Building Decoding Fluency in Children with Reading Delay and Antisocial Behaviour

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Sarah A. Whitcombe-Dobbs

University of Canterbury, New Zealand

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Contents

Page

LIST OF TABLES **4**

LIST OF FIGURES **5**

ACKNOWLEDGEMENTS **6**

ABSTRACT **7**

CHAPTER 1: INTRODUCTION **8**

CHAPTER 2: METHOD **39**

Experimental Design 39

Participants 39

Setting 45

Measurement Procedures 45

Teaching Materials and Procedures 49

Schedule of Events 52

CHAPTER 3: RESULTS **56**

CHAPTER 4: DISCUSSION **72**

REFERENCES **88**

APPENDICES

Appendix I: Information and Consent Forms 100

Appendix II: Phonemic Segmentation Test 102

Appendix III: Decoding Fluency Test 103

Appendix IV: Canterbury Social Development Scale 105

Appendix V: Practice Word Lists 107

Appendix VI: Sample Flashcards..... 108

Appendix VII: Sample Racetracks..... 109

Appendix VIII: Sample SNAP! Cards 110

Appendix IX: Sample Behaviour Chart 111

List of Tables

Page

Table 1. Various Interventions Targeting Specific Reading Skills ……..... 19

Table 2. Risk, Predictive and Protective Factors for Developing Conduct Disorder……..... 22

Table 3. Demographic Characteristics and Pre-test Scores for the Seven Participants …..... 43

Table 4. Teacher-Reported Additional Information ..…….… 44

Table 5. Pre- and Post-Test Reading Ages on the Neale Analysis of Reading Ability...…… 69

Table 6. Pre- and Post-Test or Follow Up results on the Decoding Fluency Test and the Prose Reading Fluency Measure …….……..... 70

Table 7. First Session and Seven-week Follow Up Decoding Fluency and Prose Fluency Measures for Participants in Group 1 ..…….…….…..... 71

List of Figures

Page

Figure 1. Children's vocabulary development across income groups……..…. 15

Figure 2. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rate scores for Sophie…..……...…….. 57

Figure 3. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rate scores for Isaiah…..……... 59

Figure 4. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rate scores for Emily…….……... 62

Figure 5. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rates for Jesse……..……. 64

Figure 6. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rates for Josh……..……..... 65

Figure 7. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rates for Jamal……..…… 67

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Abstract

The present study firstly aimed to identify children with delayed reading who were missing the component skills of decoding fluency and who also displayed antisocial behaviour in the classroom. It also aimed to replicate with them an intervention designed by Church, Nixon, Zintl and Williams (2005). The study finally aimed to explore the question of whether children who have both a reading delay and a disruptive behaviour disorder require a reinforcement scheme to maintain their engagement in learning activities. Six participants worked with same-age peer tutors on specially-designed practice activities for approximately 20 minutes a day, four times a week, for 8-18 sessions. Improvement in decoding fluency and prose reading fluency was tracked for each child throughout the intervention. Results showed that the six participants gained, on average, sixteen months on their age-equivalent score for reading rate. Decoding fluency scores increased from a pre-test average of 16 correct graphemes per minute to 32 correct graphemes per minute at the post-test measure. Reading accuracy improved by an average of five months and reading comprehension by an average of six months. The gains in reading rate are most likely due to the practice opportunities afforded by the testing procedures as decoding fluency scores did not improve enough to have had a direct impact on the learners' prose reading ability. Implications for remedial reading interventions with children with behaviour problems are discussed.

Chapter One

Introduction

> **“**The connection between reading speed and comprehension; a film is made up of still images flashed in rapid succession to simulate movement. Slow down the film, and the movement and meaning slows and the film's impact is diminished. Viewers won't learn as much about the film as if it were shown at normal speed. With reading the same thing can happen. When a person reads word by word, like frame by frame, they are not reading on the level of ideas. You need to read on some level that's more conversational and allows things to coalesce into ideas themselves.**”** (Evans, n.d.).

Behaviour problems and reading problems in children are the two most common difficulties faced by teachers, parents and other professionals. Prevalence rates vary, but up to about 20% of all children experience problems in learning to read (Lee, 2009; Chamberlain, 2006), and up to about 5% engage in antisocial behaviour (Church, 2003; Patterson, DeBaryshe & Ramsey, 1990). Large numbers of children in Aotearoa/New Zealand are not progressing as well as their same-age peers due to displaying both of these difficulties and research is ongoing into the development of effective and feasible interventions for these children. Children with antisocial behaviour are more likely to fall behind academically (Smart, Sanson & Prior, 1996), as well as experiencing a multitude of poor outcomes in later life. The early primary years offer a chance to remediate some of these academic problems, and perhaps even give such children a greater chance of developing along a more typical life trajectory. In order to do so, however, effective interventions for children with both reading delay and antisocial behaviour need to be developed. By examining how reading problems

and antisocial behaviour develop, interventions can be tailored to be appropriate for this group's special education and behaviour management needs.

Component Skills of Reading

Learning to read is a complex process that requires the acquisition of a number of component skills (Gelheiser & Clark, 1991). An adult-level reader can read with speed, accuracy and understanding but, in order to do so, they must have previously mastered some specific component skills. The first of these is the ability to discriminate between the written letters of the alphabet (Adams, 1990). This skill is also referred to as letter-naming or orthographic knowledge. It consists of the ability, for English-speaking readers, to discriminate between the 52 lower-case and upper-case English letters (Church, 2005). In addition to visually discriminating between the letters, a child learning to read must also be able to aurally discriminate between the sounds of the phonemes (Adams, 1990). Spoken English contains 43 phonemes, or sounds, that are used to make up words. The ability to "hear the difference" between the sounds is most commonly referred to as phonemic awareness. It is also called phoneme discrimination, phonological awareness and linguistic awareness (Church, 2005). It is virtually impossible to teach a child to read until they have acquired a good level of phonemic awareness (Church, 2005; Stanovich, 1998). A third component skill of competent reading is a knowledge of grapheme-phoneme equivalence relations, or the alphabetic code (Gelheiser & Clark, 1991). This is the ability to see a letter, or group of letters, and to correctly pronounce the sound it or they make. This is often referred to as letter-sound knowledge, but this term is misleading as it implies that knowledge of the sounds of the 26 single letters of the alphabet is sufficient. A knowledge of grapheme-phoneme equivalence relations is also referred to as decoding skill, sounding out skill, word attack skill, phonics, phonological recoding, deciphering, and so on (Church, 2005). This thesis will use the term "decoding skills" to refer to the knowledge of grapheme-phoneme

equivalence relations. The term “grapheme” refers to a letter or a group of letters used to represent a single phoneme. The term “equivalence relations” acknowledges that each phoneme has a written form and a spoken form. When joined together to make words, each word also has a particular meaning. Thus, the word “bell” can be expressed orally (as three phonemes joined together), written graphically on paper, and understood as referring to a particular object. In order to read a word with comprehension, a child needs to be able to recognise its graphic form, pronounce it orally, and understand its meaning. Knowledge of individual words involves six equivalence relations: the ability to comprehend the spoken word and the written word, the ability to use the word correctly in both oral and written language and the ability to read and to spell the word. Although there are six equivalence relations to be learned, Sidman (1994) discovered that in most cases only two of these need to be specifically taught in order for a child to acquire knowledge of all six equivalence relations. The English language uses over 200 graphemes to represent its 43 phonemes, and around 110 of these occur with high frequency (Adams, 1990).

After learning to correctly identify the letters of the alphabet, to aurally distinguish between the spoken sounds, and to recognise a sufficient number of phoneme-grapheme equivalence relations, the child needs to be able to recognise and read the written graphemes with sufficient speed to maintain the meaning of what is being read. This means that their responses (spoken phonemes) to the stimuli (written graphemes) need to be fast enough to be automatic, or without conscious thought (Church, 2005; Gelheiser & Clark, 1991). Williams (2002) discovered that the rate at which most normal-progress 8- and 9- year olds decode the 45 most commonly-occurring English graphemes is 60-70 graphemes per minute. The speed and accuracy with which a child can recognise and pronounce grapheme-phoneme equivalence relations will be referred to as “decoding fluency”. There is a relationship between a child’s decoding fluency and their overall reading fluency and hence,

comprehension (Church, 2005; Hasbrouck & Tindal, 2006; Fuchs, Fuchs, Hosp & Jenkins, 2001). This is because slower readers have to hold the beginning words of each sentence in memory for longer than faster readers; it is difficult to concentrate on decoding each word while remembering previous words. Faster readers appear to automatically recognise each word and hence only have to hold previously-read words in memory for a few seconds in order to maintain comprehension. This can be referred to as "developmental efficiency" in learning to read (Ferrer et al., 2007). Church (2005) notes that it is unlikely that the slow reading rate of the child who struggles with decoding fluency will be experienced as engaging by the child, making them less likely read for pleasure and consequently more likely to miss many vital practice opportunities.

The size of a child's receptive vocabulary must also be mentioned at this point. If one already knows the meanings of the words one is reading, mental processes simply match the written word to the spoken one with the meaning already present. It logically follows that if a child has a small vocabulary, their reading will be slower as they will also be trying to work out the meanings of words as well as decoding the graphemes (Adams, 1990; Jenkins, Fuchs, van den Broek, Espin & Deno, 2003; Sidman, 1994). Thus, the size of a child's receptive vocabulary will affect the rate of acquisition of the component skill of decoding fluency when learning to read (Church, 2005).

Attaining a "sight-word" vocabulary that is large enough to read most of the words in most of the text facilitates the development of reading fluency. When most words are instantly recognised and understood, reading proceeds at a pace that is sufficient to maintain comprehension and interest. This knowledge base of words develops over many hundreds of hours of practice. However, children vary widely with respect to the number of words read from day to day. Research into the reading of delayed and skilled readers shows that children who struggle with reading read on average between one-half and one-quarter the number of

words read by children who are skilled readers (Clay, 1967; Juel, 1988; Anderson, Wilson & Fielding, 1988).

Prose reading fluency, or oral reading fluency, refers to the number of words read correctly per minute, and can be used to define competent reading (Adams, 1990; Fuchs, Fuchs, Hosp & Jenkins, 2001). Hasbrouck and Tindal (2006) examined the oral reading fluency of children in elementary school in North America with a view to establishing norms. They found that after two years at school, the average oral reading fluency rate of age-appropriate text was around 95 words per minute. This rose to 115 words per minute after three years, and after four years to about 120 words per minute. In a related study, children who were identified as skilled readers read at around 150 words per minute, while the children whose reading was delayed read much more slowly, at around 50 words per minute after five years at school (Jenkins et al, 2003). This research allows us to use oral reading fluency as a good measure of overall reading ability.

Origins of Reading Delay

The above summary delineates the cumulative processes involved in learning to read. Many children, however, fail to acquire the necessary skills and fall behind in reading during their primary years. Although there is no agreed definition for reading delay, this thesis will consider children to have reading delay if their measured reading ability is a least one year behind their chronological age. As children progress through school, the gap in ability between children with reading delay and children with normal reading progress tends to widen. The reasons for the development of reading delay have been widely studied and will now be briefly examined.

Etiology of reading delay: Neurodevelopmental theory

Shaywitz and Shaywitz (2003) found, using functional magnetic resonance imaging (fMRI), that children and adults with dyslexia had brains that showed different activation patterns from children and adults whose reading skills were developing at a normal rate. This evidence has been used to conclude that reading delay in children is caused by a neural abnormality. However, it is possible that both the neural differences and the poor reading are caused by a common antecedent variable because cause and effect were not demonstrated by the Shaywitz and Shaywitz correlational method (Church, 2005). Nevertheless, it is clear that there are some neurobiological differences between typically-developing children and those who struggle to learn to read. If the neural differences truly are a cause of reading delay, it is doubly important to identify and effectively support children's learning as early as possible. The arguments over whether this is a cause or an effect will continue but the end result is the same: children with reading delay need effective remedial help, and educational interventions are the only interventions available at this time. As an aside, it is tempting for professionals to place the cause for reading delay "within" the child – this exonerates them from responsibility for the child's lack of progress. This is unhelpful, as it can result in parents and professionals accepting the status quo instead of adjusting the environment to give the child every opportunity to succeed. In fact, Shaywitz and Shaywitz (2007) report that evidence-based reading intervention at an early age supports the development of the affected neural areas as well as increasing reading fluency (Foorman, Brier & Fletcher, 2003; Shaywitz & Shaywitz, 2007; Torgeson et al., 1999).

Etiology of reading delay: Lack of opportunity to learn

The process of learning to read competently begins not in the classroom but in the home and in the pre-school experiences of each child. Language acquisition is vital to

learning to read, and even during the early years there are variations in the number of learning opportunities experienced by individual children. Hart and Risley's (2003) description of their research summarises the similarities and differences they found between the language experiences of the 2- to 3-year old children of professional, working class and welfare-dependent parents in their sample. As they point out, infants and preschoolers, up until the age at which they enter an educational institution, are dependent solely on their families for their language development. Hart and Risley recorded over 1300 hours of observations in the homes of 42 families. The average number of parental utterances per hour of the Professional parents was 487; the Working Class group parents used 301 utterances per hour; and the Welfare group parents engaged in 176 utterances per hour – around 36% of that of the parents in the Professional group. Given that children's language develops through exposure to conversation, it is not hard to see how their children's speech development might be affected (Hart & Risley, 2003). Figure 1 shows the differences in the vocabularies of the children in the three different socioeconomic groups at three years of age.

Research into literacy development has found similar differences in opportunity to learn and has shown that these too are correlated with rate of learning to read (e.g. Anderson, Wilson & Fielding, 1988; Bus, van Izjendoorn & Pellegrini, 1995; Gettinger, 1991; Thurlow, Ysseldyke, Graden & Algazzine, 1983). Children in higher reading groups have been found to read two to four times as much as children in lower reading groups (Clay, 1967; Juel, 1988; Anderson et al., 1988). The implications for the cumulative effects of this are clear. Children who have more practice at reading are going to be better readers. Over years, this becomes a pattern whereby children who struggle with reading avoid it and so have fewer opportunities to improve, which in turn makes them fall further behind their peers and more likely to avoid reading.

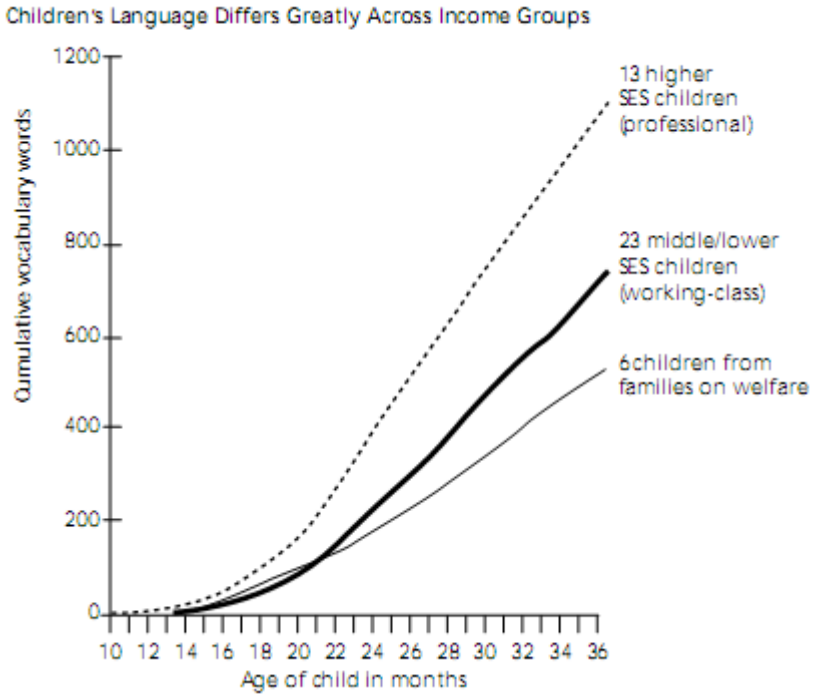

Figure 1: Children's vocabulary development across income groups (referenced from Hart & Risley, 2003, p. 114).

Remedial Reading in New Zealand

Reading Recovery has been used as the main literacy intervention for New Zealand children who struggle with reading for over 25 years (Reading Recovery, 2011). Devised by Dame Marie Clay, its aims are to intervene early in the primary years to prevent reading problems. Children are referred after one year at school if they fail to make adequate progress in reading and writing, and they attend daily individualised lessons with a specially-trained tutor (Lee, 2009). Data from the annual report show that around 14% of 6-year-old children attended Reading Recovery in 2008. Twice as many boys as girls were in the referred group, and of these 57% were successfully discontinued, which means that their reading level was tested to be at or above the lower end of the average band for their age. A further 26% were said to be responding, and their programme was carried over into the following year. Nearly ten percent (9.3) were referred for specialist support. The remaining children were

discontinued because they moved schools or for other reasons (Lee, 2009). Although results from the Progress in International Reading Literacy Study (PIRLS) 2005/2006 show that New Zealand's Year 5 students achieved well in reading, the wide range of results is concerning because it includes what is often referred to as a "long tail" of underachievement (Chamberlain, 2006). In the PIRLS study, at Year 5, 5% of girls and 11% of boys did not reach the *Low International Benchmark*, meaning that they could not, for example, "locate a specified part of the story… or reproduce explicitly stated information, particularly when it was located at the beginning of the text or in a clearly defined section" (Chamberlain, 2006, p. 23). The sociological data of the lower-achieving students point to inequalities in our education system and wider society: the children were more likely to be male and from lower socioeconomic backgrounds, and Maori and Pasifika children were over-represented (Chamberlain, 2006). This evidence is paralleled by the Annual Monitoring of Reading Recovery 2008 report, indicating that "…Asian and Pakeha/European students were more likely to have successfully discontinued their series of lessons than Pasifika and Maori students… (who were) more likely to be referred on for specialist help…(or) to have left their school before reaching the level required to successfully discontinue their Reading Recovery lessons" (Lee, 2009, p. 17).

Reading Recovery uses a whole-language, or "top-down" approach to literacy. Rather than teaching the skills for phonological decoding of unknown words, children are taught to use multiple clues to identify words (Greaney, 2002). This lack of letter-sound teaching is the main criticism of the Reading Recovery programme, and it appears that the significant proportion of children who fail to benefit are children who have scored lower on phonemic awareness and phonological skills (Greaney, 2002; Tunmer et al., 2008). Church (2005) argues that at least 20% of children fail to learn to read in a timely fashion using the whole-language approach, and attributes this to a failure to teach the component skills of reading to

the children who need it (Cosgrave, Bennie & Kerslake, 2002; Hiebert, 1994). Children with reading problems can be reliably identified at 7-8 years and spontaneous recovery after this time is extremely unlikely (Smart et al., 1996). It follows that children for whom Reading Recovery has failed need an intervention that focuses on mastery of the missing component skills of reading.

Building Decoding Fluency as a Reading Intervention

Williams (2002) investigated the phonemic awareness, decoding fluency and reading age of 8- to 9- year old children. Sixty-four children were separated, according to their ability, into two groups: Low Progress readers and Normal Progress readers. The Neale Analysis of Reading Ability (Neale, 1999) was used to measure reading ability, and the children in the Low Progress group scored on average 27 months behind children in the Normal Progress group. There were no significant differences between the groups according to gender and ethnicity. Williams measured their phonemic awareness using a short test based on the Queensland Inventory of Literacy (Dodd, Holm, Oerlemans & McCormick, 1996). Williams and Church then devised a timed two-minute test to measure decoding fluency. It was found that children in the Low Progress group had similar phonemic awareness skills to the children who were reading at the appropriate level for their age. Their decoding fluency, however, was significantly weaker than that of the normal progress readers. None of the readers who were significantly delayed were able to decode graphemes at the speed of 60 words a minute or more, whereas all except five of the children in the Normal Progress group were able to do so (Williams, 2002). Williams concluded that the ability to decode graphemes rapidly was the component reading skill lacked by many 8- to 9-year old children with reading difficulties, not phonemic awareness as had often been claimed.

Decoding fluency is positively correlated with word reading fluency (Olsen, Wise, Conners & Rack, 1990; Shankweiler et al., 1999) and with overall progress in learning to read (Juel, 1988; Jones, Torgesen & Sexton, 2001). As mentioned above, many studies have shown that oral reading fluency is an important marker characteristic of reading ability (Church, 2005; Fuchs et al., 2001; Hasbrouck & Tindal, 2006). Therefore, an intervention for older children with reading delays is more likely to be effective if it targets the specific skill deficit of reading fluency. To do this, the children whose decoding skills are less fluent must be given sufficient learning opportunities to build their decoding skills to a higher, functional level of decoding fluency. This appears to be about around 60-70 graphemes per minute. Although there are few studies that have evaluated programmes to build fluency, Table 1 summarises some interventions that targeted component reading skills. The most effective of these per unit of time was the intervention reported by Church, Nixon, Williams and Zintl (2005).

The Church et al. (2005) study was designed to find out whether building decoding fluency in older poor readers improved not only their decoding fluency but also their prose reading fluency. Children were referred by their teachers. The Neale Analysis of Reading Ability (Neale, 1999) was used to test reading age, and children were included who scored at least one year behind their biological age. The authors also screened for phonemic awareness using the Phonemic Segmentation test used by Williams (2002), including only those children who scored more than 30 out of 60 on this test. This screen was used to ensure that only those children for whom poorer decoding fluency was the reason for their delayed reading development were entered into the intervention. Ten participants from two local Christchurch primary schools met the inclusion criteria.

Table 1: Various interventions targeting specific reading skills.

Author(s)	**Question**	**Treatment**	**Effective?**	**Comments**
Ehri & Wilce (1983) "Development of word identification speed in skilled and less skilled beginning readers."	1. Are there differences in recognition speed between skilled and less skilled readers? 2. Does practice on CVC and nonce words improve reaction times?	1. Testing on reaction times of skilled and less skilled readers of CVC and nonce words. 2. Up to 18 practices of each word, with correction if incorrect.	1. N/A 2. No	Intervention duration: maximum of 2 hours. Failed to look at phonemic awareness; excluded children with 'inattention'; did not select appropriate words into stimulus set; did not provide enough practice time for improvement; did not look at generaliseability of skills.
Marholin et al. (1974) "Effect of two free time reinforcement procedures on academic performance in a class of behaviour problem children."	1. Is free time a reinforcer when contingent on academic accuracy? 2. Does reinforcement that is contingent on reading performance produce gains in other subject areas?	1. Giving 20 mins free time in a classroom setting when student achieved at least baseline median score during lesson. 2. Same as above, but randomly selecting before classes which subject area would result in free time.	1. Yes 2. Yes	Intervention duration: in class; approximately 4 hours. Shows that free time is a reinforcer for this group of children, who have both academic delays and behaviour problems; shows that speed is not affected when accuracy (in order to earn reward) improves (p. 878).
Denton et al. (2006). "Balanced, strategic reading instruction for upper-elementary and middle school students with reading disabilities: a comparative study of two approaches."	1. Does balanced, strategic reading instruction result in meaningful effects on the reading skills of older children with RD? 2. Does a greater degree of explicitness in comprehension strategy instruction lead to relatively higher gains in reading comprehension?	1. Decoding Intervention 'Phono-Graphix'. 2. Fluency Intervention: 'Read Naturally'.	1. Yes 2. Yes	Intervention duration: 120 hours. Participants had severe and persistent reading difficulties; found acceleration of learning that lessened the gap between participants and normally-developing children.
Jones et al. (2001). "Using computer guided practice to increase decoding fluency in learning disabled children: a study using the Hint and Hunt program."	What is the effect of teaching decoding fluency using a computer program to school-identified learning disabled children?	Daily practice on the 'Hint and Hunt' computer reading programme.	Yes	Intervention duration: 12.5 hours. Feasibility was high as used computer rather than tutor; participants generalised skills to other words not practised.
Church et al. (2005). "Building decoding fluency in 8- and 9-year old poor readers."	1. What is the correlation between phonemic awareness and reading ability and decoding fluency and reading ability in 8- to 9-year olds? 2. What are the effects of an intervention that works on decoding fluency deficits in 8- to 9- year old poor readers?	1. Testing on reading, decoding and phonemic scales. 2. Daily practice with a peer tutor on a list of 60 carefully-selected words.	1. N/A 2. Yes	Intervention: less than 3.5 hours to get children to required level of decoding fluency, with the whole intervention taking approximately 7 hours. Feasibility was high as used peer tutors rather than teacher time; materials were easily accessible; participants' gains generalised to prose reading.

The researchers introduced an intervention that specifically targeted decoding fluency. This was done over about four weeks, with 21 minutes of practice a day with peer tutors from the participants' classrooms. Specific activities included flashcards, reading racetracks and a game of SNAP! All reading activities centred on words from a sixty-word list compiled by the researchers. This list provided practice on 50 commonly occurring English graphemes. Each of 25 targeted consonants and consonant digraphs were present in two words in the initial position. Each of the 18 targeted vowels and diphthongs were present in two words in the middle position. Many of the targeted consonant graphemes also appeared in the terminal position. Words were limited to one-syllable words, with the exception of "video". Results showed that the children's prose reading fluency improved dramatically as a result of this intervention: from an average of 45 correct words per minute to almost 74 correct words per minute. They also had an average increase in comprehension age of 14 months (Church et al, 2005).

There were some inconsistencies in administration of the experiment. The time between intervention and follow-up was inconsistent across participants; the practice settings were inconsistent; the number of measures taken across participants varied and one child was also receiving extra reading tutoring for the duration of the experiment (Church et al., 2005). Overall, however, the intervention produced greater gains in decoding fluency and reading progress than any other intervention found on the subject. This experiment was a feasible intervention in a mainstream classroom setting, requiring very little extra teaching time or funds above those that would be normally allocated for each student.

Behaviour Problems

The relationship between behaviour problems and reading difficulties is well-known (e.g. Brier, 1995; Dishion, Loeber, Stouthamer-Loeber & Patterson, 1984; Fergusson &

Horwood, 1995). Children with behaviour problems are more likely to have difficulties learning to read, and children with learning difficulties are more likely to have behaviour problems (Fergusson & Horwood, 1995). Difficulties in learning to read and atypically high levels of antisocial behaviour, once established, can be highly stable (Smart et al., 1996).

Origins of Antisocial Behaviour in Children

Many labels have been applied to children who engage in elevated rates of antisocial behaviour: oppositional defiant disorder, conduct problems, early-onset conduct disorder, emotional-behavioural disturbance/disorder, antisocial behaviour, behaviour difficulties and so on. For the purpose of this paper, "developmentally inappropriate levels of antisocial behaviour" will suffice as it is broad enough to include most terms used by other researchers.

Over the past four decades, much research has examined the ways in which children develop antisocial behaviour, and there is now a detailed understanding of its trajectory (Cicchetti, Toth & Maughan, 2000; Patterson et al., 1990). For a list of the ecological and biological risk and protective factors for developing antisocial behaviour, see Table 2. However, the present study focuses on the social learning processes that lead to elevated rates of antisocial behaviour. "Antisocial development consists of thousands of trials in which dispositions, contexts, and life experiences reciprocally influence each other across time, canalizing pathways toward or away from chronic conduct-problem outcomes." (Dodge & Pettit, 2003, p. 358). During childhood, the immediate family is the main social environment. As the child grows, so the environment expands, but the main ecological contexts remain the parents, siblings, peers and teachers. The Oregon Social Learning Centre (OSLC) has provided detailed data on ways in which the moment by moment family interactions can train a young child to use antisocial behaviours (Patterson et al., 1990).

Table 2: Risk, Predictive and Protective Factors for Developing Conduct Disorder

	Ontogenic	Microsystem	Exosystem	Macrosystem	Chronosystem
Vulnerability Factors (enduring)	Difficult temperament Attention Deficit Disorder/Impulsivity Poor social skills Learning &language disabilities/delays Substance abuse Exposure to smoking or other teratogens in prenatal environment Male gender School failure Large size at age 3	Inconsistent, rejecting, and/or harsh parenting Unstimulating environment Parental conflict Low socio-economic status Mental health issues in parents e.g. depression Parental substance use/criminal behaviour Peer deviance Nonresponsive parenting	Aggression or bullying in classroom Ineffective teaching Poorly resourced or funded school Low level of school monitoring Poor quality early childhood out-of-home care	Culture that condones violence Community with few resources/low socioeconomic area Government policies that marginalise people suffering from poverty e.g. Matthew effect Television/film/computer game violence	Consistent exposure to vulnerability factors during early childhood Interaction of vulnerability factors over time e.g. poverty contributing to ongoing parental conflict Early-onset Amplification of effect through reciprocal influence
Challengers (transient)	Stressors e.g. being teased or bullied	Daily hassles Low level of parental/teacher monitoring Peers committing antisocial acts Coercive behaviour traps	Losing resources e.g. funding for community preventative programs	Recession	Convergence of factors at a particular point in time e.g. being bullied in an aggressive classroom with an inexperienced teacher who has ineffective discipline strategies
Protective Factors (enduring)	Good conflict management skills Close relationship with teacher/adult Skill or talent in a particular area Female gender Non-smoking mother Good early health/development	Consistent, caring discipline from parents Stimulating environment Warmth/nurturing parents	Supportive social network e.g. church, community center.	Social policies that support those at risk e.g. funding for effective interventions; policies that promote social equality	Intervention that have long-term effects
Buffers (transient)	Pride over accomplishment	Accessing parenting intervention	Accessing social support networks e.g. youth group	Reducing availability of illegal drugs	Accessing Interventions that have short-term effects

(Note summarised from Cicchetti et al, 2000; Webster-Stratton & Taylor, 2003; Wakschlag & Hans, 2002; Pettit & Dodge, 2003)

During the first four years of life, there are a number of markers which point towards a risk of antisocial development. Firstly, a child may fail to acquire age-appropriate levels of compliance. Data from direct observational studies in 12 countries show that rates of compliance for 2 to 3 years olds are around 72% (Whiting & Edwards, 1988). Parents who have not developed the skills to manage misbehaviour and establish boundaries are more likely to have aversive interactions with their children (Patterson et al., 1990). In fact, aversive interactions make up 10 to 15% of interactions in families with a child displaying antisocial behaviour, and preschoolers with antisocial development yell, tease or whine approximately twice as many times as their typically-developing peers – about once every two minutes (Patterson, 1982). Pro-social behaviour develops in young children through reinforcing responses from parents when the child displays desirable behaviour, and punishing responses when the child displays undesirable behaviour. Parents of children with antisocial behaviour tend to be non-contingent in their responses to their child's actions i.e. inconsistent and unpredictable. They also tend to be harsher, to have little positive involvement with the child, and to provide inadequate supervision and monitoring of their children (Patterson, 1982).

The effects of this style of parenting result in a higher rate of aversive interactions between family members, and children learn coercive strategies to either get what they want or, more commonly, to avoid something they do not want. Escape-conditioning, whereby a child behaves aversively (e.g. tantrums, crying, destruction) in order to avoid the unpleasant situation of having instructions given, characterises the skill repertoire of preschoolers with antisocial development. "In these families, coercive behaviours are functional. They make it possible to survive in a highly aversive social system" (Patterson et al., 1990, p. 265). Snyder and Patterson (1995) compared the conflict-resolution tactics of typically-developing children

and those with antisocial development. They found that for the children with antisocial development, coercive tactics worked more often than constructive tactics, whereas for the typically-developing children, constructive tactics worked more often than coercive tactics. This leads to a behaviour trap whereby the child repeatedly avoids demands made on them, often ones which would normally lead to important skill acquisition such as conflict resolution skills, homework and housework. Over many thousands of separate interactions, the child not only misses out on thousands of learning opportunities but coercive responses become increasingly entrenched. Thus the child develops two sets of problems: antisocial behaviour and a lack of pro-social skills (Patterson et al., 1990). Effective parents, on the other hand, avoid reinforcing child misbehaviour such as tantrums and whining, and intervene in such a way that the coercive behaviour ceases (Snyder & Stoolmiller, 2002).

When a child reaches the primary years, their antisocial behaviours begin to shape their social environment (Dodge & Pettit, 2003). Aggressive social interactions such as tantrums and hitting lead to rejection by pro-social peers, which in turn further reduces their opportunities to develop pro-social skills (Cantrell & Prinz, 1985; Dodge, Coie & Brakke, 1982; Patterson et al., 1990; Roff & Wirt, 1984) "Rejected children are also deficient in a number of social-cognitive skills, including peer group entry, perception of peer group norms, response to provocation, and interpretation of pro-social interactions" (Patterson et al., 1990, p. 265). An inability to manage appropriate classroom behaviour leads to missed learning opportunities and they are likely to fall behind in their academic skills (Patterson et al., 1990).

Not all the responsibility for a child's antisocial behaviour can be placed at the door of the parents and child; teachers treat children with antisocial behaviour more harshly than typically-developing children. They are less likely to support appropriate behaviour and more

likely to sanction inappropriate behaviour. They also have low rates of attending positively to children with disruptive behaviour even when those children display appropriate behaviour (Goldstein & Brooks, 2007; Walker & Buckley, 1973). There is potential to turn this around: school-wide changes in teachers' behaviour management practices have lead to a significant lowering in the amount of antisocial behaviour exhibited by children with behaviour problems (Nelson, 1996). In this way, the bidirectional relationship between the antisocial child and their social environment is demonstrated: social rejection by peers is both a result of and a contributing factor to aggressive behaviour. Failure to acquire academic skills is the result of an inability to self-manage, and a cause of later struggles when the child is further behind and finding the work too difficult.

Antisocial Behaviour and Reading Delay

As previously mentioned, there is a large overlap between antisocial behaviour and reading delay in children. In one study, boys with reading delay were three times more likely than their peers to have a disorder such as ADHD or conduct disorder (McGee, Williams, Share, Anderson & Silva, 1986). Both of these disorders are costly to the individual due to a greater risk for long-term outcomes such as unemployment, poverty, substance use, and criminality. They are also costly to society due to the cost to the welfare system, the health system and the justice system, as well as the victims of crime (Fergusson & Lynskey, 1997; Hinshaw, 1992; Morgan, Farkas, Tufis & Sperling, 2008). Morgan and his colleagues (2008) reported that a low score in first grade on self-regulation in learning strongly predicts later reading difficulties. They also found that reading problems in first grade moderately to strongly predict behaviour problems later. This implies that the children with behaviour problems are likely to also have reading problems, and vice versa. The correlations between the two are well-established, but the exact relationship and its implications are as yet unclear.

The nature of the correlation is complex, whether: reading problems cause behaviour problems; whether behaviour problems cause reading problems; whether there is a bidirectional relationship between the two; or whether both result from a common antecedent variable (Fergusson & Lynskey, 1997; Hinshaw, 1992). Is it more important to provide an intervention that targets behaviour, and hope that this results in better learning as well? Or, is it better to provide remedial teaching so that the child does not have to 'act out' in order to distract peer attention away from their lower academic achievement?

Hinshaw (1992) explored the issues surrounding the relationship between academic underachievement and antisocial behaviour. Firstly, he found that hyperactivity-inattention problems were associated with poor progress in primary school, but antisocial behaviour was correlated with academic underachievement in adolescents. During the early years, the strong relationship between cognitive deficits such as inattention, and externalising behaviour and poor reading progress suggests the presence of prior antecedent variables contributing to all domains (Jorm, Share, Matthews & Maclean, 1986; Kellam, Branch, Agrawal and Ensminger, 1975; McGee et al., 1986; McMichael, 1979; Richman, Stevenson & Graham, 1982; Palfrey, Levine, Walker & Sullivan, 1985;). No unidirectional causation models for reading problems or antisocial behaviour were supported when regression analyses controlled for other factors (Hinshaw, 1992).

The focus, then, must move towards identifying the prior indicators for both problems Although Hinshaw (1992) considers the variables of socioeconomic status (SES), familial factors, IQ, language skills, and neurodevelopmental delay separately, it is acknowledged that these factors interact and overlap during development. The evidence suggests these as causal variables, but it is more accurate to consider them predisposing, interacting factors, as none of them can individually be said to account for the co-morbid development of antisocial

behaviour and reading delay (Hinshaw, 1992; Moffitt, 1990; Olweus, 1983; Richman et al, 1982).

Smart and her colleagues (1996) sought to establish causality between reading delay and antisocial behaviour, as well as examining how stable the two disorders were over a two-year period between the approximate ages of seven and nine. Participants were children from the Australian Temperament Project (ATP), and were assigned, based on their scores on selected measures, into one of four groups: children with reading delay only, children with behaviour problems only, children with co-morbid reading delay and behaviour problems, and a group with neither problem. Children's reading was tested and their behaviour was assessed via parent and teacher reports. Firstly, they found that reading delay was very stable in their sample, but antisocial behaviour measures showed more variability. Their results indicated that reading delay did not cause behaviour problems, but the reading of the children with both disorders progressed more slowly than the reading of the children with reading delay only. The authors suggest that the problem behaviour of these children made their reading delay more pronounced. Gender was again a factor, in that most of the children in the group with reading delay only were girls; most boys had both disorders. Furthermore, most of the children with both disorders had histories that indicated early-onset behaviour problems which clearly pre-dated the reading delay. In fact, one quarter of the children in the cohort with behaviour problems at entry to school had behaviour problems two years later. They also found that attentional/hyperactivity problems were higher in the group with both disorders than in the group with behaviour problems only. Overall, they concluded that behaviour problems occur before reading delay, and behaviour problems make reading problems worse and may even cause reading delay. Although the authors also acknowledge that other factors, such as gender, SES, and family factors, are involved, they suggest that it is

in a mediating role rather than as a prior causative factor as argued by other researchers (Fergusson & Lynskey, 1997; Hinshaw, 1992; Morgan et al., 2008; Smart et al., 1996).

Fergusson and Lynskey (1997) sought to delineate the causation, if it existed, using data from the Christchurch Health and Development Study, which has examined the development of over 1200 children born in Christchurch in 1977. Around 13% of children were identified from testing at age 8 years as having reading delay. Conduct problems were assessed once every two years from age 10 through to age 16 using self-report, teacher-report and maternal-report measures. Information about possible confounding factors were also included in the data to be analysed, and these included: early childhood indicators of conduct problems and attentional difficulties, demographic factors such as maternal age and education, socioeconomic status, ethnicity, living standards, childhood disadvantage, avoidance of punishment, and maternal emotional responsiveness.

Unsurprisingly, they found that children with reading delay had significantly higher conduct problem scores on average. Gender and age, however, were both modifiers of the relationship, suggesting that boys' conduct problems were more likely to be exacerbated by reading delay. The authors then compared the reading-delayed and non-reading-delayed children according to social, family and individual factors. There were a number of disadvantages noted for the reading-delayed children that pre-dated the measurement. The children with reading-delay had: higher rates of conduct problems, higher rates of young mothers, mothers with poorer education, and low socioeconomic status. They also experienced higher rates of adversity, exposure to punitive mother-child interactions and lower standards of living (Fergusson & Lynskey, 1997). When all these were included in the analysis, it was found that "after adjustment for confounding factors there was little evidence to suggest statistical associations between reading delays and later conduct problems…the

covariate factor that consistently emerged as a predictor of later conduct problems was conduct problems at the age of 6 years" (Fergusson & Lynskey, 1997, p. 904). They did, however, find a correlation between conduct problems at age six and reading delay at age eight, and suggest that this may be due to common antecedent variables during early development. The authors concluded that reading delay does not cause later conduct problems, but that the two have many early risk factors in common.

Effective Interventions for Antisocial Behaviour in the Classroom

Functional assessment of disruptive behaviour and antisocial behaviour in the primary school classroom confirms that such behaviour is very frequently maintained by the positive reinforcement and negative reinforcement which it produces for the misbehaving child (Heckaman, Conroy, Fox & Chait, 2000). It is not surprising, therefore, to find that the interventions which have been shown to be most successful are those in which appropriate behaviour results in reinforcement and inappropriate behaviour results in extinction, escape extinction, time out or response cost contingencies.

The simplest way of changing the classroom contingencies for pro-social and antisocial behaviour in the classroom is differential attention. With differential attention the teacher attends to the child in a positive manner when they are behaving appropriately, and withdraws this attention whenever the behaviour becomes inappropriate (Walker et al., 1997; Webster-Stratton & Reid, 2002). It has been consistently found that when teachers attend more than 50% of the time to appropriate behaviour rather than misbehaviour, the level of antisocial behaviour is reduced even in children with ongoing conduct problems (e.g. Sutherland, Wehby & Copeland, 2000; Wood, Umbreit, Liaupsin & Gresham, 2007).

In cases where differential attention fails to provide sufficient motivation for prosocial responding to academic demands, positive reinforcement in the form of contingent rewards or

contingent access to desired activities has been found to be highly effective (e.g. Baer, Fowler & Cardin-Smith, 1984; Marholin, McInnis & Heads, 1974).

These contingency changes have been introduced in the form of a game. For example, the Good Behaviour Game devised by Barrish, Saunders and Wolf (1969) consists of breaking the class into teams. Behaviour goals are set and defined, and teams' behaviours are monitored throughout the day. Children who behave inappropriately receive a check against their team on a visible board. Teams with low numbers of checks are rewarded at the end of the day. A review by Tingstrom, Sterling-Turner and Wilczynski (2006) found that the research base for its effectiveness is strong. There are a variety of ways that the Good Behaviour Game can be implemented, but the mechanisms remain the same. Reinforcers, team competition and peer pressure combine to motivate students who are usually disruptive to curb their behaviours in order to 'win' the game. A disadvantage for this intervention is that the peer pressure from the other children in a team towards a disruptive child to try and influence them to behave pro-socially may begin to verge on harassment (Tingstrom et al., 2006).

The research into differential reinforcement for pro-social behaviour in the classroom shows that positively attending to appropriate behaviour, reinforcement for appropriate behaviour, consistent consequences for inappropriate behaviour, interdependent reward systems for appropriate team behaviour and systematic monitoring and feedback systems can all be used to motivate children with behaviour problems to behave prosocially.

Peer Tutoring as an Intervention

Church et al. (2005) successfully paired normal- to high-progress readers with low-progress readers to implement their intervention. As mentioned above, the number of learning opportunities available to each child is a key factor in the process of learning to read – normal-progress children tend to read many more words on a daily basis than their low-

progress peers. Any intervention that targets reading delay needs therefore to provide many more learning opportunities for the delayed reader if they are to “catch up”. Given that most classrooms have 20 to 30 pupils, it is not possible for a class teacher to provide individual children with additional teacher-supervised reading practice daily. Peer tutoring is an effective alternative teaching technique commonly used in classrooms to optimise one-to-one teaching and learning time, and has benefits both for the learner and the tutor. These include increased time spent on task, a greater number of learning experiences and immediate feedback on academic performance (Fuchs, Fuchs & Kazdan, 1999; Spencer, 2006). It generally consists of pairs working together to teach each other material that their class teacher has set up for them to learn and is often used, with good effect, for children who underachieve academically (Falk & Wehby, 2001).

Spencer (2006) reviewed the use of peer tutoring with children with emotional or behavioural disorders, both as the tutor and the tutee. Research studies were included from mainstream schools and special schools, and the author used a wide definition of EBD to include as many studies as possible. Peer tutoring arrangements could involve same-age or cross-age peers. Thirty-eight studies published between 1972 and 2003 were examined. Around three-quarters of these studies were set in public schools (state schools), and 526 of the 982 (54%) of the tutors had some form of EBD. On average, the tutoring sessions occurred four times per week, for 23 minutes a day, on subjects that included math, reading and social studies. Thirteen studies yielded calculable effect sizes, with an average positive effect of 0.72. Seventeen reports were set in elementary (primary) schools, with eight of them targeting reading. Peer tutoring was generally found to be effective. All but one study reported increased reading scores on general or specific tasks associated with reading. Many also reported observing positive social effects. Overall, peer tutoring involving children with

EBD was found to be an effective strategy for learning with possible additional social and behavioural benefits (Spencer, 2006).

An after-school programme was the setting for one study examining both contingent rewards, peer tutoring and paired instruction for ten at-risk pupils aged 9- to 11-years old (Gardner et al., 2001). Direct Instruction in reading was delivered by one-to-one coaching from adults, but the math component was taught via reciprocal peer tutoring, using timed tests, over three months. The educators gave group rewards for students staying on-task throughout the day's programme. Seven out of 10 students made gains in multiplication fluency to over 50 correct answers per minute. Although the academic gains in this evaluation were significant, they were made in the context of a complete programme with a large number of variables, so the attributable gains to the peer tutoring are unknown.

Sutherland and Snyder (2007) tested the effects of reciprocal peer tutoring and self-graphing on the reading fluency, disruptive behaviour and active responding of four children, aged 11-13, with EBD. Because research has found that the relationships between members of a dyad in peer tutoring situation can be problematic when randomly assigned (Pomplun, 1997; Slavin, 1994; Sutherland, Wehby & Gunter, 2000), the classroom teacher used academic achievement data as well as social competence and observation data to group each child into an intervention pair in which they were likely to work well. The method used was based on Peer-Assisted Learning Strategies (PALS), a well-supported peer tutoring intervention that uses structured activities, frequent interaction, and feedback during learning (Fuchs et al., 2001b). A multiple-baseline-across-participants design showed that the effects on the children's disruptive behaviour were mixed: two children showed a downward trend in the number of disruptive behaviours per minute, while the data of the other two was largely stable. Overall, active responding increased during the intervention phase across all participants. The academic goal for reading fluency was an increasing trend averaging 1.39

more words read correctly per minute each week – a “typical” rate of reading progress (Deno, Fuchs, Marston & Shin, 2001). All four participants exceeded this goal, but follow-up data revealed that the effects were not maintained. Three out of four of the children’s error rate trends decreased during the intervention phase. Overall, the intervention showed that active responding and reading fluency can be increased, and disruptive behaviour decreased, in students with EBD, using a peer-tutoring method. However, the authors suggest that in order for the gains to be maintained, the intervention needs to remain in place in the classroom.

Spencer, Scruggs and Mastropieri (2003) investigated peer tutoring and traditional instruction methods to teach social studies to 30 children with EBD in a North American middle school. A crossover design was used, where peer tutoring, using explicit strategy instruction, was used for two weeks, and alternated with traditional teaching methods for two weeks, to teach material in the school’s social studies textbook. In this way, each student served as their own control. The peer tutoring methods used included rules, how to identify and correct errors, and checklists for self-monitoring. The traditional teaching methods included teacher-led discussions, round-robin reading and videos. Outcomes were measured using pre- and post-chapter tests, quizzes, and children’s use of summarisation skills. Observational methods were used to provide data about on-task behaviour. Before the peer tutoring condition was implemented, two lessons were used for the class teacher to teach the children the procedures. Dyads were grouped according to reading ability and teachers’ judgement – and altered if pairings proved unsuitable. Results on all quantitative measures showed improved scores during the peer tutoring condition. Weekly quiz scores and multiple choice scores were higher, as was the average time spent on-task in each lesson. The students and teachers also reported higher levels of satisfaction and enjoyment during the peer tutoring condition. The authors report that peer tutoring is a “powerful” tool for improving comprehension of material in the classroom (Spencer et al., 2003, p. 90). They also note that

key features of the success of peer tutoring, especially when working with children with EBD, are making sure that the dyadic pairs are suitable and providing sufficiently close monitoring of interactions during the lessons.

Overall, peer tutoring when used with children with antisocial behaviour in the school setting appears to be an effective teaching method (Gardner et al., 2001; Spencer, 2006; Spencer et al., 2003; Sutherland & Snyder, 2007). However, a couple of issues are apparent. Firstly, the pairs or groups used must be chosen carefully, as problematic relationships between children who are supposed to be helping each other will lead to less work being done and more disruptive classroom incidents. For children with EBD, this can be especially difficult due to their less-developed social skills. Secondly, long-term benefits of peer tutoring in the classroom are unclear: both studies reviewed here showed increased rates of learning during the peer tutoring intervention phase, but this ended after two or four weeks. Sutherland & Snyder's (2007) work showed that the gains were not maintained, while Spencer and her colleagues' (2003) design did not allow for follow-up data to be gathered. Perhaps the highly-structured nature of effective peer tutoring strategies reviewed here lends itself to short-term teaching bursts of specified information rather than ongoing, open-ended progress in wider academic domains.

Summary and Statement of Research Objectives

The process of learning to read requires a child to master a specific set of component skills. These are built cumulatively, and include: discriminating between the letters of the alphabet, phonemic awareness (aural discrimination of the English phonemes), decoding skills (knowledge of grapheme-phoneme equivalence relations or sounding-out skills), decoding fluency, a sight word vocabulary of sufficient size and oral reading fluency. This last feature of competent reading, oral reading fluency, is a key indicator of overall reading ability. For children who have been at school for four years, the average reading fluency is

around 120 words per minute, and the average decoding fluency is around 60-70 correct graphemes per minute.

Children who learn to read along a typical developmental trajectory acquire these component skills as a matter of course in their early years at primary school. However, some children fail to acquire one or more of these component skills and thus do not learn to read in a timely fashion. Neurodevelopmental differences in brain structure may account for some of these children's problems, and provide support for the argument that effective remediation of reading delay at an early age is vital. In fact, the development of the affected neural areas is improved by evidence-based reading interventions.

A lack of learning opportunities may also account for the variation in rates of learning to read. Hart and Risley's (2003) recordings of the differences in verbal interactions for very young children based on social class highlights the massive cumulative effects of an ongoing social disadvantage. Reading progress is likewise positively correlated with the number of learning opportunities a child receives on a daily basis: The Matthew Effect in reading is clear.

Data from the annual Reading Recovery report suggest that the programme is successful at remediating the reading of up to about 83% of referred children. Recovery for the children for whom the programme does not succeed, however, is unlikely. The PIRLS report revealed that 5% of Year 5 girls and 11% of Year 5 boys did not reach the *Low International Benchmark* for reading in 2005/2006 (Chamberlain, 2006). Reading Recovery's main weakness is that it does not teach decoding skills – a weakness of most children who fail to respond. Thus, effective interventions for those children who are unresponsive to Reading Recovery should comprise the teaching of the missing component skills of reading.

Church and his colleagues (2005) trialled an intervention targeting the component skill of decoding fluency in 8- to 9- year old children with reading delay. Williams (2002) had found that the main feature distinguishing normal-progress readers from low-progress readers was their low score on a decoding fluency test. The decoding fluency intervention produced significant gains in decoding fluency and this generalised to improved prose reading fluency in nine out of 10 of the participating children. The intervention proved to be feasible and effective in a mainstream classroom setting.

Reading delay is one of the most common childhood disorders, and antisocial behaviour is another; the large overlap between the two is also well-known. Antisocial behaviour begins to develop in children from a very young age, often before they arrive at school. Research shows that aversive interactions between family members of a child with antisocial behaviour occur at much higher rates than in families of typically-developing children. On entry to school, the social environment responds to antisocial behaviour in ways which often function to reinforce this behaviour. This makes it less likely that the child will learn prosocial behaviours such as sustained attention to classroom tasks with the result that academic development is also delayed.

The relationship between antisocial behaviour and reading delay is not yet entirely clear: there are many variables, changing over time and context and influencing the development of both. It appears that reading delay and antisocial behaviour in children develop from a number of environmental factors that are interacting with each other, the child and the responses of teachers and parents.

Peer tutoring has been used effectively in remedial teaching and has a number of benefits for the learners. A number of studies have demonstrated that peer tutoring can work with children with antisocial behaviour.

It is essential to provide effective interventions for children with co-morbid reading problems and antisocial behaviour. Both problems have a high prevalence and the combination of the two places a child on a trajectory with poor outcomes both for that child and for society as a whole. At this stage, programmes such as Reading Recovery are not meeting the learning needs of a significant proportion of children in New Zealand/Aotearoa. It is possible to identify the strengths and weaknesses of children with reading delay – whether it is letter-naming, phonemic awareness, decoding skills, decoding fluency, a sight word vocabulary of sufficient size and/or oral fluency. Church and his colleagues (2005) implemented an intervention that effectively remediated the reading of older children whose decoding fluency was lower than that of their same-age peers. Given that children with behaviour problems are more likely to have reading delay than typically developing children, it is important to trial interventions that will address their academic needs. Therefore, the present study aims to replicate the findings of Church et al., using the same methods, in a group of children with persistent behaviour problems. However, children with behaviour problems can be more difficult than their typically-developing peers to engage in an intervention that aims to accelerate academic achievement. Any work with children with elevated rates of antisocial behaviour must take into account that they may be more difficult to manage than children with reading delay only. Thus, the intervention must be designed so as to manage inappropriate behaviour while also maintaining motivation. Therefore, the aims of the present research were twofold:

1. The first aim was to replicate an intervention designed by Church et al. with children with antisocial behaviour. This entailed identifying children who met three criteria. These were (a) a phonemic awareness score above 35 correct sounds out of 60 on a Phonemic Segmentation Test (Williams, 2002), (b) a decoding fluency score below 60 on a Decoding

Fluency Test (Williams, 2002), and (c) a teacher report that the child had persistent behaviour problems.

2. The second aim was to explore the question of whether children who have both reading delay and a disruptive behaviour disorder require a reinforcement scheme to maintain engagement in a system of peer supervised learning activities.

Chapter 2

Method

Experimental Design

The present research took the form of a single case generalisation experiment in which the effects of training decoding fluency were measured on both decoding fluency and reading fluency. The experiment was replicated across six primary school students with persistent behaviour problems.

Participants

One Decile 2 primary school in Christchurch was approached and asked if they were interested in participating in the proposed research. After indicating they were, preliminary discussions indicated that the school had sufficient numbers of children with both difficulties in both reading and behaviour, so no further schools needed to be approached. In order to maintain the feasibility of the study, only one school was approached. The school's most recent Education Review Office report indicated that the ethnic composition of the school included around 50% who identified as Pakeha/New Zealand European, and about 40% who identified as Maori or Pacific Islanders.

Recruitment of teachers

Although the principal and the deputy principal of the School had given verbal agreement to the research in late 2009, it was not until May 2010 that a formal meeting was held to discuss the proposed project with the Year 3/4 syndicate teachers. During this meeting, it became apparent that the teachers of the students with whom the research would be conducted had a number of issues. First, they felt that children might miss out on valuable reading time. One teacher commented that she only allocates one hour to teach literacy daily

and that the intervention group would take up half of this time. Secondly, they thought that the children with behaviour problems would not cooperate with the initial baseline testing procedures because they would “take one look” at the texts and decide that they were too hard. Thirdly, they felt that the children’s self-esteem would suffer from finding the testing procedures too difficult. Fourthly, they were concerned that the children’s behaviour would be unsettled when they returned to class after the group, and that they would then have to spend time re-settling the children instead of teaching. Fifthly, these teachers believed that running records on unseen materials were poor practice as an assessment method, and would be too daunting for children who were already aware of their reading problems. Lastly, the teachers expressed the view that the researcher would be unpractised in conducting Running Records, and would do a poor job.

Each concern was discussed and addressed as far as it could be. The researcher’s Curriculum Vitae was sent to the syndicate leader to provide her with some information about background experience in the management of children with severe behaviour difficulties. It was explained that the test results found by the research would not be used in the school’s reporting, so any methodological flaws would not affect their own educational data. Finally, they were reminded that if at any point they were dissatisfied with the way the research was being conducted, they could withdraw their consent and the intervention would be abandoned. After consideration, all four teachers gave their informed consent to the project.

The teachers were asked to nominate children whom they considered to be at least a year behind in reading, and who were engaging in persistent disruptive behaviour. Eleven students from the approximately 100 children in the four classrooms were nominated for screening, and the series of tests for recruitment were administered individually to each child during late June 2010, before parental consent was sought.

Recruitment of participants

The information sheet for the parents of the target children explained that their child had been selected for a reading programme for children who have good phonetic skills but who are still reading slowly, and who have behavioural difficulties. Everyday language was used to explain what the intervention would involve and how long it would take. It was made clear that their child's reading would be tested a number of times during the intervention, and an offer to explain the procedures in more detail was made.

Verbal consent from participating children was obtained during the baseline testing phase, and then formal consent was given on the first day of meeting together as a group for the intervention itself. Although information sheets and consent forms were given to the children, the researcher read them aloud, and had a discussion about what it meant in language that the children understood. They were encouraged to ask questions if they did not understand. Participants and peer tutors gave consent together, and their roles, as well as what to expect during the reading group, were explained fully. It was reiterated a number of times to the children at this stage, and later during the intervention, that they could withdraw their consent.

Children were selected into this study if:

(a) They scored more than 35 out of 60 on the Phonemic Segmentation Test described below,

(b) They scored less than 60 correct responses per minute on the Decoding Fluency Test described below,

(c) Their reading age for reading rate was 12 months behind their actual age as measured on the Neale Analysis of Reading Ability, and

(d) They scored at or below 106 on the Canterbury Social Development Scale (CSDS) for Year 1 to 4 students.

Eleven students were tested, and ten met inclusion criteria. All students were given two stickers and a reward for participating in the testing, which took approximately 30 minutes. One included child was one point above the cut-off score for behaviour problems. Consent forms and information sheets were sent to the parents of all ten children. Parental consent was initially obtained from the parents of four children (Group 1), so a group was started with these participants towards the end of August 2010. During this time, a further three consents were obtained, and a second group (Group 2) began once the first had finished, in October 2010.

Ethical approval for the research was obtained from the University of Canterbury Educational Research Human Ethics Committee in May 2010. An information sheet and consent form was given to the school's principal, deputy principal, relevant teachers, parents of the peer tutors, parents of the target children, as well as the potential participants and potential peer tutors themselves. These information sheets are reproduced in Appendix 1. The information sheet for the teachers described the purpose of the project, the activities involved, the time frames that were expected, and what would happen if a reading pair failed to develop a positive working relationship. Each information sheet included two footnotes, one stating that the research had obtained ethical approval, and one giving the contact details for the Chair of the Educational Research Human Ethics Committee, in case of complaint.

The demographic characteristics and pre-test scores of the seven children who were recruited into the present study are summarised in Table 3. Each child was assigned a codename to protect his or her anonymity. In conversations outside the school environment (e.g. with the research supervisors), these names were used to refer to the children. The

master list that identified participants was kept in a locked safe at the University of Canterbury.

Table 3: Demographic characteristics and pre-test scores for the seven participants

	*Eth-nic-ity**	*Gen-der*	*Year/ Class*	*Age* Y:Mo	*Phon-emic Segment-ation* (Correct Sounds/ 60)	*Decoding Fluency* (Correct responses/ min)	*Neale* Accuracy (read-ing age)	*Neale* Compre-hension (reading age)	*Neale* Rate (read-ing age)	*CSDS*
Sophie	P	F	4/2	8:4	59	24.5	6.9	7.1	7.0	107
Isaiah	M	M	3/1	7:11	48	19.5	6.0	<6*	6.8	77
Emily	P	F	3/1	7:11	45	18	6.0	<6*	6.3	64
Jesse	P	M	3/2	7:8	38	8.5	<6*	6.2	<6*	95
Josh	P	M	4/3	8:3	53	19.5	6.5	6.11	6.11	105
Jamal	P.I	M	3/1	7:3	49	8	<6*	<6*	<6*	67
Randall	P	M	4/3	8:9	42	32	6.7	6.5	7.3	74

*P=Pakeha, M=Maori, PI=Pacific Islander

Randall was initially tested at the end of June, but did not begin the intervention until October. It was noted at the time of baseline testing that he read quickly, occasionally skipping lines and had difficulty grasping what to do in the phonemic segmentation test. However, the first day of intervention showed that his reading had improved greatly; his reading of the practice flashcards was fluent, and he could read all of them in less than the goal rate of 15 seconds per list (> 60/min). The probe test revealed that his prose reading fluency was 69 words per minute. He and his teacher were informed that due to his excellent

progress, he no longer met the criteria for the intervention, so he was returned to the classroom and was excluded from the study.

The Canterbury Social Development Scale reproduced in Appendix 4 asked teachers for any information they were aware of regarding pupils' mental health diagnoses and whether they receive any extra educational funding. A summary of the information provided is given in Table 4.

Table 4: Teacher-reported additional information

Name	*Information reported, if any*
Jamal	English a second language. Receives ESOL tutoring. Currently receives RTLB assistance.
Emily	Currently receives RTLB assistance.
Josh	No issues reported.
Randall	No issues reported.
Isaiah	Has received RTLB assistance in the past but not currently.
Sophie	No issues reported.
Jesse	Currently receives RTLB assistance. Diagnoses include Dyslexia and Dyspraxia. On medication for Attention Deficit/Hyperactivity Disorder

Recruitment of peer tutors

Teachers nominated children whom they deemed suitable to be tutors, and seven information sheets and consent forms were sent home during July and August 2010. There were no formal inclusion criteria for the tutors, but the teachers were asked to suggest children with well-developed social skills and at least average reading ability. The parents of peer tutors received a similar information sheet to the parents of the participants, but

explaining that their child would participate as a peer tutor and no data would be gathered about their child. All children who were nominated by their teachers as peer tutors returned their consent forms signed by parents.

Setting

The intervention setting agreed to by the deputy principal was an unused classroom. For the first group, consisting of Emily, Isaiah, Sophie and Jesse, and their peer tutors, this was changed a number of times from Session 1 to Session 5 because the assigned room was sometimes booked by other groups. On these occasions the school library was used. From Session 6 onwards, the group met consistently in a back room off a teaching block. This room was adequately lit and ventilated, and was furnished with two tables and four chairs.

Pre-test, post-test and follow up testing were all conducted in one of two small offices off the classrooms. The rooms were adequately lit and ventilated, but there was considerable classroom noise during testing, and occasional interruptions from children or teachers needing to come through the rooms. All testing was conducted in the mornings.

Measurement Procedures

Neale Analysis of Reading Ability

The Neale Analysis of Reading Ability (Neale, 1999) was administered pre- and post-treatment. The Neale test consists of six passages at increasing levels of difficulty, with a choice of two practice passages, and comes in two forms. Form 1 was used at the pre-test measure and Form 2 was used at the post-test measure. The child is asked to read each passage aloud, and to try to remember what they read. Their performance is timed and their mistakes recorded and coded. The child is asked comprehension questions straight after they have finished. The child progresses through the passages until they read one that is too

difficult for them (i.e. they make more than 16 errors on test levels 1-5 and more than 20 errors on text level 6). Scores are derived from the passages which have been successfully read, according to norms for each year of schooling. The Neale was chosen because the norms are based on an Australian sample and this was deemed to be more similar to an Aotearoa/New Zealand context than any other measure. It is also reasonably fast to administer (about twenty minutes), and has adequate reliability and validity (Neale, 1999). It provides percentile ranks, stanine scores, and reading age equivalents for reading accuracy, reading rate (fluency) and comprehension.

The Neale is scored in three parts. Firstly, the number of errors for each text level read is counted and then subtracted from a total of 16 for each level passed up until level 6. For the text level 6, the number of errors is subtracted from 20. These remaining numbers are added together to give a raw score for accuracy. Secondly, the numbers of correctly answered comprehension questions for each text level are added together, giving a raw comprehension score. The comprehension questions are only asked if the child has passed the text level. Thirdly, each text level is timed by the tester, and the time recorded in seconds for each passage. These are added together to give the total time. The words from each passage that the child has passed are added together to give a total number of words read. The total number of words read is divided by the total number of seconds and the answer is multiplied by 60, giving a raw reading rate score. Raw scores are looked up in the norm tables at the back of the Neale manual, which provide reading ages, percentiles and stanine scores for each year of schooling from year 1 to year 8.

The Neale was used in selecting participants. Each child whose reading rate score on the Neale placed her or him at 12 months or more behind their biological age at the time of testing was included.

The Neale was also used to track the participants' progress from pre-intervention to post-intervention. Form 1 of the Neale was administered to all the participants in June 2010. Form 2 was administered to Group 1 at the end of October 2010, and to Group 2 in December 2010. Scores from this provided pre- and post-intervention measures of reading accuracy, reading comprehension and reading rate for all participants.

Phonemic Segmentation Test

The Williams' Phonemic Segmentation Test (Williams, 2002) was administered pre-treatment only. This test is reproduced in Appendix 2. It was devised to measure phonemic awareness in children, and is based on the Queensland Inventory of Literacy (Dodd, Holm, Oerlemans & McCormick, 1996). In the present project this was used as a screening test to ensure that all children had acquired sufficient phonemic awareness to profit from the proposed intervention. This test was administered as follows. After the procedures were explained to and practised by the child, 16 words (consisting of nine real words and seven pseudo-words) were said aloud to the child. After each one the child was asked to break the word into its component sounds. For example, the word "big" becomes "b – i – g". Each word was scored by counting the number of spoken sounds correctly identified (with 60 being the highest score possible). The cut-off point was set at 35 because Church et al. (2005) found that a participant who scored below this did not benefit from the proposed intervention, and in hindsight should not have been included.

Decoding Fluency Test

The Decoding Fluency Test (Williams, 2002) was administered both as a selection test and regularly throughout the intervention sessions and at follow-up. This test (which is reproduced in Appendix 3) was devised by Williams (2002) and consists of 45 words (repeated twice and in random order) and pseudo-words in rows on an A4 sheet. The first

time it was administered, children were given practice with a list of ten words until they understood what they were to do. They were asked to read the words as quickly as they could for two minutes, when the tester told them to stop. If they came to a word they did not know, they were to just say “don’t know” and proceed to the next item. The children were instructed to read the words in order, and if they read through the whole 90 words in less than two minutes, the time taken was recorded and the correct graphemes-per-minute score was calculated. Because it was regularly administered throughout the intervention, children were asked to start on a different line each time to minimise practice effects. The Decoding Fluency Test was administered approximately twice weekly during the intervention, after the day’s practice session. For the first group of children (Emily, Isaiah, Sophie and Jesse), this test was administered irregularly for the first two weeks of the intervention, due to difficulties negotiating suitable times and venues.

Running Record of Oral Reading

A simplified version of the Running Record of Oral Reading (New Zealand Ministry of Education, 2000; Blaiklock, 2004) was administered regularly during the treatment, as well as at follow-up. The form used for the present investigation asked the child to read a passage that they had not seen before at a level which they could read with 90-95% accuracy. To calculate both reading fluency and reading accuracy, these Running Records were timed for two minutes, and each error was recorded. For the present investigation, errors were recorded, but not coded, and an error rate and prose reading fluency rate were calculated. Running records were collected after the day’s practice session. Running records were administered irregularly for the first two weeks for Group 1 owing to timetabling problems. In order to calculate the appropriate reading level for each child, teachers were asked at which level the children were reading. Because the teachers were using different testing methods for calculating the appropriate instructional level, it was found that only one of the

children could read his text with at least 90% accuracy. The researcher then lowered the levels until an appropriate level for each child was found, and books were used at this level for the remainder of the running record measures. Many of the books at the lower levels were short enough to be read in one or two two-minute reading tests, and many of the books at these levels had been read before by the children, so a large number at each required level were obtained from the University of Canterbury Education Library. Even within one level, however, the text difficulty varied considerably.

The Social Development Scale

The Social Development Scale (Church, Tyler-Merrick & Hayward, 2006) was administered pre-intervention. This is reproduced in Appendix 4. This provided an independent measure, aside from the teacher's referral, of each child's behavioural difficulties. Although behaviour problems exist on a continuum, a cut-point of 106 was used to distinguish children with antisocial development from those with typical development. The SDS was completed by the child's classroom teacher. This screening measure was chosen because it was developed for the use of teachers in New Zealand classrooms, it has positive items as well as negative items and it only takes about ten minutes to complete (Church et al., 2006).

Teaching Materials and Procedures

Teaching materials

Reading activities centred on words from a 60-word master list, broken into four sub-lists, compiled by Nixon (2005) and Zintl (2005). The 60 words on this list contained 50 commonly occurring English graphemes. The 60 words are reproduced in Appendix 5. Each of 25 targeted consonants and consonant digraphs were present in at least two words in the

initial position. Each of 18 targeted vowels and diphthongs were present in at least two words in the middle position. Many of the targeted consonant graphemes also occurred in the terminal position. The words were limited to one syllable, with the exception of "video". All words were high frequency words. The stimulus set consisted of the four word lists described above (A1, A2, B1 and B2), four reading racetracks, one to match each list, and two decks of SNAP! cards. One deck of SNAP! cards (Set A) contained the words from lists A1 and A2, and the other (Set B) consisted of the words from B1 and B2.

Teaching activities

There were three practice activities. Each pair had a "kit" that contained the practice materials, which were all on laminated white paper and came in a zip lock bag with a stopwatch. The first activity was reading from flashcards, where the participant read each word either silently or aloud from a deck of 15 cards. A sample of these is reproduced in Appendix 6. All children chose to do this activity with their peer tutor either just watching, or watching and timing them. The second activity was a 'reading racetrack', where the target words were written on a 'racetrack' card. This is reproduced in Appendix 7. The participants read each word aloud until they completed the circuit, and this was timed by the peer with a stopwatch. The aim was to reduce the time to get around the whole circuit. The third activity was the game 'SNAP!' played in the conventional way, except that instead of matching words, the players were taught to identify the matching sound in the two words in order to pick up the pile (e.g. snapping "fly" and "prize" was allowable because both words contain the long "i" sound).

The peer tutors were given stopwatches, and taught how to use them. Participants were also shown how to use them, and although this was not directed from the researcher, this practice became reciprocal. As well as the peer tutor timing the participant, the participant

timed the peer tutor on reading the words. These measures were not used as data, but merely to indicate to the researcher when the participant might be ready to move on to the next practice list (i.e. reading the list in <15 seconds). During the practice sessions, participants and peer tutors were instructed to approach the researcher if the participant could read the list he or she was working on in less than 15 seconds. The researcher then checked the time of the team member, and either allowed moving on to the next list or directed them to further practice. In most cases when the pairs approached the researcher, the check revealed that the participant was making errors on the word lists. The peer tutors did not always correct participants' errors during practice. Further checks were also necessitated by the peer tutors' and participants' inaccurate use of the stopwatches.

It was intended that each activity be practised for seven minutes. The researcher set an oven timer for seven minutes at the beginning of the flashcard activity. When the timer rang, all pairs put away their flashcards and set up SNAP!. The researcher then reset the timer for another seven minutes. This was then repeated until the three practice activities were completed. All the pairs worked to the same schedule.

Each participant had a folder in which their decoding fluency tests (named and dated), reading book and running records were kept throughout the intervention. The probe testing was conducted by the researcher at the end of the day's practice session, in the same room. Two children (alternating, so each child was tested approximately once every second session) were kept behind for about ten minutes, and one was given some toys to play with quietly while the other child was tested, and then they changed places. The toys were an intriguing set of magnets and some Lego sets. Testing took about five minutes per child. If there was a disturbance that interfered with the child's reading, such as an aftershock or a loud noise that frightened them, the test was restarted on a different section of the book. The team members chose two stickers after each testing session, including post-intervention and follow up.

Schedule of Events

The week before the intervention commenced, the peer tutors were taught how to use the practice materials. At each daily practice session, each participant and peer tutor pair practised for seven minutes on each activity, four days a week. The first activity was flashcards, followed by SNAP! and the reading racetracks. The intervention lasted 19 practice sessions for Group 1 and 15 practice sessions for Group 2. At the beginning of the intervention, all participants used the A1 set of words for the flashcard and reading racetrack activities, and the A1 and A2 sets for SNAP!. Once a participant had shown they could read all 15 A1 words in fifteen seconds or less, he or she moved on to the next list for the reading racetrack and flashcards. When he or she had attained the criterion score for lists A1 and A2, they moved on to Set B1 then B2 of the racetracks and Set B of the SNAP! cards. Once the team members showed that they had mastered all sets of words, they chose which list(s) they wished to use for each activity.

During the intervention, teachers were asked to continue 'teaching as usual' during class time, and not introduce any new behavioural or learning interventions of their own through the four or five weeks of the experiment. It was not possible to ensure that the children did not experience any extraneous teaching of reading (e.g. RTLB assistance, which three team members received before and during the intervention phase), but it was assumed that this was not qualitatively different in any way from that which they had experienced prior to the intervention period.

Group 1 commenced the practice sessions on August 30 2010. The time agreed to by the teachers was straight after the lunch break. Session times were changed from Session 6 onwards to being first thing in the morning: 0915 – 0945. Practice sessions were held for approximately half an hour four days per week. The September 4th Canterbury Earthquake

occurred after five practice sessions, and seven school days were missed. Although the intervention recommenced after the break due to the earthquake, it was further disrupted by the school holidays. Six more practice sessions were held before the school holidays. Practice was resumed in the fourth school term for a final eight sessions. The peer tutors for Group 1 were removed by the school for the last five sessions, as all tutors were part of another school programme that overlapped with the intervention times. This meant that the participants had to complete the usual practice activities with each other in pairs from Session 15 to Session 19. Post-intervention testing occurred on October 27, 2010. During this, the Neale Form 2 was administered, as was the Decoding Fluency Test. This lasted about half an hour for each child. The participants were tested again at follow up on December 10, 2010. Timed two-minute running records on level-controlled prose and the Decoding Fluency Test were administered at follow up, seven weeks after the post-intervention testing had been administered. Participants were called out of their classrooms for about ten minutes during the morning.

Group 2, consisting of Jamal, Josh and their peer tutors, commenced the practice sessions on November 2, 2010 and 15 practice sessions were held between that time and November 26, 2010. There were no major disturbances to the running of the intervention but the shorter time was a result of the September 4 earthquake delays. The intervention ran over four weeks during the fourth school term. Session times were 0915-0945 throughout the intervention. Post-intervention testing was conducted on November 29, 2010. During this, the Neale Form 2 was administered, as was the Decoding Fluency Test. This lasted about half an hour for each child. No follow up data were collected for Group 2.

Behaviour Management

It was expected that because the participants had behaviour problems, staying on task during the practice sessions would be difficult. It was planned, before commencement, that if the children were not improving on the practice tasks and were displaying off-task behaviour, a reinforcement contingency for completing the activities would be introduced. For one child, Jesse, further behaviour management techniques were necessary from the second practice session. At the start of Session 2, Jesse was told that if he completed the practice according to instructions, he would be allowed to hold the stopwatch. If he did not complete the practice, his peer tutor held the stopwatch.

The participants' behaviour was managed with usual teaching strategies such as redirection, praise, differential attention and encouragement. A reinforcement contingency was found to be unnecessary for the remaining participants of Group 1 until session 15 when the peer tutors were removed.

It was found that, without the peer tutors, the team members did not stay on task, so reinforcement for doing so was introduced for all four participants. A behaviour chart was drawn up (as shown in Appendix 9) with a series of boxes for each child. It was explained that the researcher would check each child every two minutes, and give a tick if they were on-task, and a cross if they were off-task. On-task behaviour was defined as looking at the cards, reading the cards, or listening quietly to a partner reading the cards, or timing oneself or one's partner. If, at the end of the session, the individual child had received more ticks than crosses in their boxes, they were allowed to choose a small reward. Rewards consisted of small model dinosaurs, dice, pop-out models of vehicles or dolls, balloons and stickers. The researcher used a cell-phone alarm that was reset after each check to time the monitoring checks.

Group 2 had no extra behaviour management requirements above the usual teaching strategies such as redirection, differential attention, praise and encouragement.

Chapter 3

Results

The first section of this chapter presents the participants' results in series of figures. Each is accompanied by a brief description of each child's improvement in decoding fluency and prose reading fluency from session to session. The second section provides pre-, post- and follow up test scores for each of the six learners and identifies overall trends.

Sophie

Sophie, from Group 1, began the intervention with a decoding fluency score of 24.5 correct graphemes per minute, and a prose reading rate on the Neale of 36 words per minute. As can be seen from Figure 2, she attended 18 practice sessions in total. Sophie was eager to improve her reading and anxious to please the researcher. She appeared to enjoy being taken out of class and her remarks indicated that she appreciated the 'special' status afforded her by being part of the experimental group. There were some initial difficulties in identifying a suitable peer tutor for Sophie. In the first week she had four different tutors. The following week she was paired with a new tutor who was brought in to substitute for an original tutor who had turned out to be unsuitable. Once established, this peer tutor relationship worked well. Sophie and her partner approached the activities as a team rather than having one 'expert' and one learner. Both children took turns timing the other on the reading tasks. Although the tutor was faster initially, this did not appear to bother Sophie. She was competitive with herself and the other children, and occasionally had to be called to account when she talked about being much better than some of the other participants in her group. She also tended to have trouble staying focused on her own tasks. For example, she was observed correcting other children when they failed to follow the practice procedures. Sophie

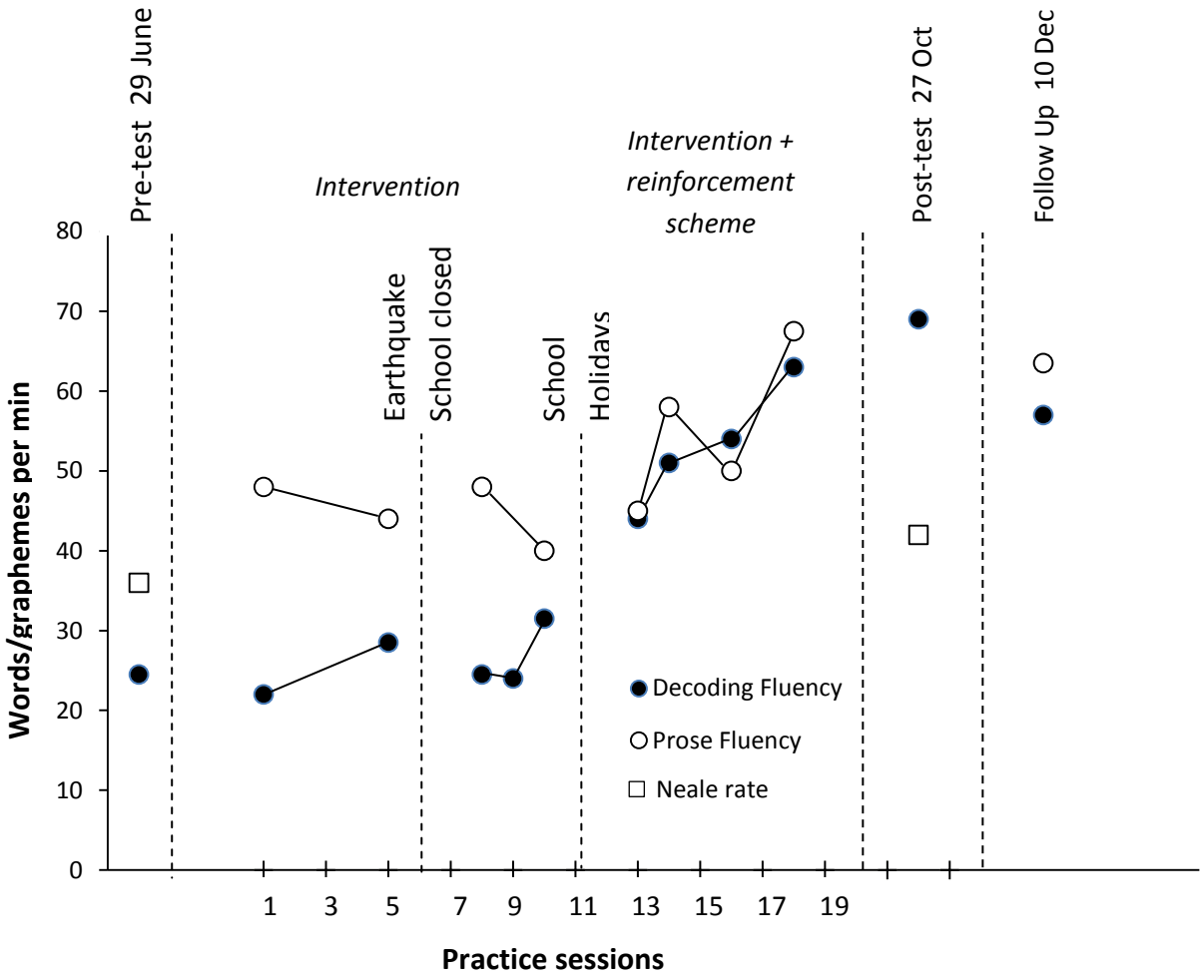

Figure 2. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rate scores for Sophie.

progressed very quickly through the four word lists, and achieved criterion within two or three days' practice on each one.

Sophie demonstrated competent sounding-out skills during prose reading although her pace was slow. Sophie's confidence appeared to be an issue for her. She made numerous remarks about her low ability during the early phases of the intervention. During the first few weeks, she was easily distracted during testing, especially after the September 4 earthquake, and needed a lot of support and encouragement to stay on task. After the school holidays, Sophie was given some specific feedback about her progress by the researcher. Seeing that

her speeds had increased buoyed her performance, and her concentration during the practice sessions improved. This appears to have been reflected by her increasing scores from session 13 onwards. By the post-intervention and follow-up testing periods, Sophie needed no reminders to stay on-task as she was fully engaged in the tests.

Sophie's post-test decoding fluency score was 69 correct graphemes per minute, and her prose reading rate on the Neale was 42 words per minute. At follow up, the decoding fluency had dropped back to 57 correct graphemes per minute – 1.76 times greater than her pre-test decoding fluency score. Her prose reading fluency score was 63.5 words per minute. The reason for the discrepancy in Sophie's reading rates may be due to the differences between the Neale passages and the reading book passages. At both pre- and post-test she was only able to read the Neale passages with 80-85% accuracy which is too low to calculate an accurate reading rate. Instead, the first and last reading book passages provide a more accurate measure of Sophie's gains. Her test on the first practice session indicated that her prose reading fluency was about 48 wpm. On the last day of the intervention, her prose fluency measure was 67.5 wpm, an increase in reading speed of nearly 20 words per minute. Sophie's error rate on the decoding fluency test decreased from 5.5 errors per minute at Session 1 to 0 errors per minute at Session 18.

Isaiah

Isaiah, from Group 1, began the intervention with a decoding fluency score of 19.5 correct graphemes per minute, and a prose reading fluency score of 29 words per minute. As can be seen from Figure 3, he attended 17 practice sessions in total. During the pre-test he said he was tired as he had stayed up very late the night before watching television. This was a common occurrence throughout the intervention and he did appear tired, even though the practice sessions occurred most commonly in the morning. At the beginning of the intervention, the meeting time was straight after lunch, and on a number of separate days

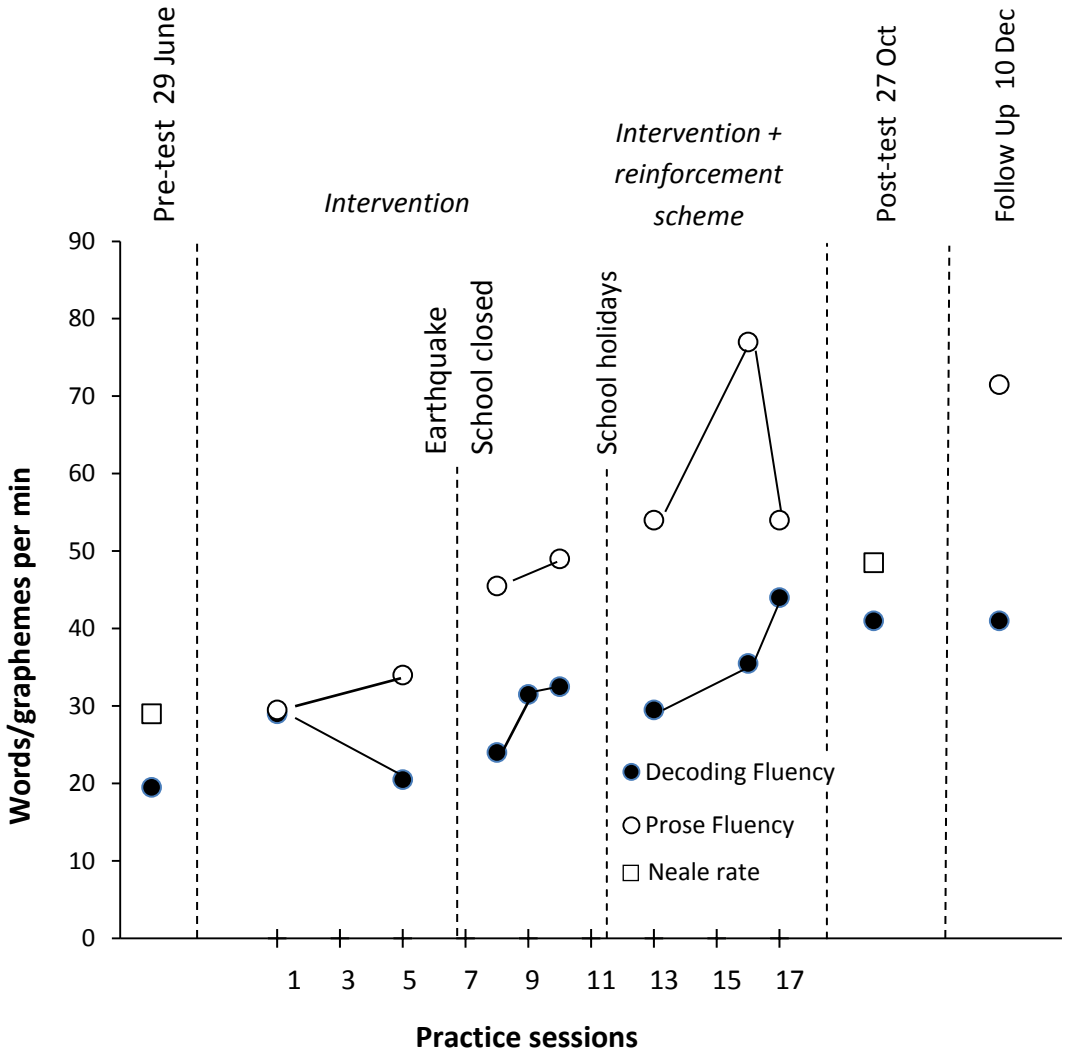

Figure 3. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rate scores for Isaiah.

Isaiah had been involved in a fight at lunch time. On these days he came to the group visibly upset and angry, and took a longer time to settle to the tasks. Isaiah had a strong personality and often struggled to remain on-task. He was, however, an able learner and took pride in moving up the word lists and lowering his times on the practice lists. Frequently during the session he informed the researcher of his latest score. Isaiah disliked the SNAP! activity – he was solely focused on the *Joker* card, and tended to slide it out of his pile and hold it at the ready for when the pile was big enough for him to use it. The joker cards were removed on

Session 4 from his pairing's deck of SNAP! cards to manage this. They were returned on Session 6, and it was not necessary to remove them again.

Of all the participants, Isaiah seemed the most severely affected by the September 4 Earthquake, and was easily distracted during testing if there was an unexplained noise. Occasionally testing had to be abandoned and restarted when he was calmer. There was one particular incident of note. On the day of Session 14, Isaiah had just had a spelling test in class, and when the researcher came in to collect the children for the reading group he had his head down on his desk and was sobbing. He needed coaxing to come to the practice session, and, although he was given the choice to decline, he chose to come to the group. However, he struggled to join in and did very little practice. In the middle of the session, he blurted out "I can't do anything right, I'm dumb and I can't spell". The researcher stopped the group to talk about learning and the benefit of making mistakes. His peer tutor and another team member were also present and both supported and encouraged him, and by the end of the session he was calm again.

After the school holidays, Isaiah was given some specific feedback about his progress by the researcher. During Isaiah's penultimate practice session he worked with another team member who was less skilled than him at reading the practice words. Isaiah was patient with him at the request of the researcher and clearly enjoyed the teaching role. During the testing afterwards, Isaiah stopped in the middle of his prose reading and said "my brain is working really fast today". As can be seen from Figure 3, his score was 77 words per minute that day – his top score overall.

Isaiah's post-test decoding fluency score was 41 graphemes per minute, double his initial score, and his Neale reading rate was 48.5 words per minute. At follow up, his gains on the decoding fluency test were maintained at 41graphemes per minute, and his prose fluency

score had increased to 71.5 words per minute – 2.4 times faster than his Session 1 rate. Isaiah's error rate on the decoding fluency test decreased from 20.5 errors per minute at Session 1 to 6.5 errors per minute at Session 17.

Emily

As can be seen from Figure 4, Emily, who was in Group 1, began the intervention with a decoding fluency score of 18 correct graphemes per minute, and a prose reading fluency score of 23 words per minute. She attended 16 practice sessions in total.

Emily initially read very quickly and made many errors. She had little persistence when she found reading difficult and was quick to give up. Throughout the intervention period, she needed coaxing to continue to try her best during the testing. However, towards the end of the intervention when her confidence had improved, she read loudly and enthusiastically. Her reading style was staccato, especially on the practice lists. Emily's initial peer tutor was unsuitable. However, she had a particular friend among the other tutors. These two were paired, and their cooperation was excellent throughout the intervention period. Emily progressed quickly through the lists in terms of speed, but made many errors. Unfortunately her peer tutor was reluctant to point out mistakes, meaning that when Emily was checked by the researcher, her progress was slower than she had hoped.

The reading level supplied by Emily's teacher was much higher than that which she could read with 90% accuracy. During testing, the researcher lowered the difficulty level of the texts used for testing until Emily was being tested on books which she could read with 90% accuracy. This was achieved on Session 9. As can be seen from Figure 4, this dramatically affected her prose fluency score, indicating that the first three measures during the intervention are inaccurate.

Emily was very poor at sounding out words and this hindered her progress. Emily's

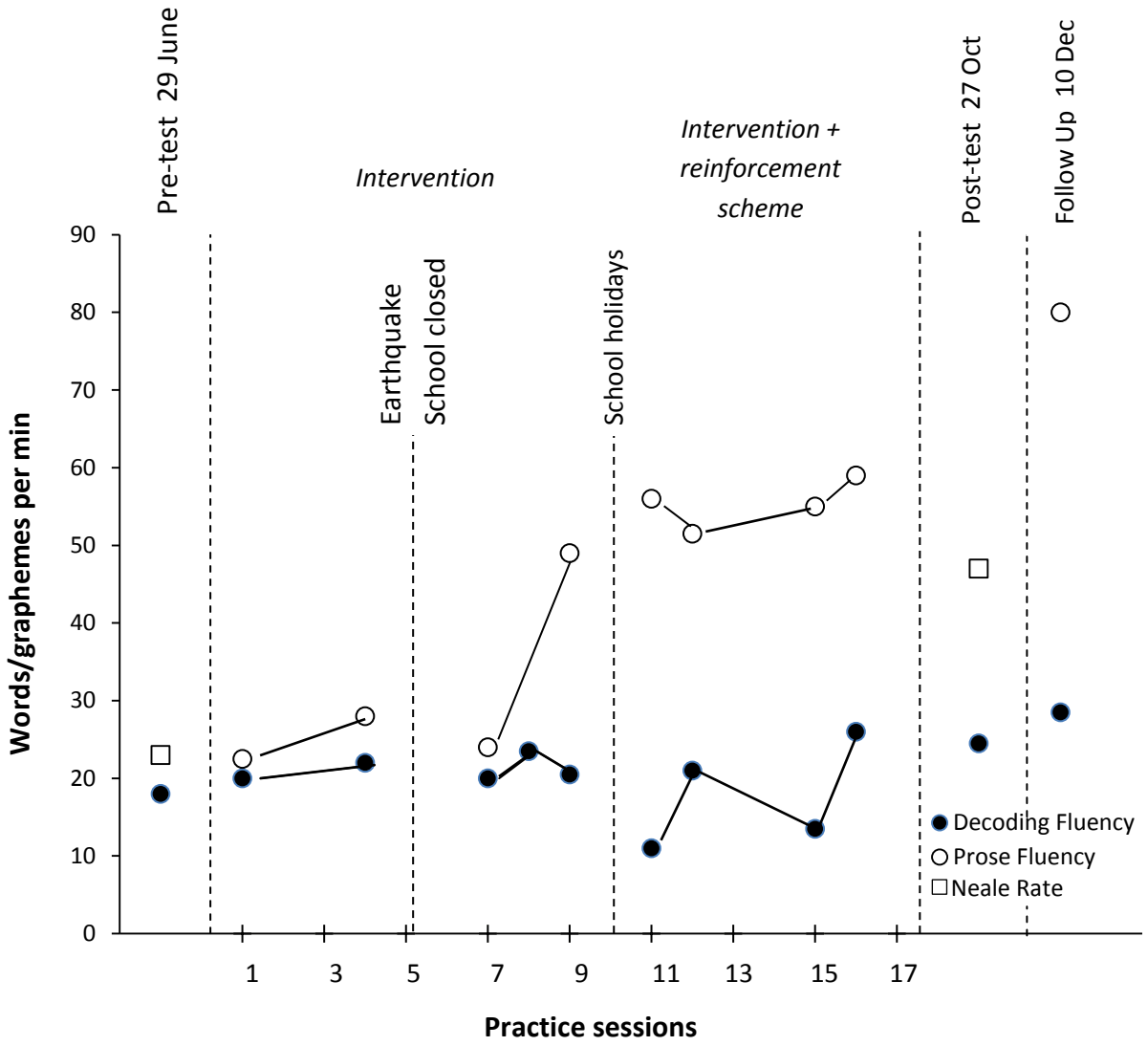

Figure 4. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rate scores for Emily.

method of improvement on the word lists was to try and memorise the words rather than by mastering the unknown grapheme-phoneme equivalence relations. Even during follow up testing, she simply skipped words she did not know rather than sounding them out. For the last seven practice sessions, Emily was told not to say "don't know" during the Decoding Fluency Test, but to make an attempt even when she did not know the word. Although her fluency level remained about the same on the test throughout the intervention, her error rate dropped dramatically from 27 errors per minute on the decoding fluency test at Session 1 to 16 errors per minute at Session 16. Emily's attitude to the activities was positive throughout

the intervention. However, she remained easily distracted.

Post-test scores show that Emily's decoding fluency only increased from 17 to 24.5 correct graphemes per minute. However, her reading rate on the Neale increased from 23 to 47 words per minute, and her fluency on level appropriate texts increased from 50 words per minute at Session 9 to 80 words per minute at follow up – a 1.6 fold improvement.

Jesse

As can be seen from Figure 5, Jesse, who was in Group 1, began the intervention with a decoding fluency score of 8.5 correct graphemes per minute, and a Neale reading rate of 18 words per minute. He attended 16 practice sessions in total. During initial testing, Jesse appeared to be easily distracted, and his attention wandered during all tasks. He was occasionally resistant to instructions, but most of the time he appeared unable to keep his mind focused on the task at hand for the required two minute test. Jesse had been diagnosed with ADHD, dyslexia and dyspraxia. Throughout the study he was medicated for ADHD. Jesse's peer tutor was an extremely effective child who persisted patiently with returning his attention to the task at hand. However, Jesse never reached criterion on any of the four practice lists. There were two particular words that he had trouble with throughout the intervention: 'chase' and 'chain' on List A1. Even though his tutor spent most of one session teaching him to discriminate between the two words, when it came to his last session, he still said the two interchangeably.

Jesse's behaviour during the practice sessions was the most difficult to manage, and he did not stay on task for 21 minutes for any practice session. The stop watch contingency introduced in Session 2 failed to function as a reinforcement contingency and had little effect on Jesse's overall level of attention. Compared to the other children in the intervention, Jesse spent much less time actually reading and practising the word lists. On most days, he read through one list approximately three times. Testing was also disrupted, and Jesse's decoding

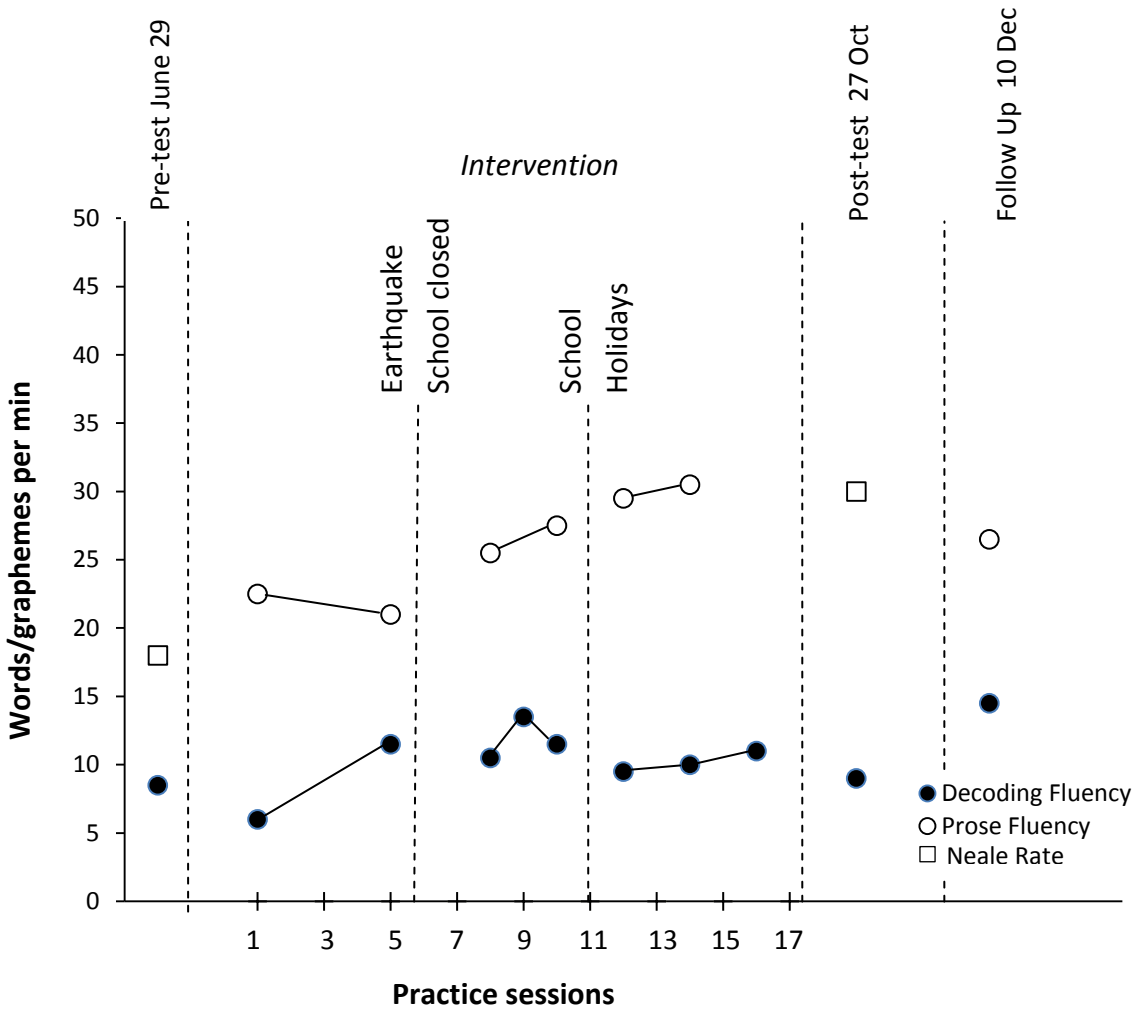

Figure 5. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rates for Jesse.

and prose fluency tests had to be re-started many times. On the final practice session, the attempt was abandoned after approximately 20 minutes. His post-test score suggests that his decoding fluency had not increased, although it was somewhat improved at follow up, with a score of 14.5 graphemes per minute. Jesse's prose fluency score on text appropriate for his level at the follow up measure was 26.5 words per minute, only slightly faster than his Session 1 score. Jesse's error rate on the decoding fluency test increased from 6.5 errors per minute at Session 1 to 14 errors per minute at Session 17.

Josh

As can be seen from Figure 6, Josh, who was in Group 2, began the intervention with a decoding fluency score of 19.5 correct graphemes per minute, and a prose reading fluency score of 34 words per minute. He attended 14 practice sessions in total.

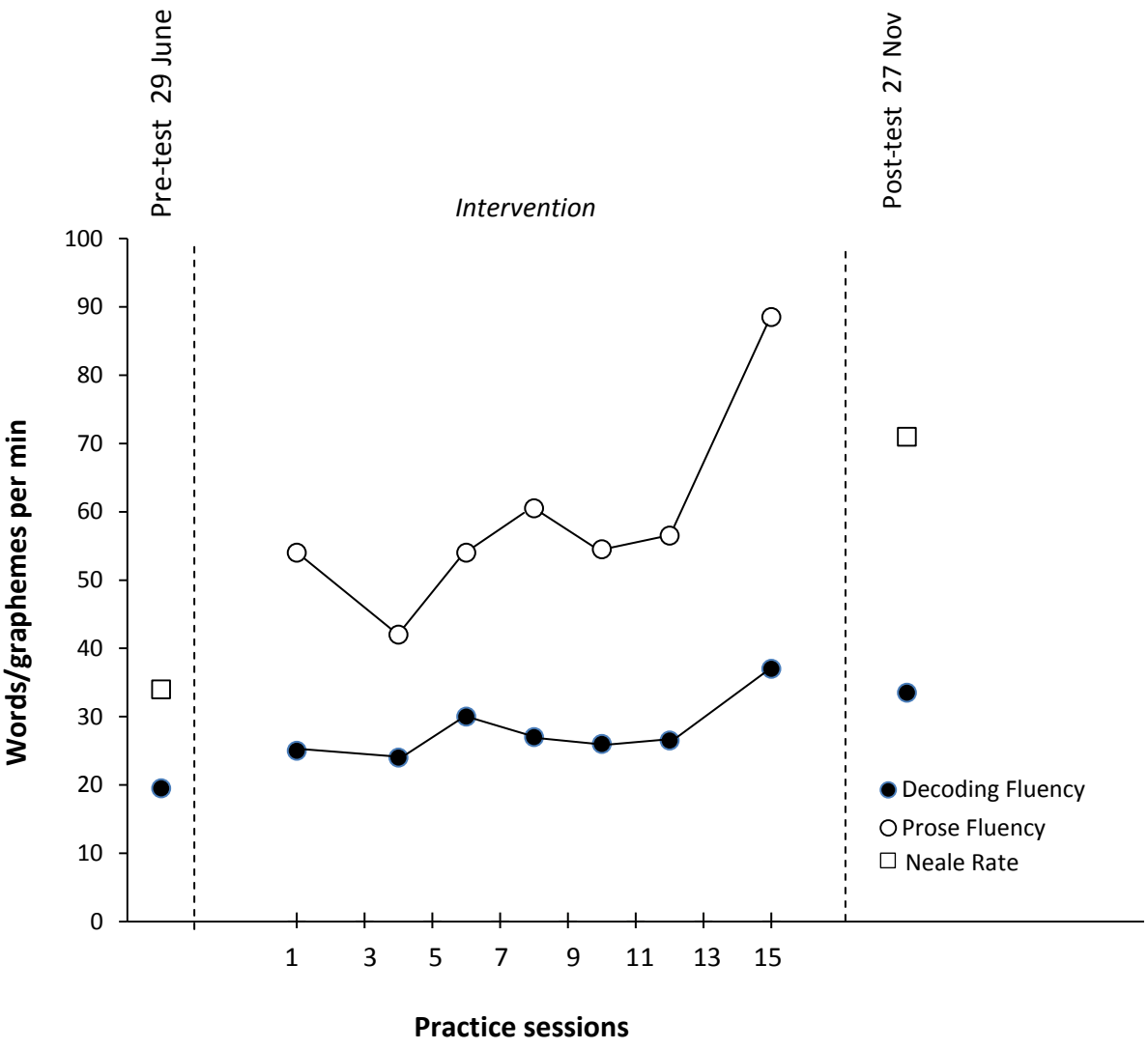

Figure 6. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rates for Josh.

Josh maintained a positive attitude for the whole intervention phase. His prose fluency score at the first practice session was 54 words per minute, and he either already knew or was able to sound out most of the words on the practice lists. As a result, he progressed through them very quickly, reaching criterion after a couple of days' practice on each word list. Josh's style of reading was loud and staccato, with little variation in pitch or pace. Once he understood that speed and accuracy were the aims, he approached the reading lists with determination to get faster. Josh and his peer tutor worked extremely well together. During the SNAP! activity, they said each word as they placed it down (as instructed) and then they broke it into its component phonemes aloud e.g. "sh – ir – t". Towards the end of the four-week period, on the occasions that his peer tutor was absent, Josh practised on his own for a few minutes at a time. During this he was completely focused and was able to monitor his own accuracy and speed. Josh appeared to enjoy coming along to the reading group, and asked at the end if he was able to continue. Post-test scores show that Josh's decoding fluency improved, with a score of 33.5 – an increase of 14 correct graphemes per minute compared with his pre-test measure. His post-test reading rate was 71 words per minute – 2.1 times greater than his pre-test Neale reading rate score. Josh's error rate on the decoding fluency test decreased from 10 errors per minute at Session 1 to 5.5 errors per minute at Session 17. No follow-up data were collected for Josh as his intervention ended only two weeks before the end of term.

Jamal

As can be seen from Figure 7, Jamal, from Group 2, began the intervention with a decoding fluency score of 8 correct graphemes per minute and a prose reading fluency score of 12 words per minute. He attended 8 practice sessions in total. Jamal's decoding skills were very poor. He could not sound out words, even when given plenty of time. He could say the individual sounds, such as "t-h-a-t", but could not put them together into a word, appearing to

have little knowledge of grapheme-phoneme equivalence relations. He was a “helpless” reader in that when he came to an unknown word he simply stopped reading. This made testing difficult, and throughout the intervention he needed a lot of prompting, support and

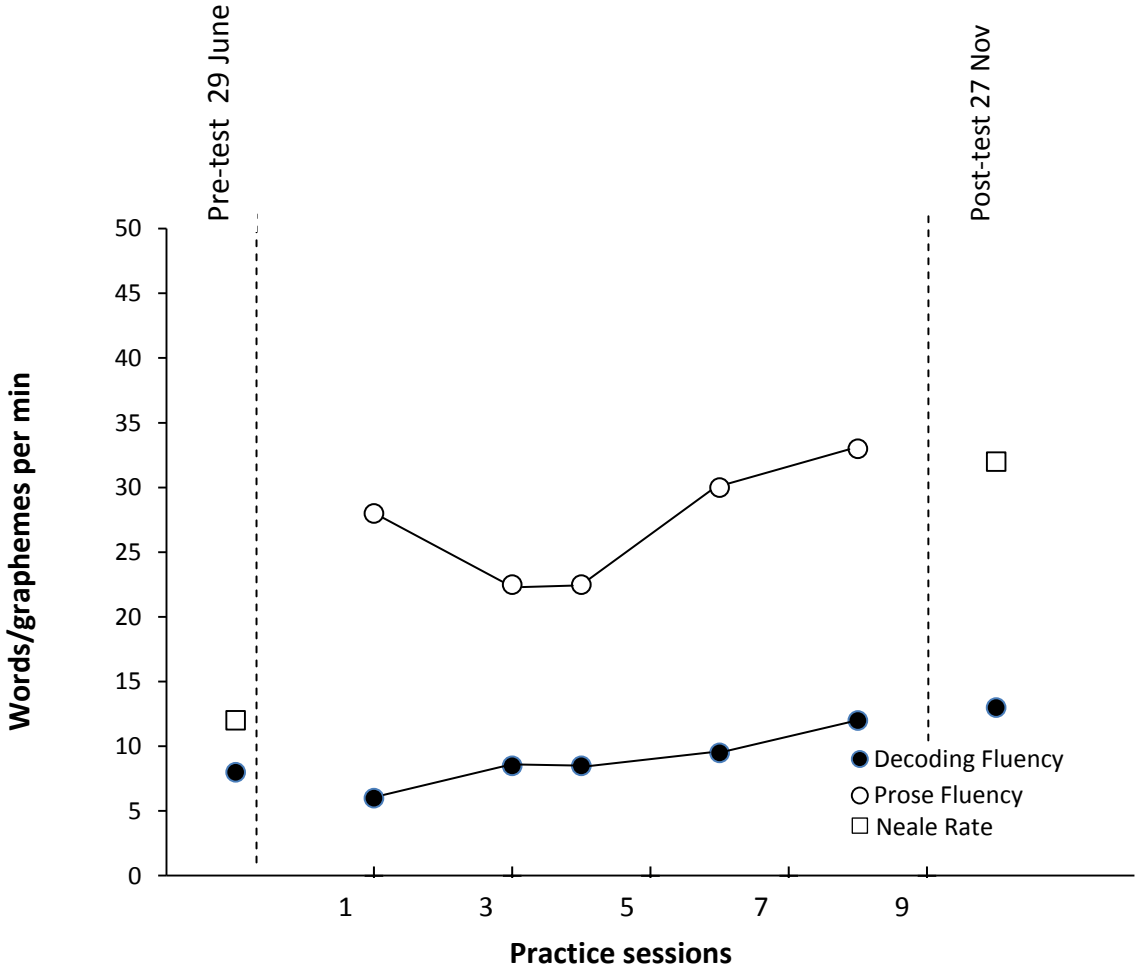

Figure 7. Number of correct graphemes per minute on the Decoding Fluency Test, number of correct words per minute on connected prose, and pre- and post-test Neale reading rates for Jamal.

encouragement to complete the measures. He clearly knew the high-frequency word list, and had learnt this to fluency. Jamal was a Pacific Island student, and his teacher informed me that he was considered an ESOL student and had previously been given English lessons. These were not occurring at the time of the intervention. He appeared fluent verbally in conversation with the researcher and the other children, but his lack of exposure to English

became apparent when shown the practice word lists. Many of the items from the practice lists were unknown: porch, term, cuff, tune, cheap, weed, loan, Ken, Roy, boil, joy and chain were all new words to him. Jamal liked to earn the token rewards for testing, but he did not always try his best. He appeared embarrassed about his reading ability, and sought to distract the researcher from this. During the periods when he was focused, he learnt all the words on whichever list he was working on with relative ease. However, he was still not at fluency on all lists by the end of the intervention. Post-test scores show that Jamal's decoding fluency had increased, with a score of 13 correct graphemes per minute from a score of 8 at the pre-test measure. His prose fluency score was 32 words per minute at the post-test measure – 2.7 times greater than his pre-test score. Jamal's error rate on the decoding fluency test increased from 10 errors per minute at Session 1 to 13 errors per minute at Session 17. No follow-up data were collected for Jamal, as his intervention ended only two weeks before the end of term.

Summary

A summary of the results of the present study is presented in Tables 5 and 6. Pre-test and post-test scores on the Neale Analysis of Reading Ability are presented in Table 5. The lowest possible reading age able on this test is 6 years and 0 months. Children who scored less than this have, for the purposes of calculating the mean, been given a score of 5 years 6 months. The scores in Table 5 show that this group of learners improved on average by about six months in reading accuracy, and by about six months on average in reading comprehension. The time between pre- and post-testing was four months for Group 1 and six months for Group 2. A greater improvement was observed in the reading rate measure, which was, on average, 1 year and 4 months.

Table 5. Pre- and Post-test reading ages on the Neale Analysis of Reading Ability.

Child	*Pre-test* Accuracy Reading age	*Post-test* Accuracy Reading age	*Pre-test* Comprehension Reading age	*Post-test* Comprehension Reading age	*Pre-test* Rate Reading age	*Post-test* Rate Reading age
Sophie	6:9	7:0	7:1	7:0	7:0	7:5
Isaiah	6:0	6:9	<6.0	7.1	6:8	7:11
Emily	6:0	6:5	<6:0	6:4	6:3	7:10
Jesse	<6:0	6:0	6:2	6:0	<6:0	6:2
Josh	6:5	6:5	6:11	6:4	6:11	9:8
Jamal	<6:0	6:2	<6:0	6:2	<6:0	6:11
Mean	*6:0*	*6:5*	*6:1*	*6:7*	*6:4*	*7:8*

Table 6 summarises the changes in Decoding Fluency Test scores and the prose reading fluency scores for each of the six participants. Each child's prose fluency scores are derived from measures taken on the first and last practice session of the intervention. On average, the children doubled their rates on the Decoding Fluency measure. Only one participant, Sophie, improved to more than 60 correct graphemes per minute.

Prose reading fluency scores improved by 21 words per minute on average. Sophie and Josh attained reading rates of over 60 words per minute. Jesse's and Jamal's improvements, of 7.5 and 5 words per minute respectively, were negligible. Emily improved by only 6.5 words per minute on the Decoding Fluency Test, but her prose reading score increased by 36 words per minute. Improvements in decoding fluency scores were lower than improvements in prose reading fluency for all participants.

Table 6. Pre- and Post-test or Follow Up results on the Decoding Fluency Test and the prose reading fluency measure.

Child	*Pre-test*	*Post-test*	*First Session*	*Last Session*
	Decoding Fluency (gpm)	Decoding Fluency (gpm)	Prose Reading Fluency (wpm)	Prose Reading Fluency (wpm)
Sophie	24.5	69	48	67.5
Isaiah	19.5	41	29.5	54
Emily	18	24.5	23	59
Jesse	8.5	9	23	30.5
Josh	19.5	34	54	88.5
Jamal	8	13	28	33
Mean	*16*	*32*	*34*	*55*

Table 7 summarises the follow up data for Group 1 compared to the measures taken on Session 1 of the intervention. Follow up data were gathered seven weeks after the final practice session. No follow up data was collected for Group 2. Isaiah, Emily and Jesse all maintained or improved their score between the post-test and follow up measures on the decoding fluency test, with a follow up mean of sixteen graphemes per minute greater than the first practice session. Sophie's large improvements during the intervention of 47 graphemes per minute was not fully maintained, dropping back to 57 correct graphemes per minute at the seven week follow up. Isaiah and Emily continued to improve their prose reading fluency scores following the intervention, with reading rates over the 60 words per minute goal. Although Sophie's reading rate fell at the follow up measure by 4 words per minute, it also was over the 60 words per minute fluency goal.

Table 7: First Session and seven-week Follow up decoding fluency and prose fluency measures for participants in Group 1.

Group 1	*First Session* Decoding Fluency (gpm)	*Post-test* Decoding Fluency (gpm)	*Follow Up* Decoding Fluency (gpm)	*First Session* Prose Reading Fluency (wpm)	*Last Session* Prose Reading Fluency (wpm)	*Follow Up* Prose Reading Fluency (wpm)
Sophie	22	69	57	48	67.5	63.5
Isaiah	29.5	41	41	29.5	54	71.5
Emily	20	24.5	28.5	23	59	80.5
Jesse	6	9	14.5	23	30.5	26.5
Mean	*19*	*36*	*35*	*34*	*53*	*60.5*

Jesse's small improvement of 7.5 words per minute was not maintained and dropped back to within 3.5 words per minute of his pre-intervention measure seven weeks after the final practice session.

Chapter Four

Discussion

The overarching research objective for this study was to measure the effects of an intervention for children with reading delay and antisocial behaviour. The first aim was to replicate an intervention designed by Church and his colleagues (Church et al., 2005). This entailed identifying children who met three criteria. These were the two criteria used by Church et al. (2005) (phonemic awareness scores above 35 correct sounds out of 60 and decoding fluency scores below 60 correct responses per minute) plus an additional third criterion "children with persistent behaviour problems". The second aim was to implement a reinforcement scheme, if it was needed, to maintain engagement in the learning activities. After the screening and informed consent processes, six participants were identified for inclusion in the study. Scores on the Neale Analysis of Reading Ability at pre- and post-intervention testing showed that the children made only small gains in reading comprehension and accuracy. Reading ages for reading rate, however, increased by an average of sixteen months. The decoding fluency scores of the children doubled from a mean of 16 to a mean of 32 correct graphemes per minute. Oral fluency scores on level-controlled prose text increased by an average of 21 words per minute. Follow up data were collected for Group 1 only, comprising four participants. Two of the children's gains were maintained or improved at follow up. One of the remaining participants, Sophie, demonstrated gains that decreased between post-intervention and follow up, but the remaining improvements were nevertheless substantial. The final child from Group 1, Jesse, continued to improve his decoding fluency, but by follow up his reading fluency score had fallen close to his pre-intervention fluency score.

Measurement Issues

Using the Neale Analysis of Reading Ability as a measure of the participants' reading rates and comprehension ability was unsatisfactory in a number of regards. Firstly, the test uses only six text levels to measure children's reading age from 6 years to 13 years, meaning that there are large increases in difficulty from one text level to the next. By the post-intervention measure, most participants in this study could easily and quickly read the first text, but only Sophie could read the level 2 text with enough accuracy to "pass" the text and answer the comprehension questions. According to the Neale procedures for text levels 1 to 5, the comprehension questions are asked only if the child has made fewer than 16 errors. For the children in this study, this meant that their comprehension score largely depended on their accuracy score, effectively giving them a "ceiling" comprehension score of 4. Most of the children could easily read the level 1 text with high accuracy, but the level 2 text was more difficult. The difficulty level also differed slightly between Form 1 and Form 2 of the Neale reading assessment and this was reflected in the standardised scores. Form 1 was administered at the pre-test measure, and Form 2 at the post-test measure, but the second text in Form 2 is a slightly more difficult text. For Josh, this meant that at the pre-test measure he was able to read and pass the first two text levels, and gained a comprehension reading age of six years and eleven months. The slightly harder prose on the level 2 text in Form 2 meant that he was not able to read it with fewer than sixteen errors, so the comprehension questions were not asked of him, even though it was likely that he would have answered some or all of them correctly. This resulted in an apparent reduction in comprehension ability following the intervention. Informal observation and discussion with the children during the prose fluency measures throughout the intervention suggested to the researcher that the participants' comprehension scores on the Neale did not accurately represent their level of reading comprehension.

Using the Neale to calculate the prose reading fluency ability for the participants also resulted in scores that may not be accurate. For example, Sophie scored 67.5 words per minute at the final practice session measure on text that she could read with over 90% accuracy. However, on the Neale her reading rate was 42 (16th percentile), because of her slowness on the second passage, which she could only read with 84% accuracy. One way to address this could be to use only passages read with more than 90% accuracy when calculating reading rates. However, if Sophie's time on the first passage was used for calculating the reading rate, she would have scored 120 words per minute (96th percentile). Neither this score nor her actual score on the Neale accurately represents her prose reading fluency which was, as measured by the prose fluency scores, about 60-65 words per minute by the end of the intervention, and about 48 words per minute at the beginning. One way to address this would be to use a standardised test with a greater number of passages, so that the gap in difficulty is not so great from one passage to the next.

Using timed running records as the prose reading fluency measure appears to have been somewhat more accurate. Reading books are categorised into difficulty levels on the colour wheel, and usually in New Zealand primary schools, children move around the wheel according to colour. However, there were large variations in difficulty from one book to the next within each colour, so fluency scores achieved using this measure also tend to be approximate. This is especially true of the lower levels, where there are few words on each page and much of the plot is conveyed through pictures. The researcher found that non-fiction texts were less useful as measures of reading fluency as they tended to contain technical terms and few words per page. One method for grading prose more accurately is The Noun Frequency Method, which grades texts according to the average frequency of occurrence (in printed text) of the nouns in the reading book (Elley, 1975). An objective

method of this sort would be particularly useful for research purposes, where accuracy in assessment is important for analysing the effects of different teaching methods.

The Decoding Fluency Test provided a quick and accurate technique for measuring improvements in decoding fluency. The children's scores indicate that any practice effects, from repeating the test frequently throughout the intervention, were minor. For example, Jesse made no improvements in his decoding fluency score from pre-test to post-test, in spite of frequent administration of the test. The lack of practice effect is probably due to the fact that the child is asked to start on a different line for each administration of the test.

A major shortcoming of the present study was the failure to assess "sounding out" skills, that is, the child's knowledge of grapheme-phoneme equivalence relations. Jamal, Jesse and Emily had poor knowledge of grapheme-phoneme equivalence relations, and could not sound out many of the words on the practice lists. They could, however, say the sounds of some of the individual letters. This suggests that the appropriate intervention for these three children would have been one which taught decoding skills, that is, knowledge of phoneme-grapheme equivalence relations rather than decoding fluency.

Tracking participants' progress by probe testing decoding fluency and reading fluency throughout the intervention was useful for tracking improvement. Often, the reason for an extremely low or high score on one or both of the tests could be attributed to circumstances on the day (such as the child having stayed up all night or being frightened by an aftershock), or the selected text being at an inappropriate level. This also helped to mitigate the measurement problems, as outliers were clearly visible. Isaiah's score of 88 words per minute at the end of Session 16 appears to be a special case. His mood appeared euphoric that day as he had received a lot of praise and admiration from the researcher and another participant for his expert knowledge on the word lists. This was not a typical experience for Isaiah, as many

comments made throughout the study indicated that he had a low opinion of his reading ability. Therefore, it is possible that this apparent outlier actually represents his true ability.

Identification of Participants

The first stage of a replication of the Church et al. decoding fluency intervention was identification of children for whom the intervention would be most appropriate. To do so, Year 3/4 teachers referred children who they thought exhibited both elevated rates of antisocial behaviour and reading delay. To identify the referred children whose behaviour problems were persistent and severe, the Social Development Scale was completed by the child's teacher. This took the class teacher about ten minutes to complete for each child. All of the referred children's scores showed that their classroom behaviour was characterised by a difficulty in remaining on-task and elevated rates of violence, disruptive behaviour, and/or non-compliance. Although minor disruptive behaviour was observed during the practice and testing sessions, very little non-compliant behaviour and no aggressive behaviour was displayed by the children during the intervention sessions. One exception to this was Jesse, who displayed some minor non-compliant behaviour during the practice and testing sessions.

To measure reading delay, the Neale Analysis of Reading Ability was used. This test confirmed that each of the referred children had reading ages that were at least one year behind their biological age.

A particular feature of the Church et al. study was screening for phonemic awareness. Other interventions that have aimed to increase decoding fluency have not done this (e.g. Fiedorowicz, 1986; Frederiksen, Warren & Roseberry, 1985; Jones et al., 2001). If a child has not yet developed phonemic awareness, an intervention that builds phonemic awareness rather than decoding skills is most appropriate (Williams, 2002). The phonemic segmentation test, based on the Queensland University Inventory of Literacy subtest, was used as the

screening tool and appeared to show that each of the experimental subjects had acquired a level of phonemic awareness sufficient to profit from an intervention targeting decoding skills.

Two component reading skills that were not measured prior to the intervention, however, were knowledge of grapheme-phoneme equivalence relations and receptive vocabulary size. As discussed above, the lack of screening for knowledge of grapheme-phoneme equivalence relations resulted in Jamal, Jesse and Emily's inclusion in the study when their lack of ability in this area suggests that an intervention targeting this skill would have been more appropriate. Additionally, Jamal's receptive vocabulary was not as large as those of the other participants. Thus, although the screening procedure successfully indentified participants with reading delay and adequate phonemic segmentation skills, they did not identify that three of the children were also lacking a knowledge of grapheme-phoneme equivalence relations sufficient to justify fluency building of the decoding skills. The screening procedure also failed to identify a child who had not yet learned the meanings of many of the practice words.

Replication of the Original Study

A complete replication of the methods used by Church et al. was not achieved with any of the participants. Group 1 had the longest intervention period with participants attending 16 to 18 sessions, but only Sophie reached the goal rate of 60 correct responses per minute on the Decoding Fluency Test before the end of the intervention. In the original study, participants attended around twenty sessions each. As a group, their pre-test reading ages were also higher than those in the present report, and so it would be expected that they would need fewer sessions to achieve the goal rate of 60 words per minute. For most of the

participants in the present study, it seems likely that they would need many more than twenty sessions to achieve a rate of 60 correct graphemes per minute on the Decoding Fluency Test.

A second challenge to replication in the present study was the loss of peer tutors for approximately the last five Group 1 practice sessions. Although this was due to external circumstances, it altered the daily practice methods away from those used by Church et al. For Group 2, comprising Jamal and Josh, peer tutors were successfully used for every session. However, the number of sessions was even fewer than that for Group 1, with Josh attending 14 sessions, and Jamal only eight. Given this lack of opportunity to engage in sufficient daily practice on the word lists, data from these two participants also failed to replicate the results of the original study.

In addition, all pairs of participants and peer tutors were supervised by the researcher for every practice session. This was not done in the original study, but when negotiating research procedures with the primary school, it was felt that supervision was a necessity. This assumption was borne out by the level of active supervision needed in order to maintain task engagement by all participants and peer tutors during the practice sessions.

The Reinforcement Scheme

Finally, the present study aimed to implement a reinforcement scheme if necessary in order to maintain engagement in the daily practice activities. This provision was made because it was expected that implementation of the decoding practice with children with antisocial behaviour would require further behaviour management techniques. For all participants bar one, Jesse, the reinforcement scheme was found to be unnecessary. On-task behaviour was maintained for the majority of all practice sessions with the peer tutors, merely using redirection and praise. Only when the peer tutors were removed for the final five sessions of Group 1 did a reinforcement scheme prove to be necessary. This was effective at

maintaining a similar level of task engagement in the participants as the use of the peer tutors. Jamal, Emily and Sophie continued to stay on-task for at least 75% of the practice session times, and Jesse continued to be off-task for more than half the practice sessions. A contingent reward scheme was introduced for these few sessions. For Group 2, implementing a contingent reward scheme was unnecessary as their peer tutors were able to attend all practice sessions and nothing further than this was needed. The second research aim was successfully met, because a contingent reward scheme was introduced when it was needed, and it was effective at maintaining on-task behaviour in the participants. However, it is unlikely that this would have become necessary if the peer tutors had not been withdrawn from the practice sessions. In this way, the assumption that children with severe antisocial behaviours will need a reinforcement scheme beyond what is normally provided for students was not supported. Jesse was the exception to this. Jesse's on-task behaviour needed to be managed continually throughout the intervention, and this was only partially successful. Jesse's individual characteristics, however, were not typical of the group as a whole. Jesse struggled to attend for the full length of the two-minute tests and frequently broke his own concentration to ask a question or make a comment, rendering the measure inaccurate. This lack of attention was also present throughout the practice sessions and severely lowered the number of learning opportunities that he experienced at each practice session. This behaviour was consistent with a diagnosis of ADHD. The information provided by the school indicated that Jesse had received this diagnosis previously and was taking medication to treat the symptoms throughout the elapsed intervention time. This lack of ability to attend to the practice activities was not characteristic of the participants as a group. In contrast, the children's concentration appeared to increase towards the second half of the intervention, as they began to see the improvements in speed from their daily practice activities.

Peer Tutoring as an Intervention Technique

The use of same-age peers as tutors for this reading intervention was successful once the pairs were established. This took about five sessions for Group 1, due to one peer tutor displaying significant behaviour problems, and thus being inappropriate for use as a peer tutor for children with antisocial behaviour. A suitable replacement was found. This was also an issue in Group 2 where the peer tutor for Jamal had difficulty managing his behaviour, but this was able to be managed by the researcher by using closer monitoring, redirection and praise. She completed the intervention as a tutor. Another child was referred for tutoring who could not read many of the practice words, so was excluded. Most pairs appeared to enjoy working together. In the present study the pairs were set up as two-member teams in which one child was the tutor and one was the team member (participant). However, the pairs that worked most effectively together had a reciprocal arrangement whereby the participant timed the tutor, and they then took turns. This meant that the tutor modelled reading the words, and the participant was able to take a break from concentrating. It also gave the participants a goal – they wanted to read the words as fast as their peer tutor, and became competitive. Much of the research on peer tutoring seems to support a reciprocal arrangement as being effective (e.g. Sutherland & Snyder, 2007). This aspect of competition between the children also meant that sometimes there was the risk of argument over who was progressing more quickly. For this reason, it was apparent that the practice sessions needed to remain under supervision. The children, although they complied with practice procedures, needed many researcher-led reminders to stay on task. Much of the research on peer tutoring uses programmes that are implemented with varying amounts of supervision by a teacher, or other adult, who is available to intervene if needed (Gardner et al., 2001; Spencer, 2006; Spencer et al., 2003; Sutherland & Snyder, 2007).

Effects on peer tutors

No iatrogenic effects on the peer tutors were observed as a result of daily contact with the children with antisocial behaviour. The teachers were willing for children to leave their classrooms and act as tutors for a few weeks. When the Group 1 tutoring went on longer than this, one of the teachers felt that the children were missing out on valuable learning time especially as, at that time, they were not missing reading, but mathematics. This raises the question of how the needs of children with learning and behaviour disorders are to be balanced equitably with the needs of the other children in inclusive classrooms (Corbett, 2001).

Intervention Effects

Although the present study failed to replicate the results of Church et al. (2005), there were many positive effects of the reading intervention. The children's mean gains of 21 words per minute in prose reading fluency, and 16 correct graphemes per minute on the Decoding Fluency Test indicate that decoding fluency and prose reading fluency can be built in children with co-morbid reading delay and antisocial behaviour using methods developed by Church and his colleagues (2005). Even the minor mean gains of five and six months in reading age on the Neale Accuracy and Comprehension measures are notable given that these children had been falling steadily further behind that of their peers with respect to reading development.

The children in the present study made much less progress in decoding fluency than the children in Church et al. None of the children except for Sophie gained fluency (i.e. >60 graphemes per minute) on the decoding fluency test. However, the children's starting reading level was much lower. In the present study, the participants' mean prose fluency score at the pre-test measure was 24.5 words per minute, whereas in the original study, the participants'

mean prose fluency score at pre-test was 45.1 words per minute, a difference of over 20 words per minute. The decoding fluency scores were similarly discrepant, with the participants scoring an average of 16 correct graphemes per minute as opposed to the original study's 36.4 correct graphemes per minute. In fact, the children in the present study were still learning the grapheme-phoneme equivalence relations. All the participants except for Sophie were in the 'acquisition' phase of building their decoding skills. They were still learning the word lists and learning to recognise and pronounce each grapheme. There was no indication that Jamal or Jesse ever moved beyond this phase. Josh, Emily, and Isaiah's decoding fluency scores were beginning to improve towards their final practice sessions, but it is unclear whether they would have continued to improve and reached more than 60 correct graphemes per minute within the next 10 or 20 practice sessions.

The children in the present study also made lesser gains in prose reading fluency than the children in Church et al. Gains of 21 words per minute were made in the present study, whereas improvements of 29 words per minute were made in the original study by Church et al. Given that they were still learning many of the grapheme-phoneme equivalence relations and did not reach fluency with respect to decoding skills (apart from Sophie), this improvement is somewhat unexpected. Church and others (e.g. Church, 2005; Fuchs et al., 2001; Gelheiser & Clark, 1991; Williams, 2002) have argued that improvements in reading fluency are dependent upon the achievement of decoding fluency to a level above about 60 correct graphemes per minute. So how did this happen?

There are several possible reasons for these gains in prose reading fluency. Firstly, it may be that the hypothesis by Church and his colleagues – that a functional level of decoding fluency of at least 60 graphemes per minute is necessary for improvements in prose reading fluency – is incorrect. It may be that any improvement in decoding fluency will generalise to an improvement in prose reading fluency. This seems unlikely given that a certain level of

expertise in the fast decoding of unknown words is a prerequisite for improvements in prose reading fluency. That this is so is illustrated by the progress made by Sophie – progress which closely mirrors the improvements made by the nine children studied by Church et al. (2005). She was the only participant whose decoding fluency improved to the 60 correct graphemes per minute criterion and whose prose reading fluency also improved to 63.5 words per minute. A second possibility is that measurement errors accounted for much of the improvement in prose reading fluency. This is likely to be true to a certain extent in Emily's case: her reading level was originally overestimated by her teacher, so her scores for the first few sessions of the intervention were artificially low. However, the method of taking multiple measures throughout the intervention reduces the likelihood of a conclusion based on measurement errors. A third possibility is that the participants had never before been asked to increase their speed of reading, and had never practised doing so. It was made explicit to the participants that the goal of the practice sessions and testing was to improve speed. The children were encouraged not to pause and "work out" words from the pictures or the context of the sentence. Instead, they were told to attempt the word, and if they did not read it correctly on the first attempt plus a short pause, the researcher told them the word and encouraged them to continue reading as quickly as possible. This was done consistently for the Neale measures and the prose fluency measures throughout the intervention. Simply being asked to read as quickly as possible, and having the two-minute tests every second session on which to practise increasing speed, probably accounts for at least part of the increase in prose fluency scores. These practice effects, along with the desire to please the researcher, may have been sufficient to increase the reading rates of the children in this study. Further investigation is needed to discover the exact mechanisms by which children's oral reading fluency can increase.

Real-World Research: Efficacy vs. Effectiveness

This study was conducted in a typical state primary school in Christchurch, New Zealand. The participants were drawn from mainstream classrooms and the intervention was implemented to fit in with the school's busy schedule. Research conducted in mainstream classrooms achieves less control over external variables than research conducted in a clinic or even in a special class for children with learning and behaviour problems. Thus factors such as length of time spent practising, teaching methods outside the intervention, the social environment of the participants, and so on were all left uncontrolled. This means that factors other than those controlled by the experimenter also operate to influence student progress or lack of progress. Trialling an intervention in a controlled clinic environment may demonstrate larger effect sizes, but these may diminish when the intervention is transported into the real world (Henggeler, 2004). Demonstrating the effectiveness of an intervention in real-world applications in a variety of settings, with participants with a variety of characteristics, is useful for teachers and psychologists working with similar populations in the wider community.

Even the difficulties with implementation provide valuable lessons for those who seek to replicate this type of study. For example, the present study showed that the researcher must fit in with the classroom teacher, and bear in mind that they are working with only two or three students out of 25. "Special treatment" in the form of attending extra groups cannot be taken for granted, and there were occasions when the teachers clearly preferred to have their students take part in other group activities, such as assemblies. There were many occasions when a participant or peer tutor was absent because they were attending another programme or activity. Factors such as these are common and occur in all schools. For this reason, all interventions intended to be implemented in real-world settings must be evaluated in the settings for which they are being designed.

Limitations of the Present Study

The most severe limitation to the present study was the short length of time of the intervention. Group 1 had 19 sessions that the children could attend, and Group 2 only 15. Furthermore, none of the participants attended every session due to a number of factors described earlier in this report. The results suggest clearly that both groups needed a greater number of practice sessions. For Group 1, this was largely due to the unexpected Canterbury Earthquake, so the momentum was lost – twice – and it took a day or two each time for the children to get back to where they were before the interruptions.

In light of the measurement issues outlined above, the use of only one set of scores as pre-test and post-test measures limits the reliability of the findings. Usually, three data points are required to establish a level of baseline functioning prior to the implementation of an intervention. When the present study was in the design stage, there was no indication that the single measure would be inaccurate as the original study by Church and his colleagues (2005) had not reported any difficulties or inaccuracies with the Neale Analysis of Reading Ability. It was assumed that one measure would be sufficient to show the child's reading ability. The use of continued testing throughout the intervention mitigated this limitation and provided repeated data points to establish general reading levels and overall trends.

The reliability of the session to session fluency measures was not demonstrated. However, all of these involved simple timed counts of correct responses over short periods of time. Because none of the children obtained high rates, the likelihood of systematic error seems low.

With one exception, the present study did not replicate the original results of the intervention reported by Church et al. (2005), so the data does not provide further support for the fluency building intervention designed for that study. However, the extraneous factors

described above are sufficient to account for the different results observed in the present study.

Implications

The most important implication arising from the findings of the present study is the need for comprehensive analysis of children's reading prior to implementing an intervention. Even though the present study screened for phonemic awareness, decoding fluency and reading delay, it failed to discover prior to the intervention that three of its participants were lacking a knowledge of phoneme-grapheme equivalence relations sufficient to profit from a fluency building intervention. These participants still benefited from the intervention, but the most appropriate intervention for these children would have been to build their "sounding-out" skills, rather than to build their decoding fluency. For children whose reading is severely delayed, this structural analysis of reading skills is even more essential. The "Matthew effect" of children with reading delay falling further behind their peers as they grow older, means that the window of opportunity in which they might "catch up" is limited. Time in class allocated to reading practice and intervention is limited. Thus, it is important that interventions produce the largest gains in the shortest and most feasible manner.

The present intervention was effective at increasing the reading rate of children with reading delay and behaviour problems. The assumption that children with behaviour problems may not respond to interventions, or may not be able to fully engage in the practice activities, was not supported. The differences in findings between this study and the original study were not due to the children's behaviour problems, although these were significant. It is almost certainly differences in prior reading skills that resulted in the failure to replicate. For this reason, it would be worthwhile for future research to study the possibility that, given

suitable practice activities, children with antisocial behaviour will respond to effective teaching methods in much the same way as children without persistent behaviour problems.

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Appendix I

Tel: +64 942 2579
Email: saw58@uclive.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

The effects of building decoding fluency on the reading fluency of children with reading and behaviour difficulties.

Information sheet – Parents of Team Members

Your child has been selected to take part in research being run by the University of Canterbury. The project is a reading programme, supervised by Dr. John Church, that aims to accelerate the progress of students so they can read more fluently. It is especially designed for students who have good phonetic skills but read slowly, and who have behavioural difficulties.

If you and your child agree to take part in this research, your child will do reading activities for around 20 minutes a day, during class time, with another child from their class. They will go to the library or another quiet classroom together to practise reading words. The programme is expected to run for 3-5 weeks, and your child will be involved for the duration. The teams will work together and, for the second part of the intervention, achieve rewards together. If any issues arise within the peer tutor/team member relationships, a more suitable match will be arranged.

Some reading tests will be done with your child – some longer reading tests at the beginning and end of the programme to see if they have improved, and some very short tests during the programme, to track their progress. The teacher will also answer some questions about your child. The same tests will be done with your child again, at around six weeks after the programme has finished. If you would like to know the details of these tests, please ask for more information and I will contact you.

- The data gathered about your child's progress will be kept in a locked file at the University of Canterbury. Your child's name will not appear anywhere in the report to be published, and anonymity of participants will be maintained at all times outside the school.
- If you and your child decide to join the project, they and you have the right to change your minds and pull out at any time, until I have begun analysing the results.
- Any complaints will be taken seriously and brought to the attention of the Chair of the Educational Research Human Ethics Committee (see below).
- If you would like further information, or you would like someone to explain it to you in person, just let the teacher know and I will arrange to meet with you.

Thank you for taking the time to read this. Attached is a consent form that needs to be returned to the class teacher.

Regards,
Sarah Whitcombe-Dobbs
Health Sciences Centre,
University of Canterbury

1. This project has received ethical approval from the University of Canterbury Educational Research Human Ethics Committee

2. Complaints may be addressed to:
   Chair
   Educational Research Human Ethics Committee
   University of Canterbury, Private Bag 4800, CHRISTCHURCH
   Telephone: (03) 345 8312

Tel: +64 942 2579
Email: saw58@uclive.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

The effects of building decoding fluency on the reading fluency of children with reading and behaviour difficulties.

Child's Declaration of Consent to Participate – Team Members

I have been told and understand the information provided about this research project.

I understand that my participation is voluntary and that I may withdraw at any time until the results have been analysed.

I understand that any information about my progress will be kept completely confidential to the researcher and that no information which could identify me or my school will appear in any report of this research project.

I understand that suitable matches will be arranged between peer tutors and team members to ensure the optimum learning environment and safety of all participants.

I understand that all data from this research will be stored securely at the University of Canterbury for five years following the study and then be destroyed.

I understand that a summary report of the results of the study will be sent to the school and that I will be able to view this report.

By signing below, I agree to participate in this research project.

Name:

School:

Date:

Signature:

*Please **return this completed consent form** in the envelope provided by **30 June 2010.***

Thank you for your contribution to this study.

1. This project has received ethical approval from the University of Canterbury Educational Research Human Ethics Committee

2. Complaints may be addressed to:
   Chair
   Educational Research Human Ethics Committee
   University of Canterbury, Private Bag 4800, CHRISTCHURCH
   Telephone: (03) 345 8312

Appendix II

PHONEMIC SEGMENTATION TEST
(Adapted from the QUIL TEST)

Date: Tester: Participant:

I'm going to say some words and you will have to listen carefully. You are going to say the sounds in the words and I want you to use your fingers to help you. In the word *it* there are two sounds - /i/ and /t/.

The tester demonstrates two sounds by saying "it" and then putting down her small finger and saying "/i/" and ring finger and saying "/t/".

Now we are going to do some practice items. Some of the words are made up words and some are real words. Say the word first. Then say the sounds.

The tester gives feedback and if necessary further practice on the practice items.

fom? (3) baby? (4) knife? (3) stelp? (5) sledge? (4)

Say the word first. Then say the sounds.

Stimuli	Response	Sounds	Sounds
1. big	/b/ /i/ /g/	3	
2. oskad	/o/ /s/ /k/ /a/ /d/	5	
3. itch	/i/ /tch/	2	
4. frog	/f/ /r/ /o/ /g/	4	
5. lek	/l/ /e/ /k/	3	
6. **strebe**	/s/ /t/ /r/ /e/ /be/	5	
7. on	/o/ /n/	2	
8. plate	/p/ /l/ /a/ /te/	4	
9. **yut**	/y/ /u/ /t/	3	
10. vist	/v/ /i/ /s/ /t/	4	
11. dancer	/d/ /a/ /n/ /c/ /er/	5	
12. og	/o/ /g/	2	
13. **zokt**	/z/ /o/ /k/ /t/	4	
14. white	/wh/ /i/ /te/	3	
15. stamp	/s/ /t/ /a/ /m/ /p/	5	
16. **absence**	/a/ /b/ /s/ /e/ /n/ /ce/	6	
	Raw Scores		/60

Words added to QUIL in bold.

Table constructed by Deborah Williams and Karen Bradley.

Appendix III

CANTERBURY DECODING FLUENCY TEST – Administration Instructions

In a moment I am going to show you a page that has some words on it. Some are real words and some are made up. I want you to read the words as quickly as you can until I say stop. Before we begin let's try some for practice. Read these 10 words as quickly as you can. If you come to a word that you don't know, just say "don't know" and go on to the next one. Ready? Go.

car	dot	she	lad	kit
bed	his	mop	but	my

If the child hesitates on any word, say the word. If the reading is slow, model reading fast and then ask the child to try again (up to 3 times in total). Now go on with the test.

Okay, let's try some more. Remember, read the words as quickly as you can and keep going until I tell you to stop. Ready?

CANTERBURY DECODING FLUENCY TEST

Date: _____ Tester: _____ Participant: _____

Graphemes Correct: _____ Errors: _____ Correct Graphemes per Minute: _____

pa	in	to	eat	ka	
on	far	shoo	er	do	10
oil	bee	hay	lee	so	
ed	the	vee	oat	jar	20
eel	no	at	we	urn	
quit	aim	me	oo	go	30
or	zoo	boy	why	irk	
coo	cha	owl	ha	art	40
ra	up	ox	out	you	
shoo	eat	eel	bee	pa	50
to	in	hay	jar	urn	
the	aim	ka	boy	do	60
oo	me	er	go	cha	
vee	out	coo	owl	far	70
at	up	irk	ha	oil	
lee	oat	zoo	ra	or	80
we	quit	so	ed	why	
on	art	ox	no	you	90

Appendix IV

Instructions for Teachers

The scale which follows consists of descriptions of 30 different social behaviours.

1 Please decide whether each of these behaviours is one which the named student engages in 'very frequently', 'often', 'about half the time', occasionally' or 'not at all' and ***place a circle*** around the appropriate number.

2 When making these decisions, please take into account **only the behaviour which you yourself have seen**. It is most important that you do not allow your judgement to be influenced by what other people have told you.

3 When making these decisions, please take into account only the behaviour which you have seen **during the past four weeks**. It is most important that you do not allow your judgement to be affected by events which have happened at some earlier time.

4 When making these decisions, please record your **immediate or first impression**. Do not spend time pondering over individual behaviours.

5 Please complete every item. An incomplete scale cannot be used.

6 Each scale takes about 10 minutes to complete. Please select a period of time when you know that you will be free from interruptions to complete the scale.

7 After completion, please return your Scale(s) to the Principal.

Thank you for your assistance.

Social Development Project

UNIVERSITY OF CANTERBURY

Social Development Scale

To be completed by the classroom teacher. Use this Scale for Year 1 to Year 4 students.

(Please circle where necessary)

School:	Student Initials:			Gender: Girl Boy
DOB:	Age: yrs months			Ethnicity:
Year: *(please circle)*	Year 1	Year 2	Year 3	Year 4
Does this student have a disability?				Yes No
If yes, name the disability				
Has the teacher of this student received RTLB assistance within the past 12 months?				Yes No
Does the teacher of this student currently receive RTLB assistance?				Yes No
Is this student on the RTLB waiting list?				Yes No
Is this student currently receiving 2 or more hours per day of teacher aide assistance?				Yes No
For how long have you had day-to-day contact with this student?				weeks
This scale completed by: *(initials only)*				Date:

For Office Use Only	Part 1	
	Part 2	
	Total	

Part 1

(Please circle one number for each item)

		very frequently	often	about half the time	occasionally	never
1	Follows established classroom rules.	5	4	3	2	1
2	Complies promptly with teacher instructions.	5	4	3	2	1
3	Gets started on required tasks as soon as this is signalled or requested.	5	4	3	2	1
4	Persists with (continues to work on) set tasks when left unsupervised.	5	4	3	2	1
5	Uses polite remarks/requests to gain the attention of peers.	5	4	3	2	1
6	Responds appropriately when other students try to interact socially with him/her.	5	4	3	2	1
7	Shows interest in what others are saying during conversations, e.g. by nodding, smiling, commenting etc.	5	4	3	2	1
8	Shows appreciation when others offer to help, e.g. by smiling, saying 'thank you', etc.	5	4	3	2	1
9	Takes his/her turn when others are waiting.	5	4	3	2	1
10	Completes required tasks to an acceptable standard (given his/her present level of ability).	5	4	3	2	1
11	Compromises with others when conflicts or disagreements arise.	5	4	3	2	1
12	Behaves sympathetically when others are unhappy, upset or embarrassed.	5	4	3	2	1
13	Approaches peer groups in a way which results in acceptance into the current group activity or conversation.	5	4	3	2	1
14	Associates with a range of typically developing peers	5	4	3	2	1
15	Expresses anger appropriately (without becoming destructive or violent).	5	4	3	2	1

Part 2

(Please circle one number for each item)

		very frequently	often	about half the time	occasionally	never
16	Ignores initial requests and directions even though he/she has heard them.	1	2	3	4	5
17	Reacts in a cheeky or impertinent way to requests or directions from those in authority.	1	2	3	4	5
18	Continues talking after others have indicated that they would like to comment or that they would like to get on with something else.	1	2	3	4	5
19	Interrupts or annoys others when they are working or relaxing on their own.	1	2	3	4	5
20	Disrupts the play or the activities of the other children.	1	2	3	4	5
21	Uses demands where others would use requests.	1	2	3	4	5
22	Continues to plead, nag, or whine after his/her initial request or demand has been refused.	1	2	3	4	5
23	Tries to get own way by throwing tantrums e.g. by sulking or shouting, or swearing and refusing to co-operate.	1	2	3	4	5
24	Continues to behave inappropriately after being reprimanded, warned, or asked to stop.	1	2	3	4	5
25	Says things which indicate that he/she doesn't care about the consequences of his/her inappropriate behaviour.	1	2	3	4	5
26	Shouts others down when he/she disagrees with them.	1	2	3	4	5
27	Blames others when reprimanded for behaving inappropriately.	1	2	3	4	5
28	Interrupts others when they are speaking.	1	2	3	4	5
29	Acts violently towards others, e.g. shoves, hits, punches, or kicks others.	1	2	3	4	5
30	Behaves in ways which result in other students actively avoiding having to talk, play, or work with him/her.	1	2	3	4	5

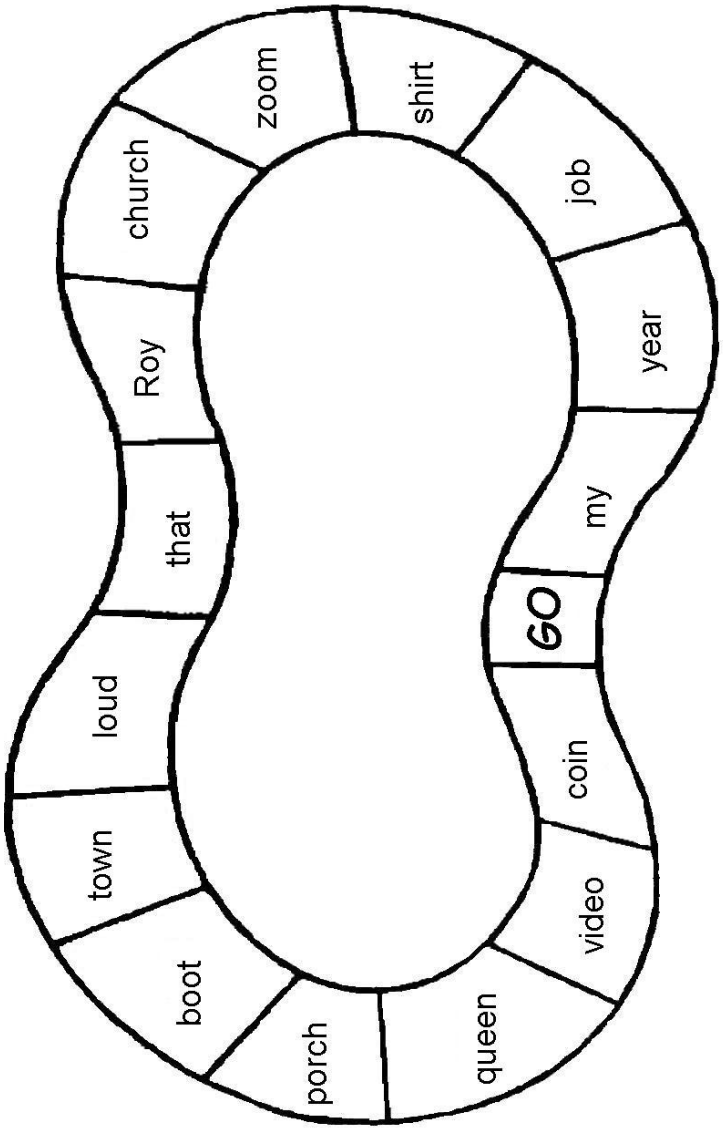
Appendix V

Practice List A1	Practice List A2	Practice List B1	Practice List B2
fly	**boil**	**her**	**coin**
nice	**teeth**	**tune**	**video**
kick	**shoot**	**rain**	**queen**
chase	**sharp**	**dark**	**porch**
wit	**say**	**cuff**	**boot**
cute	**girl**	**loan**	**town**
yes	**term**	**then**	**loud**
run	**road**	**way**	**that**
van	**down**	**feet**	**Roy**
Ken	**mouth**	**zip**	**church**
quiz	**short**	**cake**	**zoom**
prize	**cheap**	**get**	**shirt**
not	**hurt**	**size**	**job**
chain	**weed**	**wide**	**year**
box	**joy**	**six**	**my**

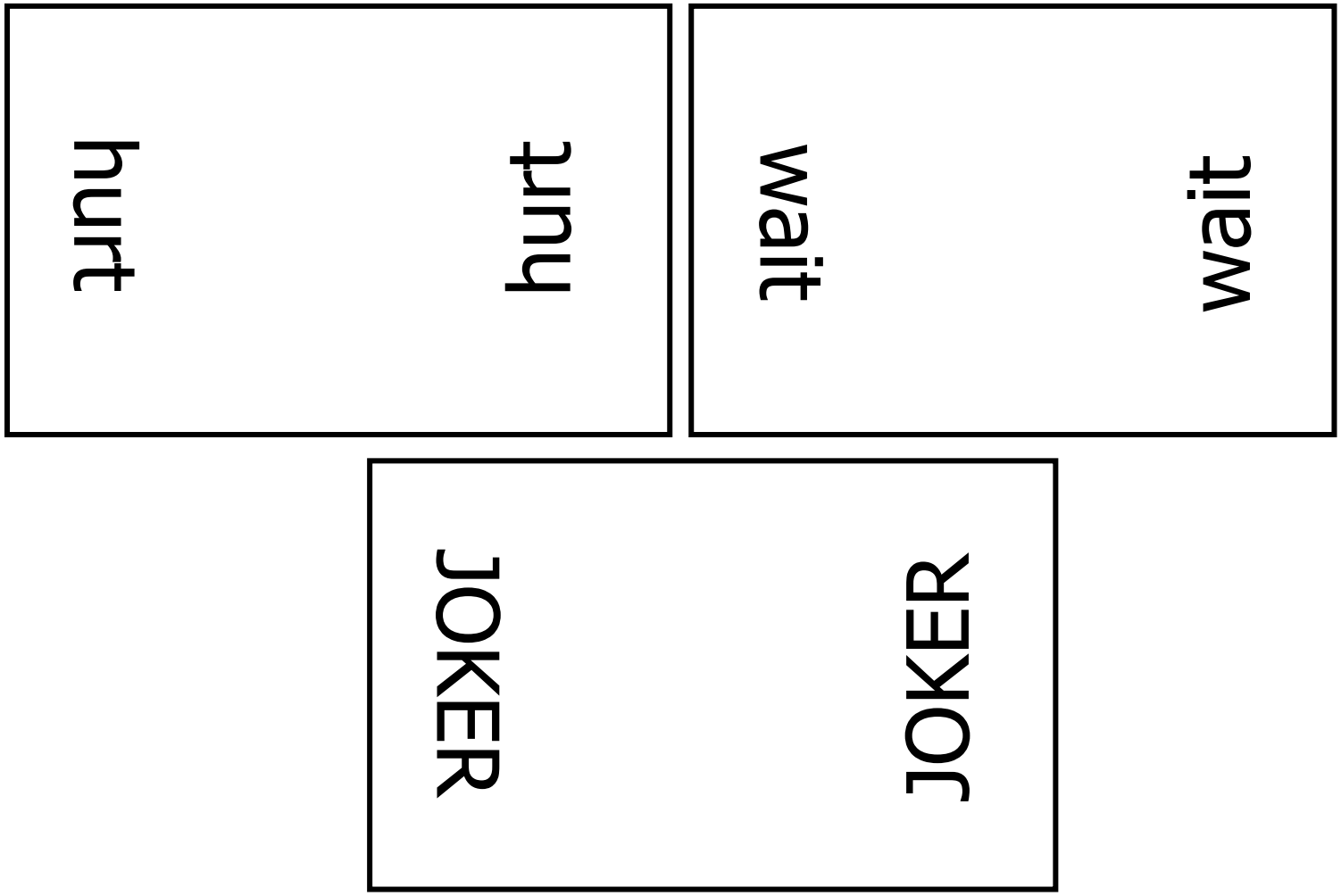
Appendix VI

van	Ken
yes	kick
quiz	not

Appendix VII



Appendix VIII



Appendix IX

Sample behaviour chart

Time	Sophie	Isaiah	Emily	Jesse
0915				
0917				
0919				
0921				
0923				
0925				
0927				
0929				
0931				
0933				
0935				
0937				
0939				
0941				

Guidelines: Observe each child at two-minute intervals, then:

- Tick if on-task

- Cross if off-task

- If more ticks than crosses at end of practice session, child receives token reward