyslexia*, Mahwah, NJ: Lawrence Erlbaum Associates.

Blachman, B. A. (2000). Phonological awareness. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.). *Handbook of reading research* (Vol. III, 483-502). Mahwah, NJ: Lawrence Erlbaum Associates.

Bradley, L., & Bryant, P. (1985). Rhyme and reason in reading and spelling. *Interntional Academy for Research in Reading Disabilities, Monograph Series, 1*, 75-95.

Brady, S. A., (1997). Ability to encode phonological representations. In B. Blachman, (Ed.), *Foundations of reading acquisition and dyslexia*, Mahwah, NJ: Lawrence Erlbaum Associates.

Bryant, N. D. (1975). *Bryant test of basic decoding skills.* New York: Teachers College Press.

Bus, A. G., & Ijzendoorn, M. H. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Experimental Psychology, 91,* 403-414.

Cambourne, B. (1988). *The whole story: Natural learning and the acquisition of literacy in the classroom.* Sydney, Australia: Ashton Scholastic.

Chapman, J.W., Tunmer, W.E., & Prochnow, J.E. (2001). Does Success in the Reading Recovery program depend on developing proficiency in phonological-processing skills? A longitudinal study in a whole language context. *Scientific Studies of Reading, 5*(2), 141-176.

Christie, F. (1990). The changing face of literacy. In F. Christie (Ed.), *Literacy for a changing world.* Hawthorne, Victoria, Australia: Australian Council for Educational Research.

Clay, M. M., (1979). *The early detection of reading difficulties: A diagnostic survey with recovery procedures.* Auckland, New Zealand: Heinemann Publishing.

Clay, M. M., (1991). *Becoming literate: The construction of inner control.* Auckland, New Zealand: Heinemann Publishing.

Clay, M. M. & Tuck, B. (1991). *A Study of Reading Recovery subgroups: Including outcomes for children who did not satisfy discontinuing criteria.* University of Auckland, New Zealand: Ministry of Education.

Clay, M, M. (1993). *An observation survey of early literacy achievement.* Auckland, New Zealand: Heinemann Education.

Cohen, J. (1988). *Statistical power analysis for the behaviour sciences* (2nd Ed.).Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education.* London: Routledge Falmer.

Denton, C. A., Ciancio, D. J., & Fletcher, J. M. (2006). Observational survey of early literacy achievement. *Reading Research Quarterly*, *1*(41), 10-33

Dolch, E. W. (1960). *Psychology and teaching of reading*. Westport, CT: Greenwood Press.

Dunn, L. M., & Dunn, L. M. (1981). *Peabody picture vocabulary test – revised.* Circle Pines, MN: American Guidance Service.

Ehri, L. C. (1997). Sight word learning in normal readers and dyslexics. In B. Blachman, (Ed.), *Foundations of reading acquisition and dyslexia.* Mahwah, NJ: Lawrence Erlbaum Associates.

Ehri, L. C., & Robbins, C. (1992). Beginners need some decoding skill to read words by analogy. *Reading Research Quarterly, 27*(1), 12-26.

Elbaum, B., Vaughn, S., Hughes, M., & Moody, S. (2000). How effective are one-to-one tutoring programs in reading for elementary students at risk for reading failure? A meta-analysis of the intervention research. *Journal of Educational Psychology, 92*, 605-619.

Everatt, J. (1999). *Reading and dyslexia: Visual and attentional processes.* London: Routledge.

Fry, E. B., Kress, J. E., & Fountoukidis, D. L. (1993). *The reading teacher's book of lists*. Englewood Cliffs, NJ: Prentice Hall.

Flores, B., Cousin, P. and Diaz, E. (1991). Transforming deficit myths about learning, language and culture. *Language Arts, 68*, 369-379.

Foorman, B. R., Francis, D. J., Shaywitz, S. E., Shaywitz, B. A., and Fletcher, J. M. (1997) A case for early reading intervention. In B. Blachman, (Ed.), *Foundations of reading acquisition and dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

Gathercole, S. E., & Baddeley, A. D. (1993). *Working memory and language.* Hove, England: Lawrence Erlbaum Associates.

Gaskins, R. W., Gaskins, I W., Anderson, R. C., & Schommer, M. (1995). The reciprocal relationship between research and development: An example involving a decoding strand for poor readers. *Journal of Reading Behavior 27*(3), 337-377.

Gibson, K. D., (1993). *Reading Recovery in English, Maori and Spanish (in the U.S.A.) a comparative study.* Wellington, New Zealand: College of Education Press.

Goodman, K.S., (1976). Behind the eye: What happens in reading. In H. Singer & R.B. Ruddell (Eds.), *Theoretical models and processes of reading*. Newark, DE: International Reading Association.

Goodman, K.S., & Goodman, Y. M. (1979). Learning to read is natural. In L. B. Resnick & P. A. Weaver (Eds.), *Theory and practice of early reading*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Goodman, S. (1989). Whole –language research: Foundations and development. *The Elementary School Journal, 90*(2), 207-221.

Gough, P. B. & Hillinger, M, L. (1980). Learning to read; An unnatural act. *Bulletin of the Orton Society, 30, 176-196.*

Gough, P. B., & Tunmer, W.E. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7*, 6-10.

Goswami, U. (2005). Synthetic phonics and learning to read: A cross-cultural perspective. *Educational Psychology in Practice, 21*, 273-282.

Hatcher, P. J., & Hulme, C. (1999). Phonemes, rhymes and intelligence as predictors of children's responsiveness to remedial reading instruction: Evidence from a longitudinal study. *Journal of Experimental Psychology, 72,* 130-153.

Hatcher, P. J, Hulme, C., & Ellis, A. W. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development, 65*, 41-57.

Holdaway, D. (1972). *Independence in reading: A handbook on individualized procedures.* Auckland New Zealand: Ashton Scholastic.

Holland, C., (2006). *Resource Teachers: Literacy annual report 2004.* Wellington, New Zealand: Ministry of Education.

Hudson, R. F., High, L., & Al Otaiba, S. (2007). Dyslexia and the brain: What does current research tell us? *The Reading Teacher, 60*(6), 506-517.

Iverson, S. J., & Tunmer, W.E. (1993). Phonological processing skills and the Reading Recovery program. *Journal of Educational Psychology, 85,* 112-126.

Johnston, R.S. (1993). The role of memory in learning to read, write and spell: A review of recent research. In G. M. Davies, & R. H. Logie (Eds.), *Memory in everyday life.* New York: North-Holland.

Jones, N. K., (1997). Learning to Read: Insights from Reading Recovery. In Sartz, S. L. & Klein, A.F., (Eds.). *Research in Reading Recovery.* Portsmouth, NH: Heineman.

Juel, C. (1991). Beginning reading. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 759-788).NewYork: Longman.

Liberman, A. M., (1997). How theories of speech affect research in reading and writing. In B. Blachman (Ed.), *Foundations of reading acquisition and dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

Literacy Taskforce (1999). *Report of the Literacy Taskforce.* Wellington, New Zealand: Ministry of Education.

Lonigan, C. J. (2003). Development and promotion of emergent literacy skills in children at-risk of reading difficulties. In B. R. Foorman (Ed.), *Preventing and remediating reading difficulties.* Tumonium, MD: New York Press.

Lovett, M. W., Bordan, S. L., DeLuca, T., Lacerenza, L., Benson, N. J., & Brackstone, D. (1994). Treating the core deficits of developmental dyslexia: Evidence of transfer of learning after phonologically- and strategy- based reading training programes. *Developmental Psychology, 30,* 805-822

Luke, A. (1992). Reading and critical literacy: Redefining the great debate. *Reading Forum New Zealand, 2*, 3-32.

Lyon, G. R., and Chhabra, V. (2004). The science of reading research. *Educational Leadership, 61*, 12-17.

National Center for Health statistics. (2000). *Stature-for-age percentiles for Girls, 2-20 years* and *Stature-for-age percentiles for Boys 2-20 years.* Retrieved July 6, 2008, from http://www.kidsgrowth.com/stages/viewgrowthcharts.cfm?id=GH318, and http://www.kidsgrowth.com/stages/viewgrowthcharts.cfm?id=BH318.

Ng, L. (2006). *Annual monitoring of Reading Recovery data: The data for 2005.* Wellington, New Zealand: Ministry of Education.

Nicholson, T. (1997a). Closing the gap on reading failure: Social background, phonemic awareness and learning to read. In B. Blachman, (Ed.), *Foundations of reading acquisition and dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

Nicholson, T. (1997). *Solving reading problems across the curriculum.* Wellington, New Zealand: New Zealand Council for Educational Research.

Nuthall, G. (2000). The role of memory in the acquisition and retention of knowledge in Science and Social Studies units. *Cognition and Instruction, 18*(1), 83-139.

Oliver, D., (1999). *The Students at Risk Readers (SARR) Programme; A case study.* Hamilton, New Zealand: University of Waikato School of Education.

Olson, R. K., Wise, B., Johnson, M. C. and Ring, J., (1997). The etiology and remediation of phonologically based word recognition and spelling difficulties. In B. Blachman (Ed.), *Foundations of reading acquisition and dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

O'Shaughnessy, T. E., & Swanson, H. L. (2000). A comparison of two reading interventions for children with reading disabilities. *Journal of Learning Disabilities, 33,* 257-277.

Philips, A. (2006). *Cool book of mindbenders.* Kettering, England: Igloo Books Limited.

Programme for International Student Assessment (2000). The condition of education, 2003, reading literacy international comparisons. Retrieved June 20, 2009 from http://nces.ed.gov/surveys/pisa/pisa2003highlights_3.asp and http://nces.ed.gov/pubs2003/2003067_2.pdf

Pressley, M. (2006). *Reading instruction that works: The case for balanced teaching.* New York: The Guilford Press.

Pressley, M., & Fingerlett, L. (2006). Fluency. In M. Pressley (Ed.), *Reading instruction that works: The case for balanced teaching.* New York: The Guilford Press.

Rack, J. P., Snowling, M. J., & Olson, R. K. (1992). The non-word reading deficit in developmental dyslexia: A review. *Reading Research Quarterly, 27*(1), 29-53.

Roper, H. D., (1984). *Spelling, word recognition and phonemic awareness among first grade children.* Unpublished doctoral dissertation, University of Texas, Austin: TX.

Sattler, J. M., (1982). *Assessment of children's intelligence and special abilities.* Boston: Allyn and Bacon.

Savage, R., Carless, S., & Stuart, M. (2003).The effects of rime and phoneme based teaching delivered by learning support assistants. *Journal of Research in Reading, 26*(3), 211-233.

Scarborough, H. S., & Brady, S.A. (2002). Toward a common terminology for talking about speech and reading; A glossary of the *"Phon"* words and some related terms. *Journal of Literacy Research, 34*(3), 299-366.

Schonell, F. J. (1950) *Diagnostic and attainment testing: Including a manual of tests, their nature, use, recording and interpretation.* Edinburg, Scotland: Oliver & Boyd.

Shanahan, T., & Barr, R. (1995). Reading Recovery: An independent evaluation of the effects of an early intervention for at-risk learners. *Reading Research Quarterly, 30*(4), 958-996

Shaywitz, S. E. (1996). Dyslexia. *Scientific American,* 275, 78-84.

Shaywitz, S. E., & Shaywitz, B. A. (2004). Reading disability and the brain. *Educational Leadership, 61,* 6-11.

Snider, V. E. (1997). Transfer of decoding skills to a literature basal. *Learning Disabilities Research and Practice, 12*(1), 54-62.

Spear-Swerling, L. and Sternberg, R. J., (1996). *When poor readers become "Learning Disabled".* Boulder, CO: Westview Press.

Stanovich, K. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*, 360-407.

Stanovich, K. (1988). Explaining the differences between dyslexic and the garden-variety poor reader: The phonological-core variable-difference model. *Journal of Learning Difficulties, 21,* 590-612.

Stanovich, K. E., & Stanovich, P. J. (1995). How research might inform the debate about early reading acquisition. *Journal of Research in Reading, 18,* 87-105.

Stanovich, K. E., Siegel, L. S., Gottardo, A., Chiappe, P. and Sidhu, R., (1997). Subtypes of Developmental Dyslexia: Differences in phonological and orthographic coding. In B. Blachman, (Ed.), *Foundations of Reading Acquisition and Dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

Taylor, B., Harris, L. A. & Pearson, P. D. (1988). Reading difficulties assessment and instruction. New York: Random House Publishing.

Thorndike, R. L., Hagen, E. P., & Sattler, J. M. (1986). *Stanford-Binet intelligence scale: Fourth edition.* Chicago: Riverside Publishing.

Torgeson, J. K., & Davies, C. (1996). Individual difference variables that predict response to training in phonological awareness. *Journal of Experimental Child Psychology, 63,* 1-21.

Torgeson, J. K., Wagner, R. K., & Rashotte, C. A., (1997). Approaches to the prevention and remediation of phonologically based reading difficulties. In B. Blachman, (Ed.), *Foundations of Reading Acquisition and Dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

Torgeson, J. K., Wagner, R. K., Rashotte, C. A., Lindamood, P., Rose, E., Conway, T., & Garvan, C. (1999). Preventing reading failure in young children with phonological processing difficulties: Group and individual responses to instruction. *Journal of Educational Psychology*, *91,* 579-593.

Tunmer, E. E. (1994). Phonological processing skills and reading remediation. In C. Hulme & M. Snowling (Eds.), *Reading development and dyslexia*. London: Whurr Publishers Limited.

Tunmer, W. E., & Chapman, J. W. (2004). Reading Recovery: Distinguishing myth from reality. Retrieved 7 July, 2009 from http://www.knowledgenetwork.ca/literacy/resources/literature/myth_from_re.pdf

Tunmer, W.E., Chapman, J. W., Ryan, H. A., Prochnow, J. E. (1998). The importance of providing beginning readers with explicit training in phonological processing skills. *Australian Journal of Learning Disabilities, 3,* 4-14.

Treiman, R. (1997). Spelling in normal children and dyslexics. In B. Blachman, (Ed.), *Foundations of Reading Acquisition and Dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

United States department of Education, (2002). No Child Left behind Document, Retrieved 20 June 2008 from http://www.ed.gov/policy/elsec/guid/states/index.html#nclb

Vadesy, P., Jenkins, J., Antil, L., Wayne, S., & O'Connor, R. (1997). Community-based early intervention for at-risk first graders. *Learning Disabilities Research and Practice, 12*, 29-39.

Valencia, S., Hiebert, E. H., & Afflerbach, P. (1994). *Authentic reading assessment: practices and possibilities*. Newark, DE: International Reading Association.

Valett, R. E. (1980). *Dyslexia; a neuropsychological approach to educating children with severe reading disorders*. Belmont, CA: Fearon Pitman Publishers.

Vellutino, F. R., & Scanlon, D. M. (1987). Phonological coding, phonological awareness and reading ability: Evidence from a longitudinal and experimental study. *Merrill-Palmer Quarterly, 33*, 321-363.

Vellutino, F. R., Scanlon, D. M. and Sipay, E. R. (1997). Towards distinguishing between cognitive and experiential deficits as primary sources of difficulty in learning to read: The importance of early intervention in diagnosing specific reading disability. In B. Blachman, (Ed.), *Foundations of Reading Acquisition and Dyslexia*. Mahwah, NJ: Lawrence Erlbaum Associates.

Vaughn, S., & Linan-Thompson, S. (2003). Group size and time allotted to intervention: Effects for students with reading difficulties. . In B. R. Foorman (Ed.), *Preventing and remediating reading difficulties.* Tumonium, MD: York Press Inc.

Wagner, R. K., Torgeson, J. K, Laughon, P., Simmons, K, & Rashotte, C. A. (1993). Development of young readers phonological processing abilities. *Journal of Educational Psychology, 85*(1), 83-103.

APPENDIXES

Appendix A

Ethics Application

THE UNIVERSITY OF WAIKATO APPLICATION FOR ETHICAL APPROVAL OF

SUPERVISED GRADUATE/POSTGRADUATE RESEARCH PROJECTS

The purpose of this form is to give the School of Education Ethics Committee sufficient information to make an informed judgment about the ethics of your application

Name of applicant: Janice Elizabeth Belgrave
Contact address: 70 North Street, Morrinsville
Contact phone number: 07 8895458
Email address: janbelgrave@xtra.co.nz
Program of study: Master of Education, 4 Paper Thesis.
Department/centre/unit: Arts and Language Education Department
Paper code: DSOE594 – 07c(HAM)
Principal supervisor: Dr David Whitehead

Current qualifications: Bachelor of Teaching, Postgraduate Diploma in Education.

Current employment: Full time student
Title of project: ***The characteristics of children Referred On from Reading Recovery.***

Interest in topic

Having spent the past five years teaching the senior class at a small country school, it came to my attention that there appeared to be a pattern in the learning and behavioural characteristics of children entering my class after being enrolled in, but failing to successfully complete a Reading Recovery programme. This concerned me as I searched to find a reading programme that would facilitate the acquisition of reading skills for Referred On (RO) children. I was intrigued by the similarity in skills and behaviours of these children and felt that there was a need to formally identify their characteristics in order to have a positive outcome for them., and that this needed to be compared to international research in this area.

As part of Dr Sue Dymocks' *Reading Difficulties* paper last year, I administered the assessment measures outlined in this proposal, and subsequently was able to develop individualized reading programmes for four children in my school who had been RO. I am confident that this experience will allow me to conduct this research in a systematic and consistent manner.

Other personnel: No other personnel.

1. Details of the Project

Aim: To investigate the cognitive, social and behavioural characteristics of Referred On children and investigate correlations between these characteristics and those identified by Al Otaiba and Fuchs (2002).

a) Research question(s)

Main research Question: What characterises learners who are Referred On from Reading Recovery?

Subsidiary Questions:

Cognitive Questions

1. Is there evidence that RO children score poorly in their Observational Survey (OS), and if so, are any particular tests typically very poor? (Clay and Tuck, 1991)
2. Do RO children display poor decoding skills? (Bryant, 1975)
3. Are RO children low in phonemic awareness and if so, what particular phonemic awareness tests do they score most poorly in, i.e., blending, deleting, substitution or segmenting?
4. Is there evidence that RO children have poor recall of prior procedural learning?
5. Is there Right brain dominance in RO children? (Shaywitz, 1996)
6. Is the entry test indicative of who is most likely to be RO? (Reading Recovery Data, 1991; Clay, 1979; Clay and Tuck, 1991)
7. Is it possible to determine the developmental phase for learning sight words the RO children are at? (Ehri, 1995; Adams & Huggins, 1985; Goswami, 2005)
8. Is sight word vocabulary low in RO children? (Clay, 1979; Schonell, 1950)
9. Is listening comprehension at an age appropriate level in RO children?
10. Is poor listening comprehension indicative of being RO?
11. What were the Record of Oral Language (ROL) scores at school entry for RO children?

Procedures in which participants will be involved relevant to cognitive questions:

Question 1. Reading Recovery (RR) teacher interviews.
Question 2. Bryant test of Basic Decoding Skills, administered by researcher.
Question 3. Bryant test of Basic Decoding Skills, administered by researcher.
Question 4. Roper Phonemic Awareness test administered by researcher.
Question 5. Observations by researcher.
Question 6. RR teacher interviews.
Question 7. Talking to RO participants about how they remember/recognise words.
Question 8. Schonell sight word test administered by researcher.
Question 9. Assessment of Childrens Language Comprehension (ACLC) administered by researcher.
Question 10. Compare data with test results. RR teacher interviews.
Question 11. RR data and RR teacher interviews.

Social/Behavioural Questions

1. Are RO children from one ethnicity more than any other?
2. What percentage of RO children are from low decile schools?
3. Are RO children predominantly boys or girls? (Clay and Tuck, 1991)
4. Is there any evidence of late (global) development in RO children?
5. Are the gross or fine motor skills of RO children below their cohorts?

Procedures in which research participants will be involved relevant to social/behavioural questions.

Question 1. RR data.

Question 2. RR data.
Question 3. RR data.
Question 4. RR teacher interviews and observations by researcher.
Question 5. Observations by researcher of participants; eye tracking while reading and pencil grip while working. Timed maze tracking test administered by researcher.

b) Justification Research has shown that there is a worldwide problem whereby some children experiencing reading difficulties, remain unresponsive to reading intervention programmes. In New Zealand, around 10% of children who receive a programme of Reading Recovery (Clay, 1979) fail to respond adequately and are Referred On for further assistance. This research will identify the characteristics of these children and compare them to the characteristics of unresponsive children as defined by Al Otaiba and Fuchs (2002) in their review of 23 studies pertaining to literacy intervention programmes and their effectiveness.

The research is significant because of:

- The increase in ROs, from 4% in 1988 (Clay & Tuck, 1991) to 11.6% in 2005 (Ng, 2006).
- The long tail of poor achieving readers in NZ. PISA (2003) results indicate a larger distribution between the highest and lowest performing readers in NZ as compared to others similarly placed countries such as Canada.
- Disproportion of boys in the low achievement statistics (PISA, 2003).

The understandings that emerge from this research will be useful within a school context as it may help teachers develop programmes for children with reading difficulties.

c) Procedure for recruiting participants and obtaining informed consent Schools within the Waikato region who run Reading Recovery programmes will be contacted and informed of the research. I will ask them if they have had any RO children in the past year and if they would be willing for me to contact them again with regard to seeking permission to interview the RR teacher and seek consent from parents to test and work with any children who have been RO. All participants will be informed of the choice to decline or withdraw from participation in the research at any time.

See Application Appendix A for letter of introduction.

See Application Appendix B for Information Sheet for parents.

See Application Appendix C for consent form.

d) Procedures in which research participants will be involved

Reading Recovery Teachers: Interview, questionnaire

Children: Measures to be administered to participants are listed under the cognitive and Social/behavioural subsidiary questions

e) Procedures for handling information and materials produced in the course of the research

Responses to questionnaires and interviews and results of testing will only contain required information and will have no references to schools or names of participants and their families. Data will be stored in the form of an excel

programme sheet. Data will be subject to qualitative and descriptive qualitative analysis as appropriate.

2. <u>Ethical Issues</u>

a) Access to participants Access to participants will be sought directly through the schools identified as having Reading Recovery programmes. The purpose of the study and their role in it will be clearly outlined in writing, including their informed consent and rights of withdrawal. I have no normal contact with the majority of potential participants although I will seek to involve teachers and children from the school I have taught at for the past five years, and will gain their informed consent in the same manner as the other participants.

b) **Informed consent** Written consent will be gained from participating schools/school Principals, Reading Recovery teachers and the parents of the RO children prior to sending questionnaires, participating in interviews or being involved in teaching/testing sessions. A covering letter with an option to indicate a willingness to participate will precede formal consent. All participants have the right to complain to the research advisor

Dr. David Whitehead should they feel their trust has been abused.

c) Confidentiality The work with Reading Recovery teachers and RO children will be subject to the regulations laid down by the University of Waikato School of Education Ethics Committee for working with human subjects. Individual participants and schools will not be identified in the data stored or within the thesis completed using this data. Data will be kept securely and confidentially except for the purpose of the research and will be held securely for the required time subsequent to the completion of the research.

d) Potential harm to participants All adult participants, RO children, parents/caregivers of RO children and classroom teachers will be aware that they are part of a research and that this may require some time out of the classroom for the children. No personal details will be recorded and as such there is no further potential harm to participants anticipated. Reading Recovery teachers will be asked to reveal testing information about their RO children, however this will be treated in the same manner as data collected from the children via the testing procedures.

e) Participants' right to decline to participate and right to withdraw

i) Indicate what activities you require participants to do in your study

Participants are expected to:

1. Take part in an individual interview (RR teachers)
2. Complete a questionnaire (RR teachers)
3. Participate in cognitive testing (children)
4. Complete a survey and/or attend an informal informational discussion pertaining to the research (parents, caregivers and interested teachers)

Participants have the right to withdraw from the research up until September 30 2007 at which

point data will have been analysed for the first draft of the thesis. Participants may withdraw by

contacting myself or the RR teacher at their school either verbally or by letter/email contact.

ii) Indicate how much participants' time will be required

Adult participants: RR teachers will have to spend approximately 15 minutes completing a questionnaire and 30 - 45minutes in an interview.

Children: RO children will have a minimum of two sessions and a maximum of three sessions of approximately 45 minutes duration to take part in teaching and testing.

Parents/caregivers: Time commitments are minimal with the survey taking 10-15minutes to complete and the meeting (if attended) taking 20 minutes at the maximum.

f) Arrangements for participants to receive information An overview of the results of the completed research will be forwarded via mail to each participating school, RR teacher and parents of the children involved. If they indicate an interest in viewing the complete thesis a copy can be forwarded on an 'on loan' basis.

g) Use of the information The information gathered by the above means for the purposes of addressing the research questions will be used to complete this 4 paper thesis with the possibility of developing a published article and/or conference paper.

h) Conflicts of interest There are no known conflicts of interest and none are anticipated. I have no professional relationships with possible participants or their families.

i) Procedure for resolution of disputes In information provided to schools and parents/caregivers, a clear line of communication will be made evident. First point of contact will be with my Supervisor, Dr David Whitehead.

j) Other ethical concerns relevant to the research

None.

k) Cultural and Social considerations The research will be conducted within environments that I am very familiar with due to my work as a Primary School teacher. Respect for individuals, families and unique school cultures will be paramount. It is expected that some participants will be from social situations that are different from mine and these will considered with sensitivity with regard to correspondence and meetings.

3. <u>Legal Issues</u>

a) Copyright The University of Waikato will have copyright over the texts produced. It is not

Expected that the project will breach any copyright regulations.

b) Ownership of data or materials produced Participants will own material produced by themselves and generated as a result of testing throughout the course of the research. Texts produced as a direct result of the analysis of data will be owned by myself and the University of Waikato.

c) Any other legal issue relevant to the research

None.

d) Place in which the research will be conducted

Primary schools around the Waikato area.

e) Has this application in whole or part previously been declined or approved by another ethics committee?

No

f) For research to be undertaken at other facilities under the control of another ethics committee, has an application also been made to that committee?

Not applicable

g) Is any of this work being used in a thesis to be submitted for a degree at the University of Waikato

Yes, MEd

h) Further conditions

None known

4. Research Timetable

a) Proposed date of commencement of data collection

July/August 2007

i) Expected date of completion of data collection

September 2007

5. Applicant Agreement

I agree

a) to ensure that the above-mentioned procedures concerning the ethical conduct of this project will be followed by all those involved in the collection and handling of data.

b) in the event of this application being approved, the researcher agrees to inform the SOE Ethics Committee of any change subsequently proposed.

c) to submit for approval any amendments made to the research procedures outlined in this application which affect the ethical appraisal of the project.

d) that this application has been developed with my supervision and has my support. I have checked that all the information requested in the checklist below is included

e) I agree to support the student to follow the above mentioned procedures concerning the ethical conduct of this project.

Signature of applicant: Date:

Signature of supervisor: ..... Date: .....

6. Check List

Before sending this form to the SOE Ethics Committee Administrator please ensure that you have completed the following and attached these as appendices:

☐ Letter(s) to: participants, e.g. children, caregivers, principal, BOT, teachers.

☐ Information sheet, introductory letter for each type of participant

☐ Consent form(s) for each type of participant

☐ Questionnaire/survey questions/interview questions

☐ Reference list

☐ *Every page of your ethics application form has been numbered*

Please return 5 copies of your completed application to Sue Bradley at the School of Education by the following dates in 2006:

1 February, 1 March, 5 April, 3 May, 7 June, 5 July, 2 August, 6 September, 4 October, 1 November, 6 December

Appendix B

Letters, Reply Forms and Consent Forms for Stakeholders

Principal and BOT
School Name
School Address
Date

To whom it may concern;

I would like to take this opportunity to introduce myself. My name is Janice Belgrave and I am currently completing a thesis for my Master of Education degree at the University of Waikato. I am a fully registered Primary teacher who is taking a year out from the classroom to conduct this research in an area that I am very passionate about; children with ongoing reading difficulties. The title for my thesis is;

The characteristics of children Referred On from Reading Recovery.

In this study I aim to investigate the learning and behavioural characteristics of Referred On children and investigate correlations between these characteristics and those identified by prominent researchers overseas with regard to children experiencing persistent reading difficulties.

I understand that your school runs a Reading Recovery programme, and at this point I seek permission to contact your RR teacher(s) to ascertain if they would be willing to participate in my research. As outlined in the information sheet enclosed, I would be also seeking permission for any children in your school who have recently been Referred On from RR to participate as well.

I would be grateful if you could discuss the possibility of participation in this research with relevant staff members and return the relevant reply form the prepaid envelope enclosed at your earliest convenience.

Yours sincerely,

Janice Belgrave

Principals/BOT consent form for contact with Reading Recovery teachers Re: participation in the Masters Thesis research being conducted by;

Janice Elizabeth Belgrave
70 North Street
Morrinsville
Phone (07) 8895458
janbelgrave@xtra.co.nz
Supervisor: Dr. David Whitehead.
School of Education, University of Waikato.

I/we_____ have read the information

outlining participants involvement in this study and consent to contact with our school's Reading Recovery teacher(s) with regard to possible participation.

Signed_____Principal Date_____

And/or_____ BOT Chairperson Date_____

School_____

I/we have forwarded information to our Reading Recovery teacher(s)

yes/no

Or

The contact details for our Reading recovery teacher(s) is/are

_____
_____
_____
_____
_____
___

Reply form for Schools not interested in participating in the Masters Thesis research being conducted by;

Janice Elizabeth Belgrave
70 North Street
Morrinsville
Phone (07) 8895458
janbelgrave@xtra.co.nz
Supervisor: Dr. David Whitehead.
School of Education, University of Waikato.

I/we have read the information provided but are not interested in participating in this research.

Signed_____Principal Date_____
And/or_____BOT Chairperson Date_____

School_____
Address_____
Phone_____ Email_____

Reading Recovery teacher
School Name
School Address
Date

To whom it may concern;

I would like to take this opportunity to introduce myself. My name is Janice Belgrave and I am currently completing a thesis for my Master of Education degree at the University of Waikato. I am a fully registered Primary teacher who is taking a year out from the classroom to conduct this research in an area that I am very passionate about; children with ongoing reading difficulties. The title for my thesis is;

The characteristics of children Referred On from Reading Recovery.

In this study I aim to investigate the learning and behavioural characteristics of Referred On children and investigate correlations between these characteristics and those identified by prominent researchers overseas with regard to children experiencing persistent reading difficulties.

Your principal has indicated that you are prepared to read the information I have provided about my study and I would like to extend this opportunity to you to participate in my research. As outlined in the information sheet enclosed, I would be also seeking permission for any children in your school who have recently been Referred On from RR to participate as well.

When you have made a decision about being involved in this research please return the enclosed intentions form or contact me personally via email at janbelgrave@xtra.co.nz or by phone on (07) 8895458.

Thank you for your time,

Yours sincerely,

Consent form for Reading Recovery teachers
Participating in the Masters Thesis research being conducted by;

Janice Elizabeth Belgrave
70 North Street
Morrinsville
Phone (07) 8895458
janbelgrave@xtra.co.nz
Supervisor: Dr. David Whitehead.
School of Education, University of Waikato.

I_____ have read the information outlining participants' involvement in this study and consent to participating in this research. I understand that I have the right to withdraw from the study until 30 September, 2007 and agree to data collected from myself being used for the purpose of this thesis and any subsequent published articles generated from the analysis of this data.

Signed_____ Date_____

School_____
Address_____
Phone_____ Email_____

Reply form for Reading Recovery teachers not interested in participating in the Masters Thesis research being conducted by;

Janice Elizabeth Belgrave
70 North Street
Morrinsville
Phone (07) 8895458
janbelgrave@xtra.co.nz
Supervisor: Dr. David Whitehead.
School of Education, University of Waikato.

I have read the information provided but am not willing to participate in this research.

Signed_____ Date_____

School_____
Address_____
Phone_____ Email_____

Date

Dear Parents/Caregivers,

I would like to take this opportunity to introduce myself. My name is Janice Belgrave and I am currently completing a thesis for my Master of Education degree at the University of Waikato. I am a fully registered Primary teacher who is taking a year out from the classroom to conduct this research in an area that I am very passionate about; children who are experiencing difficulties with learning to read.
The aim of my study is to work with children who have taken part in Reading Recovery to find out if there are any common learning or behavioural characteristics. This information could help teachers prepare their reading programmes.

From discussions with the Reading Recovery teacher at your child's school, I understand that your child has received assistance with reading through the Reading Recovery programme. I would like to have the opportunity to work with your child as part of my study and have enclosed an information sheet outlining the types of activities that would be involved.

Please take the time to look at this information and discuss with other family members. If you feel that you would be interested in having your child participate, I will negotiate a suitable time to meet with you and discuss the project in more detail.

I would be grateful if you could return the relevant form to your child's Reading Recovery teacher or Principal as soon as you are able,
Thank you for your time,

Yours sincerely,

Janice Belgrave

Consent form for Parents/Caregivers of children participating in the Masters Thesis research being conducted by;

Janice Elizabeth Belgrave
70 North Street
Morrinsville
Phone (07) 8895458
janbelgrave@xtra.co.nz
Supervisor: Dr. David Whitehead.
School of Education, University of Waikato.

I_____ have read the information outlining participants' involvement in this study and consent to my child
_____ participating in this research.
I understand that I have the right to withdraw my child from the study until 30 September, 2007 and agree to data collected from my child being used for the purpose of this thesis and any subsequent published articles generated from the analysis of this data.

Signed_____ Date_____

Address_____
Phone_____ Email_____

Reply form for Parents/Caregivers not interested in their child participating in the Masters Thesis research being conducted by;

Janice Elizabeth Belgrave
70 North Street
Morrinsville
Phone (07) 8895458
janbelgrave@xtra.co.nz
Supervisor: Dr. David Whitehead.
School of Education, University of Waikato.

I/we have read the information provided but are not interested in having our child participate in this research.

Signed_____ Date_____

Childs Name_____(Optional)
School_____

Appendix C

Reading Recovery Teachers Questionnaire

Questionnaire for Reading Recovery teachers taking part in the Masters Thesis research conducted by Janice Belgrave in conjunction with the University of Waikato School of Education, Arts and Language Education Department.

Any inquiries should be directed to Janice Belgrave at janbelgrave@xtra.co.nz
Or by phone; (07)8895458.
Concerns or issues can be discussed in the first instance with Dr David Whitehead (thesis supervisor), davidw@waikato.ac.nz or phone(07)8384511 ex

Information and instructions for completing the questionnaire:

- **Please allow 20-30 minutes to complete this questionnaire.**
- **All information is confidential and will remain anonymous, with your name and school being removed from this paper before analysis.**
- **Endeavour to answer all the questions to the best of your knowledge.**

Name_____
School_____

School decile rating_____ Approximate roll_____

1. For how many years have you been taking Reading Recovery lessons ?

2. In what year did you first receive RR training?

3. Have you received any subsequent re-training or refresher courses?

If so, in what year(s)?

4. Do you generally work with more boys or girls?

5. Have you ever observed that children who score poorly on their Observational Survey
are more likely to be Referred On for further interventions?

6. How many children do you work with per year?

7. What percentage of these children are Referred On?

8. Do you believe that there is any particular skill(s) that RO children tend to score poorly
in?

If so, which skill(s)?

9. Have you ever noticed a correlation between children who are globally late developers
and instances of being Referred On?

If so, are there any particular developmental skills that are commonly late in developing in RO children?

10.Approximately what percentage of your RO children have been diagnosed ADD, ADHD or ODD (Oppositional defiance Disorder)?

11.Do you believe RO children tend to have poor sight word vocabulary?

12.Have you notice any instances of poor recall of prior leaning in your RO children?

If yes, do you believe this has impacted on their ability to respond favourably to the RR programme?

13. Do you <u>personally</u> believe that some RO children who have scored very poorly in
their OS were not really ready for the RR programme?

14. What type of follow-up interventions do you recommend for your RO children?

Thank you for taking the time to complete this questionnaire. Your confidential information is vital to this research and your assistance is much appreciated.

Ethics Application References

Al Otaiba, S., & Fuchs, D. (2002). "Characteristics of children who are unresponsive to early literacy intervention: A review of the literature." Remedial and Special Education **23**(5): 300-316.

Bryant, N. D. (1975). Bryant Test of Basic Decoding Skills. New York: Teachers College Press.

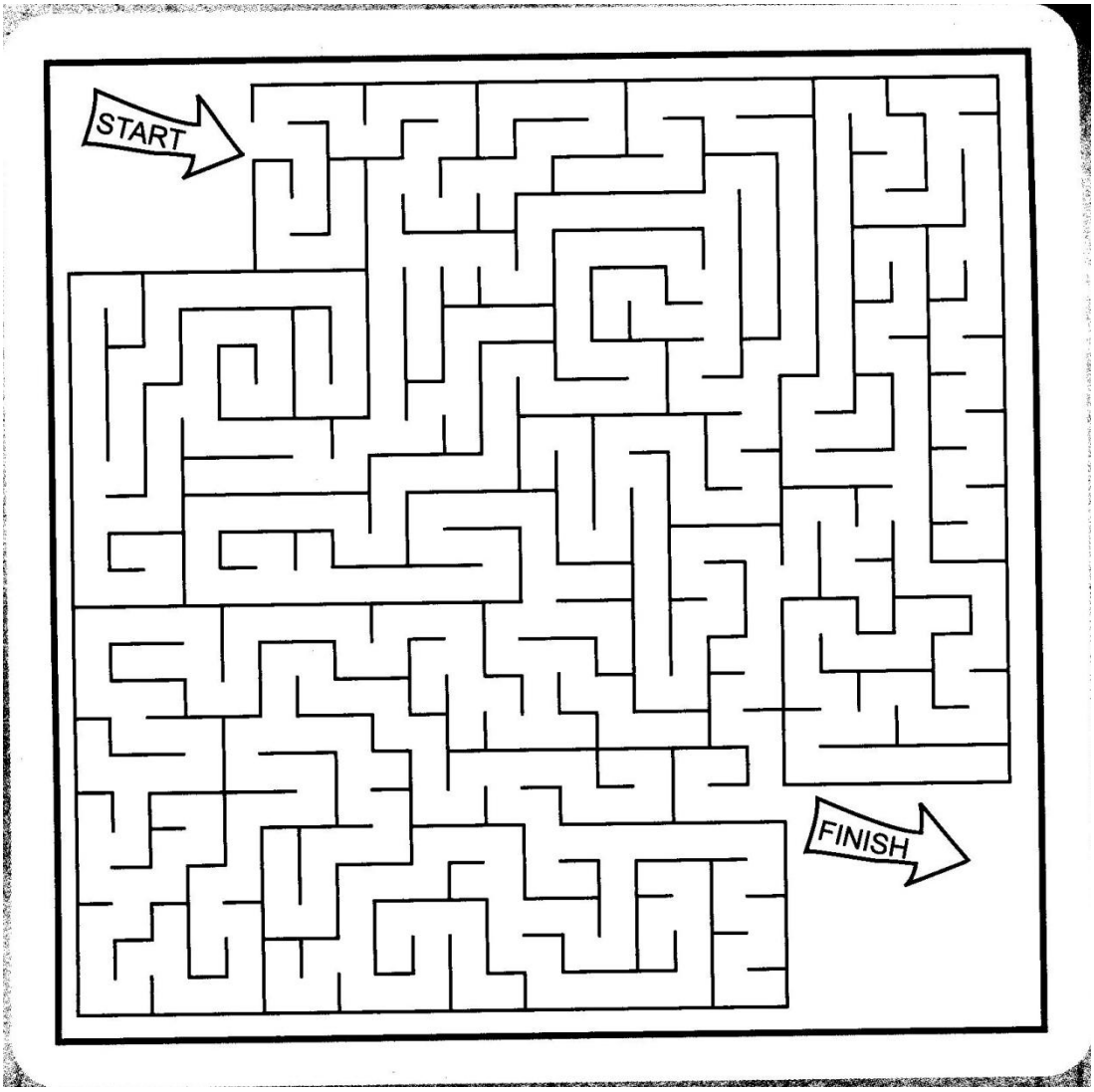
Clay, M. (2002). An observational survey of early literacy achievement. Auckland, New Zealand: Heinemann.

Roper, H. D. (1984). Spelling, word recognition and phonemic awareness among first grade children., University of Texas, Austin**:** 35-36.

Schonell, F. J. (1950). Diagnostic and attainment testing: Including a manual of tests, their nature, use, recording and interpretation. Edinburg: Oliver & Boyd.

Appendix D

Hand-Eye Co-ordination Maze Test



Appendix E

Bryant test of Basic Decoding

BRYANT TEST OF BASIC DECODING SKILLS

Tester instructions: Score as correct if the pupil pronounces the made-up words as shown below. Write down the error if the pupil makes a mistake (e.g., reads "buf" as "but"). Be sure to explain to the pupil that these are not real words. They are the names of children from another planet, and they speak a different language to us. Stop testing after 10 consecutive errors. Ask the pupil to look at the rest of the words and to read out any words that can be decoded. Then score out of 50.

1. buf (as in "muff")	26. phune (as in "tune")
2. cos (as in "toss")	27. cho (as in "go")
3. dit (as in "hit")	28. shi (as in "shy")
4. fev (as in "Bev")	29. whe (as in "he")
5. gac (as in "sack")	30. thade (as in "made")
6. huz (as in "buzz")	31. staw (as in "store")
7. jod (as in "cod")	32. plew (as in "flew")
8. kib (as in "rib")	33. fler (as in "her")
9. lek (as in "neck"	34. smar (as in "bar")
10. maz (as in "jazz")	35. blor (as in "floor")
11. nuv (as in "love")	36. cleef (as in "leaf")
12. pof (as in "off")	37. troob (as in "tube")
13. quig (as in "big")	38. spail (as in "mail")
14. rel (as in "bell")	39. groy (as in "boy")
15. san (as in "pan")	40. groaf (as in "loaf")
16. tup (as in "cup")	41. cosnuv (as in cos-nuv)
17. vom (as in "from")	42. relhime (as in rel-hime)
18. wix (as in "six")	43. defev (as in de-fev)
19. yeg (as in "leg")	44. gaction (as in gak-shun)
20. zad (as in "bad")	45. prefute (as in pre-fute)
21. fute (as in "cute")	46. uncabeness (as in un-cabe-ness)
22. yode (as in "code")	47. exyoded (as in ex-yode-ed)
23. bime (as in "time")	48. sanwixable (as in san-wicks-able)
24. nepe (as in "keep")	49. bufkibber (as in buff-kibb-er)
25. cabe (as in "babe")	50. vomazful (as in vom-az-ful)

Reference: Bryant, D. (1975). *Bryant Test of Basic Decoding Skills*. Unpublished manuscript, Teachers College, Columbia University, New York

Appendix F

Schonell spelling Age Test

Schonell Spelling Task

net	A fish was caught in the net.	net
can	Can you swim?	can
fun	We had a lot of fun.	fun
top	A book in on the top of the table.	top
rag	Wipe the table with a rag.	rag
sat	My friend sat beside me.	sat
hit	A car hit the tree.	hit
lid	Put the lid on the rubbish bin.	lid
cap	Put your cap on.	cap
had	I had a dream last night.	had
let	I will let you go home when the bell goes.	let
doll	My rag doll is lying on my bed.	doll
bell	The bell will ring at lunchtime.	bell
yes	Yes. When you're finished you can go home.	yes
then	I ate my sandwich then I ate my apple.	then
may	You may have an ice-cream later.	may
tree	The tree had pink flowers on it.	tree
by	We will pass by the shops on our way to the bus.	b
ill	I felt ill after I had eaten a green apple.	ill

egg	A bird laid an egg.	egg
land	The plane came into land on the runway.	land
how	How are you today?	how
your	Where is your schoolbag?	your
cold	It is very cold in winter.	cald
talk	I will talk to the teacher.	talk
flower	I put the flower in a vase.	flower
son	The mother was talking to her son.	son
seem	I seem to have lost my keys.	seem
four	There are four boys playing tennis.	four
loud	You will have to shout out loud.	loud
ground	The apples fell to the ground.	ground
lowest	Can you reach the lowest branch of the tree?	lowest
brain	Your brain has lots to remember.	brain
write	Please write your name on the board.	write
amount	Count out the amount you need for your ice-block.	amount
noise	"What an awful noise" said the teacher.	noise
remain	"Please remain in your seats" said the teacher.	remain
hoped	I hoped you would give me a smile.	hoped
worry	Don't worry about your cat. I will feed it.	worry

dancing	Our class enjoyed dancing to the music.	dancing
damage	Please do not damage the book.	damage
else	What else can we play?	else
through	The dog went through the tunnel.	through
entered	The girl entered the competition.	entered
cough	The boy had a loud cough.	cough
fitted	My shoes fitted me last year, but they are too small now.	fitted
spare	There is a spare tyre in the boat.	spare
daughter	I have a daughter and a son.	daughter
edge	Keep away from the edge of the road.	edge
search	We will search for your lost dog.	search
concert	I went to the concert.	concert
domestic	We went to the domestic terminal at the airport.	domestic
topic	Today's topic is spelling.	topic
method	What is the best method for mixing paint?	method
freeze	Put on your coat so you don't freeze.	freeze
avoid	Try to avoid crossing the road by yourself.	avoid
duties	Police have special duties to help people.	duties
recent	That rule is a recent change.	recent
type	What type of car is that?	type

instance	In this instance, ask your teacher first.	instance
liquid	Water is liquid.	liquid
assist	Will you please assist me?	assist
guess	Can you guess the answer?	guess
compulsory	Attendance at school is compulsory.	compulsory
description	The police asked for her description.	description
welfare	I am concerned about his welfare	welfare
various	We play various games at school.	various
genuine	His sadness is genuine.	genuine
interfere	Do not interfere with the computer.	interfere

Appendix G

Gough-Kastler-Roper Phonemic Awareness Test

Chart 1: Gough-Kastler-Roper Phonemic Awareness Test

Teacher Instructions: Remember that this is **not** a reading test. You have to **read aloud** the questions to the child. The test has six subtests. Total of 42 items.

Give the practice item first in each subtest. The answers to each item are given in brackets.

If the child has trouble during the test, give supportive comments like 'Good boy/girl', 'That's good', 'OK, let's try another one'. You can give explanations for the practice test items.

1. Blending

Practice: 'Say c-a-t. What word is c-a-t?' (answer = cat)

- n-i-ce (nice)
- t-oo (too)
- h-e (he)
- r-a-ke (rake)
- t-r-ai-n (train)
- p-l-a-ne (plane)
- f-u-nn-y (funny)

2. Deletion of first phoneme

Practice: 'Say cat. Now say cat without the k.' (answer = at)

- top (t) (op)
- gasp (g) (asp)
- find (f) (ind)
- paint (p) (aint)
- up (u) (p)
- at (a) (t)
- so (s) (o)

3. Deletion of last phoneme

Practice: 'Say cat. Now say cat without the t.' (answer = ca)

- same (m) (sa)
- me (e) (m)
- ate (t) (a)
- go (o) (g)
- frog (g) (fro)
- grab (b) (gra)
- stride (d) (stri)

4. Phonemic segmentation

Practice: 'Say cat. What are the three sounds in cat?' (answer = ceh-ah-teh)

- 2 no (n-o)
- 2 at (a-t)
- 2 up (u-p)
- 3 keep (k-ee-p)
- 3 man (m-a-n)
- 3 teeth (t-ee-th)
- 4 into (i-n-t-o)

5. Substitution of first phoneme

Practice: 'Say cat. Now, instead of k, start the new word with f.' (answer = fat)

• ball	b	c	(call)
• goat	g	b	(boat)
• took	t	c	(cook)
• fish	f	d	(dish)
• two	t	z	(zoo)
• chair	ch	p	(pair)
• meat	m	f	(feat)

6. Substitution of last phoneme

Practice: 'Say cat. Instead of t, end the new word with p.' (answer = cap)

• park	k	t	(part)
• run	n	g	(rug)
• late	t	m	(lame)
• mess	s	n	(men)
• rope	p	d	(rode)
• fame	m	s	(face)
• wet	t	b	(web)

Total Score = /42

Interpreting scores

There are no New Zealand norms for this test, but the following scores are a guide:

five-year-olds (beginning of year):	low pre-reading = 5;	high pre-reading = 10
five-year-olds (end of year):	poorer readers = 10;	better readers = 25
six-year-olds (end of year):	poorer readers = 25;	better readers = 35

Appendix H
First Fifty Most Common English words

4. *Instant Words*

These are the most common words in English, ranked in frequency order. The first 25 make up about a third of all printed material. The first 100 make up about half of all written material, and the first 300 make up about 65 percent of all written material. Is it any wonder that all students must learn to recognize these words instantly and to spell them correctly also?

THE INSTANT WORDS* FIRST HUNDRED

WORDS 1–25	WORDS 26–50	WORDS 51–75	WORDS 76–100
the	or	will	number
of	one	up	no
and	had	other	way
a	by	about	could
to	word	out	people
in	but	many	my
is	not	then	than
you	what	them	first
that	all	these	water
it	were	so	been
he	we	some	call
was	when	her	who
for	your	would	oil
on	can	make	its
are	said	like	now
as	there	him	find
with	use	into	long
his	an	time	down
they	each	has	day
I	which	look	did
at	she	two	get
be	do	more	come
this	how	write	made
have	their	go	may
from	if	see	part

Common suffixes: *-s, -ing, -ed, -er, -ly, -est*

*For additional instant words, see *Spelling Book* by Edward Fry, Laguna Beach Educational Books, 245 Grandview, Laguna Beach, CA 92651.

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