A Metacognitive Program for Improving the word Identification and Reading Comprehension skills of Upper Primary Poor Readers

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ABSTRACT

A great deal of current research supports the notion that the remediation of comprehension problems firstly requires help in developing automaticity in word identification so that the word recognition tasks require little attention. Furthermore, it has been proposed that a metacognitive instructional approach to teaching word identification skills may be a useful way of ameliorating word identification problems as it has proven to be with comprehension difficulties. This paper reports on two studies designed to examine
the effectiveness of a program for improving the reading skills of upper primary poor readers by combining metacognitive instruction in word identification with reciprocal teaching of comprehension strategies.

The first study aimed to trial the proposed program, and involved instruction of poor readers by the experimenter in small groups in a withdrawal situation. The second study was designed to explore organisational features which would best facilitate the implementation of the program by the regular class teacher in the classroom setting. In each study subjects were tested pre-, mid-, and post-intervention with a range of measures of word identification, metacognitive abilities in word identification and comprehension. The results provided evidence for the facilitative effects of the program on both word identification and comprehension skills, but indicated the need for further research into the most effective ways of implementing the program into the regular classroom.

CHAPTER ONE
INTRODUCTION

Metacognitive research has provided valuable insights into effective methods of teaching comprehension skills to children with reading difficulty (e.g., Bruce & Chan, 1991; Cole & Chan, 1990; Cross & Paris, 1988; Lysynchuk & Pressley, 1990; O'Shea, & O'Shea, 1994; Palincsar & Brown, 1983, 1987; Pressley, Johnson, Symons, & McGoldrick, 1989; Roberts & Erdos, 1993; Talbott, Lloyd, & Tankersley, 1994). However, there has been very little parallel research into a metacognitive approach to teaching word identification skills to children with reading problems (Calfee & Drum, 1986; Spedding & Chan, 1994). Moreover, the authors of a number of the successful metacognitive training programs described in the literature stress that they are designed for students who are adequate decoders but poor comprehenders (Englert, Tarrant, Mariage, & Oxer, 1994; Palincsar, 1987; Palincsar & Brown, 1984; Pressley, Johnson & Symons, 1987). Despite the orientation of metacognitive programs towards skilled decoders, there is evidence that children who are adequate decoders but poor comprehenders (often referred to as hyperlexics), (Gough & Tunmer, 1986; Shankweiler, 1989), only actually constitute only a small proportion of the reading disabled population (Perfetti, 1986). In addition there are questions as to whether their decoding skills of hyperlexics have actually reached the stage of automaticity necessary for the smooth operation of comprehension processes (Herdman & LeFevre, 1992; Näsström & Samuels, 1992; Perfetti, 1986; Stanovich, 1986a; Walczyk & Raska, 1992). Rather, the vast majority of poor readers have problems in both decoding and comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990; Perfetti, 1986; Shankweiler, 1989; Stanovich, 1986a, 1988), which become increasingly pronounced as children move through the primary grades and into high school (Perfetti, 1986;
Stanovich, 1986a, 1992). It follows that an effective intervention at the upper primary level would seek to use metacognitive insights to remediate deficits in both word identification and comprehension skills.

In this chapter the concept of reading difficulties is first defined. This is followed by a description of efficient word identification skills and an outline of the characteristics typically exhibited by children with reading difficulties. The concept of metacognition is then defined followed by a discussion of a proposed metacognitive approach to remediating the word identification, reading comprehension and motivational deficits of poor readers. Finally there is a statement of the purpose of the research and the research questions are outlined.

READING DIFFICULTIES

Estimations of the number of school-age children who experience difficulties in learning to read vary from 5% to as much as 40% depending on the definition being used (Berninger, Hart, Abbott, & Karovsky, 1992; Prior, Sanson, Smart, & Oberklaid, 1995; Stanovich, Nathan, & Vala-Rossi, 1986). Australian surveys suggest that somewhere between 10% and 20% of primary school children have significant and persistent problems in learning to read (House of Representatives Standing Committee on Employment, Education and Training, 1992; Keeves, Matthews, & Bourke, 1978; Prior et al., 1995; van Kraayenoord & Elkins, 1990). Below is the definition of reading difficulties used in this study along with research information justifying the choice of that definition.

Definition

In recent decades it has been common to classify poor readers according to whether or not they exhibit a discrepancy between their actual level of achievement and that which could be expected based on their IQ and chronological age (Hammill, 1990; Pennington, Gilger, Olson, & DeFries, 1992; Stanovich, 1988a, 1991a; Stanovich & Siegel, 1994). Those who show statistically significant discrepancies between reading achievement and intelligence test performance are variously referred to as reading disabled, specific reading disabled, specific reading retarded, dyslexic or developmental dyslexic (Block, 1995; Miles & Miles, 1990; Rutter & Yule, 1975; Stanovich, 1988a; Stanovich & Siegel, 1994). The individuals in this group are said to have unexpected reading problems, in that their reading competence is well below the expected level despite having normal or above-average intelligence, adequate educational opportunity, and no obvious sensory or neurological damage. In contrast, those whose poor reading achievement is predictable from their below-average intelligence test scores are usually labelled backward readers (Rutter & Yule, 1975), or garden variety poor readers (Gough & Tunmer, 1986; Stanovich, 1988a).

According to research evidence, the vast majority of school-age poor
readers belong in the latter category (Gough & Tunmer, 1986; Stanovich, 1991a). In addition, contrary to widely held beliefs, there is not a significantly greater proportion of boys than girls with reading difficulties (Block, 1995; Pennington et al. 1992; Prior et al., 1995).

The critical assumption behind the IQ-discrepant versus low-functioning definitions is that the two groups constitute distinctive subtypes and have different reading problems requiring different instructional methods (Fletcher, Shaywitz, Shankweiler, Katz, Liberman, Stuebing, Francis, Fowler, & Shaywitz, 1994; Share, Jorm, Matthews, & Maclean, 1988; Siegel, 1992; Stanovich, 1991a). However, recent research evidence has questioned at least one component of this assumption. This evidence suggests that poor readers of all levels (with and without an aptitude-achievement discrepancy) share a common source to their reading problem, that of unusual difficulty in acquiring the independent word recognition skills necessary for later skilled reading (eg Aaron, 1991; Berninger et al., 1992; Felton & Wood, 1992; Fletcher et al., 1994; Glez & López, 1994; Gough & Tunmer, 1986; Jorm, Share, Maclean, & Matthews, 1986; Pennington et al., 1992; Share, Jorm, Matthews, & Maclean, 1988; Siegel, 1989a, 1990b, 1992; Stanovich, 1991a, 1991b; Stanovich & Siegel, 1994). Research indicates two possible underlying causal mechanisms for these word recognition problems. First, a substantial and growing body of research suggests that the vast majority of poor readers right along the continuum from garden variety to dyslexic, experience phonological processing deficits which impede the development of spelling-to-sound correspondence skills (eg Fletcher et al., 1994; Felton & Wood, 1992; Glez & López, 1994; Jorm et al., 1986; Pennington et al., 1992; Perfetti, 1986, 1991; Rack, Snowling, & Olson, 1992; Shankweiler, 1989; Siegel, 1989a, 1990b, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a, 1992; Stanovich & Siegel, 1994; Stuart & Masterson, 1992; Torgesen, Wagner, & Rashotte, 1994; Vellutino, Scanlon, & Spearling, 1995). Second, converging evidence indicates that some poor readers, regardless of levels of intelligence, experience visual processing deficits which cause problems in recognising words on a visual/orthographic basis (Breitmeyer, 1989; Eden, Stein, Wood, & Wood, 1995; Lehmkühle, Garzia, Turner, Has, & Baro, 1993; Lovegrove, Martin, & Slaghuis, 1986; Manis, Szczulski, Holt, & Graves, 1990; Robinson, 1994; Robinson & Conway, 1994; Stanovich, 1991a, 1992; Tyrrell, Holland, Dennis, & Wilkins, 1995; Williams, Lecluyse, & Rock-Faucheux, 1992).

It is only as one moves outside the word recognition domain, which is at the core of reading disability, that evidence of differential effects of various IQ levels has been found. This evidence suggests that poor readers with an aptitude-achievement discrepancy, ie dyslexia, are likely to outperform garden variety poor readers in a variety of cognitive areas such as memory tasks (Glez & López, 1994; Stanovich, 1988a; 1991a, Stanovich & Siegel, 1994); listening comprehension (Aaron, 1991; Fletcher at al., 1994; Gough & Tunmer,
1986; Pennington et al., 1992; Stanovich, 1988a, 1991a) and, to a lesser extent, in general language abilities such as vocabulary knowledge and sensitivity to the syntactic and semantic features of text (Stanovich, 1988a, 1991a; Stanovich & Siegel, 1994). However, the performance of children with dyslexia is still below that of their normally-achieving peers on most memory and language tasks (Fletcher et al., 1994; Manis et al., 1990; Siegel, 1992; Stanovich & Siegel, 1994). This evidence suggests that for educational purposes, the most appropriate measure for defining reading disabilities may simply be a low score on a word recognition test (Berninger et al., 1992; Felton & Wood, 1992; Fletcher et al, 1994; Jenkins, Pious, & Peterson, 1988; Siegel, 1992). It also suggests that there is little difference between age- and IQ-discrepant poor readers in the kind of instructional programs they require (Berninger et al., 1992; Jenkins et al., 1988; Siegel, 1989a; Spear-Swerling & Sternberg, 1994; Stanovich, 1991a; Torgesen, 1989), although there is evidence that verbal IQ will constrain how well and how fast students respond to treatment (Berninger et al., 1992; Pennington et al., 1992; Wong, 1989) and the level to which reading comprehension develops (Berninger et al., 1992; Stanovich, 1988a).

Consistent with this research and in accordance with Australian Federal Government Education policy which adopts a non-categorical approach to services for students with learning difficulties (Cadman, 1976) poor readers in this study have been defined without strict regard to psychometric measures of aptitude-achievement discrepancy. Instead a functional criterion of a discrepancy between word recognition reading age and chronological age was used. Because this study focuses on upper primary students (Years 5 & 6 in NSW) a discrepancy of at least 18 months was chosen, taking into account that upper primary students whose reading achievement is at the middle primary school level (or lower) will be seriously disadvantaged academically. In addition, the problems of the poor readers in this study are described with the more general term reading difficulties, rather than the term reading disabilities which has connotations of specific causality and categorisation (Casey, 1994; Elkins, 1990). Students with an obvious intellectual or sensory disability, however, were excluded from the subject sample.

A key component of the definition used in this study is the notion that the source of the difficulty for the vast majority of poor readers is failure to develop accurate and efficient, (ie automatic,) word identification skills. However, it is also recognised that while there may be one source of reading difficulty there are many consequences (Stanovich, 1992). In order to better understand the nature of the difficulties of poor readers the concept of automatic word identification will first be discussed. The likely consequences of early coding failure will then be outlined, with particular reference to children at the upper primary level of schooling.

**STAGES OF WORD IDENTIFICATION**
The term word identification, is used interchangeably in this study with the term word recognition to refer to the process whereby the reader extracts enough information from printed text to allow “access to the appropriate entry in the mental lexicon, and thus, the retrieval of semantic information at the word level” (Hoover & Gough, 1990, p.130). The information used for identifying words can include contextual cues (semantic and syntactic information); graphophonic cues (knowledge of relationship between spellings and pronunciation); and structural cues (use of the unique syllabification and morphological features of English orthography) (Alexander & Heathington, 1988; Durkin, 1981, 1983; Ekwall & Shanker, 1988; Spear-Swerling & Sternberg, 1994; Taylor, Harris, & Pearson, 1988). The related term decoding is usually limited to the use of graphophonic and structural cues in word identification (Samuels, 1988; Tunmer & Nesdale, 1985).

Recent theories of reading acquisition propose that normally achieving readers move through several distinct yet overlapping developmental stages in progressing to fluent word recognition (eg Adams, 1990; Adams & Bruck, 1995; Biemiller, 1970; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; Gough, Juel, & Griffith, 1992; Marsh, Friedman, Welch, & Desberg, 1981; Spear-Swerling & Sternberg, 1994). While there is some debate as to the sequencing of the stages and the precise focus of each (eg Stuart & Coltheart, 1988; Ellis, 1993), most models suggest a progression from visually-based, to phonological-based to orthographically-based word acquisition procedures, with particular emphasis on the fundamental importance of the phonological stage in beginning reading (eg Adams & Bruck, 1995; Byrne, 1992; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; Gough, Juel, & Griffith, 1992; Snowling, 1991; Spear-Swerling & Sternberg, 1994). A broad overview of each of these stages will now be provided.

The first stage is often referred to as the logographic (Frith, 1985) or visual-cue stage (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994), because beginning readers tend to recognise words through association with some arbitrarily selected, distinctive visual cue which bears no relationship to the phonological structure of the word. These associations may include picture cues, the shape or length of the word, the colour or font in which the word is printed, the first or last letter of the word, or a distinctive logo (Adams & Bruck, 1995; Byrne, 1992; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; Gough et al., 1992; Spear-Swerling & Sternberg, 1994). For example the child may associate yellow with the two sticks in the middle, donkey with the tail on the end, and the road sign STOP with the distinctive shape and colours of the sign post. Given the same words in a different context or in a different case (upper instead of lower, etc), the child may no longer be able to read them (Ehri, 1992). Logographic reading is characteristic of most preschool and some kindergarten children, who are developing insights into the nature and function of print but who have little knowledge about letter names and sounds or of the phonological structure of speech and how phonemes are represented by

Research indicates that while children can be taught to read many words through this strategy, continued reliance on rote memory of visual cues eventually leads to difficulties for at least two reasons. First, as the list of known words increases, it becomes increasingly difficult to find a unique cue by which to remember each newly encountered word (Gough & Juel, 1991; Gough et al., 1992). Second, logographic readers have no way of decoding or "sounding out" unfamiliar words (Adams & Bruck, 1995; Byrne, Freebody, & Gates, 1992; Gough & Juel, 1991; Gough et al., 1992; Snowling, 1987; Stainthorp, 1989; Spear-Swerling & Sternberg, 1994). Instead they rely on context to supply a semantically and syntactically appropriate, though not necessarily graphically correct, substitute for the unknown word (Biemiller, 1970; Ehri, 1992; Gough & Juel, 1991; Gough et al., 1992; Marsh et al., 1981). This strategy is described as being similar to the "top-down" processes recommended by the advocates of the "psycholinguistic guessing game" (eg Goodman, 1967; Smith, 1971) (Adams, 1991; Adams & Bruck, 1993, 1995). It has been shown, however, that while reliance on context may facilitate the identification of short, high frequency words in the beginning stages of reading, it is unreliable for the recognition of longer, less common words in more difficult text (Biemiller, 1979; Gough, 1983; Gough, Alford, & Holley-Wilcox, 1981), and is particularly problematic when reading text where there are many unfamiliar words (Stanovich, 1984, 1986a; 1986b). For these reasons there is agreement among many theorists that if progress is to be made in reading, children must move into the next stage where they learn to read words via a phonological rather than a visual route (eg Adams, 1991; Adams & Bruck, 1995; Gough & Juel, 1991).

This second stage is often referred to as the alphabetic stage (Frith, 1985), as word recognition is no longer dependent on an arbitrary selection of visual cues but on systematic connections between spellings and pronunciations of words (Adams & Bruck, 1995; Ehri, 1991, 1992). Entry into this stage is dependent on at least three interacting factors. First, a rudimentary level of phonological awareness, which involves an awareness of the sounds within speech and the ability to isolate, blend, segment, or otherwise manipulate those sounds. Second, this stage is dependent upon a knowledge of letter sound/names; and third, upon the attainment of alphabetic insight, or the realisation that specific speech sounds and letters map onto each other in a systematic way (Adams & Bruck, 1995; Byrne, 1992; Ehri, 1991, 1992; Frith, 1985; McBride-Chang, 1995; Munro & Munro, 1993; Spear-Swerling & Sternberg, 1994). It has been argued that children who enter school with good phonological awareness and knowledge of letter sounds and names, may bypass the logographic stage and launch straight into the alphabetic stage of reading (Ellis, 1993; Stuart & Coltheart, 1988). However, there is strong evidence that many children do not gain such insights readily without explicit and specific
specific instruction in the alphabetic principle can foster the discovery of parallel phonological principles thus further facilitating the acquisition of word recognition skills (Adams, 1991; Ehri & Wilce, 1987; Ehri, 1991, 1992; Perfetti, Beck, Bell, & Hughes, 1987). According to several theorists (e.g., Ehri, 1991, 1992; Marsh et al., 1981; Spear-Swerling and Sternberg, 1994) there are two phases in the alphabetic stage. In the initial phonetic-cue phase (Ehri, 1991, 1992), children make only partial and incomplete use of phonetic cues, such as using only the first and last letters in spellings, thus causing them to misread words with the same visual-phonetic cues. For example, children using the initial b and final t may confuse boat with boot (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994). For this reason children in the phonetic-cue stage of beginning reading continue to rely heavily on contextual information (syntactic and semantic) to assist in word identification (Goldsmith-Phillips, 1989; Perfetti, 1986; Rayner, 1988; Simons & Leu, 1987; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a; Stanovich et al., 1986).

Over time, children should progress to the more mature second phase of alphabetic reading which has been termed cipher reading (Ehri, 1991, 1992), sequential decoding (Marsh et al., 1981), or controlled word recognition (Swerling-Spear & Sternberg, 1994). During this phase they learn to use all the letters in a word as part of the identification process and are able to move from simple, invariant letter-sound relations (e.g., bat) to the use of increasingly complex graphophonological information, such as long vowels (tap vs. tape), vowel digraphs (ea, ow), and permissible letter strings (-tion and -ight) (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994). It has been suggested that progress through this phase is facilitated through specific instruction in subword units of English orthography such as onset/rime spelling patterns (e.g., st/art), syllables, and root words and affixes (Barker et al., 1992; Goswami, 1994; Goswami & Bryant, 1992; Henry, 1988, 1993; Moustafa, 1995; Olson, Wise, Conners, Rack, & Fulker, 1989; Treiman, 1992). As a result, decoding becomes increasingly accurate and there is correspondingly less reliance on contextual cues (Goldsmith-Phillips, 1989; Perfetti, 1986; Rayner, 1988; Simons & Leu, 1987; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a; Stanovich et al., 1986). However, word identification still requires considerable effort, thus drawing away attentional resources from higher-order comprehension skills (Breznitz, 1987; Chan & Robinson, 1990; Juel, Griffith, & Gough, 1986; Kirby & Williams, 1991; LaBerge & Samuels, 1974; Lovett, 1987; Näslund & Samuels, 1992; Perfetti, 1985; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). In the third and final automatic word recognition (Spear-Swerling &
Sternberg, 1994) or orthographic stage (Frith, 1985) words are recognised accurately and effortlessly through memory for specific visual/orthographic representations of the words or word parts (Adams, 1991; Barker et al, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). Automatic word recognition allows higher-order comprehension processes to operate efficiently (Näslund & Samuels, 1992; Perfetti, 1986; Perfetti & Lesgold, 1979; Spear-Swerling & Sternberg, 1994; Stanovich, 1984,1986a, 1992). The effective use of orthographic processing skills in the automatic word recognition stage is claimed to be dependent on sufficient exposure to print to allow specific words and subword representations to become permanently remembered (Adams, 1991; Cunningham & Stanovich, 1990; Ehri, 1991, 1992; Olson et al, 1989; Juel, Griffith, & Gough, 1986; Perfetti, 1986; Stanovich & West, 1989). Automatisation may be domain specific; while mature readers can recognise the vast majority of words automatically, they still make flexible and efficient use of a variety of graphophonic and contextual cues for unusual words from an unfamiliar domain (Näslund & Samuels, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). There is evidence that domain specific automatisation can be acquired by normally achieving readers as early as grade one (Perfetti, 1992), and by second- to third-grade they can recognise most words that are in their spoken vocabularies automatically (Anderson, Hiebert, Scott, & Wilkinson, 1985; Chall, 1983).

However, while normally-achieving students may be reading grade-level materials fluently by mid primary years, poor readers in the upper primary school (the subjects of this study) are likely to be still struggling through the earlier stages of reading (Spear-Swerling & Sternberg, 1994). Stanovich (1980, 1984) has coined the term interactive-compensatory to describe the process whereby poor readers (and skilled readers coping with degraded text) are likely to make increased use of contextual information in word recognition to compensate for decoding difficulties. He claims that where context is adequately understood, they use top-down or conceptually driven processes to compensate for their lack of bottom-up or data driven processes, a phenomena replicated in other studies (eg Goldsmith-Phillips, 1989; Simons & Leu, 1987; Yoon, 1994). However, Stanovich (1984) also points out that the use of higher-level processes to compensate for poor word recognition skills comes at a cost. While the compensatory mechanism may facilitate the processing of unknown words, it does so at the expense of cognitive capacity. Thus less capacity remains for the operation of comprehension processes which of themselves tend to be very capacity draining. According to Stanovich (1984) "there is no substitute for automatic, efficient data-driven processing at the word level. Capacity must be freed for the all-important comprehension and text integration processes" (p.15).

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several distinct yet overlapping developmental stages on the road to fluent word recognition (eg Adams, 1990; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; Marsh, Friedman, Welch, & Desberg, 1981; Spear-Swerling, 1994). In the first stage, known as the logographic (Frith, 1985) or visual-cue (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994) stage, children tend to rely on some arbitrary, nonalphabetic visual cue such as picture cues, shape, colour, or a distinctive logo, to recognise words. Visual-cue word recognition is characteristic of preschool and some kindergarten children who are just beginning to recognise words.

Children next enter the alphabetic stage (Frith, 1985) in which they learn to recognise and remember words on the basis of systematic visual-phonological connections between letters seen in words and sounds detected in their pronunciation (Ehri, 1992). Entry into this stage is dependent on at least two factors. First, a rudimentary level of phonological awareness, ie an awareness of the sounds within speech and the ability to isolate, blend, segment, or otherwise manipulate those sounds; and second, the attainment of alphabetic insight, or the realisation that specific speech sounds and letters map onto each other in a systematic way (Byrne, 1992; Ehri, 1991, 1992; Frith, 1985; McBride-Chang, 1995; Munro & Munro, 1993; Spear-Swerling & Sternberg, 1994).

According to Spear-Swerling and Sternberg (1994) and Ehri (1991, 1992) there are two phases in the alphabetic stage. In the initial phonetic-cue phase, children make only partial and incomplete use of phonetic cues, such as using only the first and last letters in spellings, thus causing them to misread words with the same visual-phonetic cues. For example children using the initial b and final t may confuse boat with boot (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994). For this reason children in the early stages of beginning reading tend to rely heavily on contextual information (syntactic and semantic) to assist in word identification (Goldsmith-Phillips, 1989; Perfetti, 1986; Rayner, 1988; Simons & Leu, 1987; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a; Stanovich et al., 1986).

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Automatic word recognition sets the stage for higher-order comprehension processes to operate efficiently (Nöslund & Samuels, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a, 1992). It has been suggested that effective use of orthographic processing skills in the automatic word recognition stage is dependent on two factors. First, that the reader has adopted an analytical processing style that allows him or her to make use of the subword units of English orthography such as onset/rime spelling patterns, eg st/art, syllables, and root words and affixes (Barker et al, 1992; Goswami, 1994; Moustafa, 1995; Olson, Wise, Conners, Rack, & Fulker, 1989). Second, sufficient exposure to print to allow specific words and subword representations to become permanently stored in the mental lexicon (Cunningham & Stanovich, 1990; Ehri, 1991, 1992; Olson et al, 1989; Juel, Griffith, & Gough, 1986; Perfetti, 1986; Stanovich & West, 1989). Automatisation can be domain specific so that while mature readers can recognise the vast majority of words automatically, they still make flexible and efficient use of a variety of graphophonic and contextual cues for unusual words from an unfamiliar domain (Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). It has been suggested that domain specific automatisation can be acquired by normally achieving readers as early as grade one (Perfetti, 1992), and that by second- to third-grade they can recognise most words that are in their spoken vocabularies automatically (Anderson, Hiebert, Scott, & Wilkinson, 1985; Chall, 1983). The developmental trend whereby the relative reliance on context to facilitate word recognition used by skilled and less skilled readers changes at different levels of the processing hierarchy, has been incorporated into Stanovich's (1980, 1984) interactive-compensatory model of reading. According to this model, however, while normally achieving readers have generally achieved automatic word recognition skills by the upper primary level, poor readers are likely to be still in the alphabetic stage and therefore making use of contextual information in word recognition to compensate for their decoding difficulties. The developmental trend whereby younger children and less skilled older children rely on contextual cues to compensate for their lack of automatic word
recognition skills has been addressed by Stanovich in his interactive-compensatory model of reading. Younger and less skilled older students who have not yet acquired word recognition automaticity in grade level materials, are likely to become compensatory readers (Spear-Swerling & Sternberg, 1994; Stanovich, 1980,1984; Yoon & Goetz, 1994) and

CONSEQUENCES OF FAILURE TO DEVELOP AUTOMATIC WORD IDENTIFICATION SKILLS

The consequences of early reading failure manifest themselves at a number of levels which will be discussed below.

Consequences at the Word Recognition Level

Longitudinal studies have shown that those children who do not develop good word recognition skills in first grade display ever increasing deficits in both accuracy and speed of word recognition (Gough & Juel, 1991; Juel, 1988; Manis, 1985; Mann, Cowin, & Schoenheimer, 1989; Prior et al., 1995; Rack et al., 1992; Samuels, 1988; Stanovich, 1986a, 1992; Torgesen et al, 1994). As they advance through the primary grades and into high school, particular problems with decoding long, polysyllabic words may be exhibited (Lewkowicz, 1985; Manis, 1985; Nicholson, 1986,1991; Perfetti, 1984; Stanovich, 1986a, 1992). In addition they are likely to display deficits in sequential processing of words (Bentin, Deutsch, & LibermanLind-Bland, 1990); an inability to generalise the rules for pronouncing long words (Lewkowicz, 1985; Schell, 1986); and a tendency to rely on only one strategy such as "sounding-out" by letter-sound correspondence (Henry, 1988; Lewkowicz, 1985; Rayner, 1988; Spiegel, 1985). Their lack of automatic word identification skills may also lead to a greater but far less efficient reliance on context cues than good readers (Kim & Goetz, 1994; Nicholson, 1986, 1991; Nicholson & Hill, 1985; Stanovich, 1986a, 1988). It has been proposed that these ongoing word recognition problems occur when children leave the road to proficient reading at one or more of several predictable points (Spear-Swerling and Sternberg,1994). The first major point of departure occurs when phonological processing deficits cause children to experience unusual difficulty in moving from the logographic to the alphabetic stage of reading (Spear-Swerling & Sternberg,1994). Research indicates that upper primary students who have failed to move beyond the alphabetic stage of word identification exhibit phonological processing deficits in one or more of the following areas: (a) lack of phonological awareness which slows the initial acquisition of letter-sound correspondences in the phonetic-cue reading phase (Adams, 1990; Bryant & Bradley, 1985; Bryant, MacLean,
Bradley, & Crossland, 1990; Byrne & Fielding-Barnsley, 1993; Felton, 1993; Griffeth, Klesius, & Kromrey, 1992; Jorm et al., 1986; Juel, 1988; Liber, & Shankweiler, 1991; O'Connor, Jenkins, & Slocum, 1995; Perfetti, Beck, Bell, & Hughes, 1987; Prior et al, 1995; Stanovich 1986, 1988a, 1992; Tunmer & Nesdale, 1985; Vellutino & Scanlon, 1987; (b) limitations within phonological working memory which results in phonemes and syllables of long words not being held in memory long enough to blend them into the whole word causing particular difficulty with holding in memory and sequencing and blending the phonemes and syllables of long words (Manis, 1985; McBride-Chang, 1995; Stanovich, 1985; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993; Watson & Williams, 1995); and (c) . In particular they may exhibit deficits in the rapid naming of highly familiar verbal material which impair children's ability to easily and rapidly match a string of phonemes in a written word to a word within the reader's listening vocabulary (Blachman, 1994; Manis, 1985; Stanovich, 1985; Torgesen et al., 1994, Watson & Williams, 1995). According to Blachman (1994) "poor phoneme awareness may get the child into a remedial reading program, but also having a naming rate deficit may be what keeps the child in the program" (p. 290).

The second major point of departure on the road to proficient reading occurs when orthographic processing deficits cause problems with moving from the alphabetic to the automatic stage of word recognition (Spear-Swerling & Sternberg, 1994; Watson &7 Williams, 1995). Although upper primary poor readers at upper primary may usually utilise regular letter-sound correspondence to pronounce printed words (Manis, 1985), they may appear to have difficulty in building up a store of visual representations of words and word parts. This can cause which causes them to laboriously "sound out" each letter of a long word rather than using the natural chunking of sub-word units, eg onset/rime patterns, syllables and root word plus affix (Henry, 1988; Lewkowicz, 1985; Rayner, 1988; Spiegel, 1985).

Recent evidence suggests that the phonological processing deficits which are the initial cause of the difficulty are highly heritable (Olson at al, 1989; Pennington et al., 1992; Stevenson, 1991; DeFries & Alarcón, 1996) and therefore enduring and resistant to change (Blachman, 1994; Torgesen et al., 1994). Orthographic processing deficits may be more environmentally mediated, as Poor readers tend to read far less than print than their normally achieving peers and thus do not get sufficient reading practice to build up an easily accessible mental store of word and subword spelling patterns which would facilitate automatic orthographic processing (Barker, Torgesen, & Wagner, 1992; Cunningham & Stanovich, 1990; Juel, Griffeth, & Gough, 1986; Olson et al., 1989; Pennington et al., 1992; Stanovich, 1992; Stanovich & Siegel, 1994; Stanovich & West, 1989). There is, however, a growing body of evidence which suggests that the reluctance of some poor readers to practice reading may be due to dysfunctions of the visual and oculomotor systems which may result in print distortions,
restricted span of recognition, and problems with sustaining focus (Eden, Stein, Wood, & Wood, 1995; Lehmkuhle et al., 1993; Lovegrove et al., 1986; Robinson & Conway, 1994; Whiting, 1985).

Consequences at the Comprehension Level

If studentsTo the extent that children fail to develop a high degree of word recognition coding efficiency, comprehension processes may be placed at risk, as poor word recognition skills usually accompany, and almost certainly exacerbate, comprehension deficits (Eldredge, Quinn, & Butterfield, 1990; Gough & Tunmer, 1986; Juel, 1988; Lewkowicz, 1987; Nöslund & Samuels, 1992; Perfetti, 1984, 1986; Samuels, 1987; Shankweiler, 1989; Stanovich, 1986a, 1988b; 1992). It has been suggested that poor decoding skills can reduce compromise comprehension processes in a number of ways. First, as indicated above, poor readers devote so much attention to the decoding task that there are not enough attentional resources left to allocate to construction of meaning (Ackerman, Spiker, & Bailey, 1991; Groff, 1991; Perfetti, 1986; Perfetti & Lesgold, 1979; Stanovich, 1993, 4). Second, the problem is exacerbated by the fact that less-skilled readers often find themselves reading grade-level materials that are too difficult for them, thus degrading the contextual clues which they might otherwise use to facilitate comprehension of text (Juel, 1988; Stanovich, 1986a, 1988, 1992). Finally, there is evidence that comprehension processes are compromised by a complex interaction between inefficient word recognition and increasingly pervasive general cognitive deficits (Stanovich, 1986a, 1992). These deficits include: a limited and slow growing vocabulary (Davey, 1987; Eldredge et al., 1990; Lewkowicz, 1985; Stanovich, 1986a); impaired listening skills (Juel, 1988; Mann et al., 1989; Perfetti, 1986; Stanovich, 1988b); deficits in metalinguistic and syntactic awareness (Bentin et al., 1990; Dreher & Zenge, 1990; Stanovich, 1992); increasing memory deficits (Brainerd, Kingman, & Howe, 1986; Torgesen, 1985), and significant gaps in general background knowledge (Juel, 1988; Stanovich, 1986a, 1992).

It has been suggested by Stanovich and his associates (Cunningham & Stanovich, 1990; Stanovich, 1986a, 1992; Stanovich & West, 1989) and Juel (1988), suggest that one reason for these more generalised cognitive deficits is that children who fail to develop good word recognition skills in the early grades begin to dislike reading and hence read significantly less than good readers. This lack of practice could delay thus impairing the development of vocabulary, syntactic knowledge, and general knowledge, concepts, and ideas, that are fostered by good reading, which. This in turn further inhibits growth in reading, thus leading to what Stanovich (1986a) calls this cycle the "Matthew Effects" or the "rich-get-richer" and the "poor-get-poorer", from the Gospel according to Matthew: "For to everyone who has, more will be given, and he will have abundance; but from him who does not have, even what he has will be taken away" (25:29).
Consequences at the Motivational Level

A third consequence of failure to develop efficient coding skills, is the affective and motivational problems that usually accompany and exacerbate difficulties with the crucial task of learning to read (Carr, Borkowski, & Maxwell, 1991; Dweck, 1986; Gaskins, 1984; Gaskins and Baron, 1985; Juel, 1988; Paris & Winograd, 1990; Pintrich, Anderman, & Klobucar, 1994; Schunk, 1989; Stanovich, 1986a, 1988b, 1992; Winograd & Paris, 1988-1989). Fear, doubt, shame or anger resulting from repeated failure experiences can lead to attitudes of "learned helplessness" whereby students attribute their failures to factors beyond their personal control. Characteristically, students who have learned to be helpless devalue any successes they do have by attributing them to luck or help from the teacher, and attribute their failures to the uncontrollable causes of low ability, task difficulty, or teacher bias (Borkowski, Weyhing, & Turner, 1986; Cullen, 1985; Jacobsen, Lowery, & DuCette, 1986; Winograd & Niquette, 1988). These students do not see themselves capable of success. Believing that they will fail regardless of whether or not effort is expended they give up trying and so perpetuate the failure cycle (Borkowski et al., 1986; Craske, 1988; Cullen, 1985; Paris & Winograd, 1990; Spear-Swerling & Sternberg, 1994;). According to Stanovich (1986, 1988b, 1992) the learned helplessness which resulted initially from reading failure may begin to influence performance in other cognitive tasks, thus leading to increasingly global performance deficits. Gaskins (1984) and Gaskins & Baron (1985) claim poor readers usually have so many "roadblocks" to success, (ie maladaptive cognitive styles, poor self-concepts, inflexibility, disorganisation, poor home support), that the prognosis for continued progress in reading is poor even after the reading problem itself has been "cured".

Although this characterisation suggests a poor prognosis for the disabled reader, especially after a number of years of failure (Stanovich, 1986a, 1988b; Stanovich et al, 1986), it also has some positive implications for educational practice. Many of the characteristics of poor decoders suggest deficiencies in metacognitive functioning (Wong, 1985; Rack et al., 1992; Spedding & Chan, 1993, 1994; Stanovich, 1991), and A metacognitive approach to decoding instruction may well be effective in developing lower-order reading skills, in much the same way that it has been found effective in developing higher-order comprehension skills in the learning disabled population (Calfee & Drum, 1986; Spedding & Chan, 1993, 1994).
Metacognition is usually defined as awareness and control of one's own learning activities (Baker, 1982; Baker & Brown, 1984). Thus a metacognitive approach to learning aims to help students develop an awareness of the skills, strategies, and resources needed to perform a task effectively; along with the ability to use self-regulatory mechanisms, such as planning, monitoring, evaluating and modifying strategies, so as to ensure the successful completion of the task (Baker, 1982; Baker & Brown, 1984; Wong, 1985). From this perspective, metacognitive instruction thus focuses on students' thoughtful and selective use of cognitive strategies to promote academic learning (Winograd & Paris, 1989-1990).

However, a metacognitive approach which focuses solely on cognition may fail to induce maintenance and generalisation of learned strategies, due to the influence of the affective and motivational problems mentioned above. Even if students are taught how, when, where and why to use effective strategies, they may not activate them because of negative perceptions about self-efficacy, or an attitude of learned helplessness (Borkowski, Carr, Relinger, & Pressley, 1990; Chan, 1992, 1994; Cullen, 1985; Paris & Winograd, 1990; Reeve & Brown, 1985; Schunk, 1989; Wong, 1985). Learned helplessness is partly due to the unavailability of metacognitive strategies for coping with failure (Borkowski et al, 1990; Cullen, 1985; Paris & Winograd, 1990). As a consequence, metacognition instruction could be expanded and refined to include self-appraisal and self-management of affective as well as cognitive components of learning (Borkowski et al, 1990; Cullen, 1985; Paris & Winograd, 1990; Reeve & Brown, 1985; Winograd and Paris, 1988-1989). From this perspective Metacognitive techniques should be included in both specific strategy training and motivational/attributional retraining (Bruce & Chan, 1994; Borkowski et al, 1986; Chan, 1993,1994), for "if we wish to help children develop into thoughtful and independent readers, we need to pay attention to both 'skill and will'" (Winograd & Paris, 1988-1989).

The crucial role of "shared knowledge" (Paris & Winograd, 1990) in helping children develop the metacognitive insights necessary for conscious control of both 'skill and will' has been the subject of much recent discussion in the literature (eg. Applebee and Langer, 1983; Beed, Hawkins, & Roller, 1991; Duffy & Roehler, 1986, 1987; Englert et al, 1994; Englert, Raphael, & Mariage, 1994; Garner, 1992; Reeve & Brown, 1985; Rosenshine, & Meister, 1992; Palincsar, 1986b; Palincsar & Brown, 1987; Paris & Winograd, 1990; Stone, 1989; Turnure, 1986). Shared knowledge is based on Vygotsky's (1978) theory of socially mediated learning. This theory suggests that the emergence and development of self- regulatory activities has its roots in social interactions with others, and only gradually comes under the conscious control of the child. Thus the focus of intervention should not be so much on task and performance factors, as on the importance of the social situation and, in particular, the personal involvement and impact of the teacher on the development of cognitive and metacognitive
Central to this socially interactive approach is the notion of "scaffolded instruction", i.e., a process whereby the expert adult provides the novice with just enough support and guidance to achieve goals that are beyond unassisted effort such that over a period of time student's performance comes to match expert performance (Applebee & Langer, 1983; Henderson, 1986; Palincsar, 1986b; Rosenshine, & Meister, 1992). Critical to the success of scaffolded instruction is the role of dialogue, whereby teachers engage their students in collaborative communication and conversation to help develop a shared understanding of the mental processes associated with the to-be-learned strategies to-be-learned. Teachers also use student responses to diagnose the sources of problems and spontaneously generate additional explanations and elaborations as needed until independent application of the strategies is achieved (Cole & Chan, 1990; Beed, Hawkins, & Roller, 1991; Duffy & Roehler, 1986, 1987; Englert et al, 1994; Palincsar & Brown, 1987; Paris & Winograd, 1990; Rosenshine, & Meister, 1992; Stone, 1989).

A variety of The research outlined in this review suggests specific metacognitive techniques for assisting poor readers have been discussed in the research outlined in this review. Remediating comprehension problems firstly requires help in developing automaticity of decoding so that word recognition tasks require little attention. Second, A metacognitive instructional approach to teaching word identification skills could thus be a useful way of helping to ameliorate word identification their problems as it has proven to be with comprehension difficulties. A ideal metacognitive training program for students with poor word recognition skills would include the following features: (1) instruction in task specific strategies for word identification (cognition) and in techniques to monitor and control the use of those strategies (metacognition); combined with (2) attributional retraining to help students develop realistic metacognitive self-appraisals about themselves as learners and about their attributions of success and failure; all of which should take place in (3) a socially interactive learning environment (scaffolded instruction), where the teacher gradually helps pupils take responsibility for their own learning. Each of these aspects will now be discussed in more detail.

Developing Metacognitive Abilities in Word Identification for Poor Readers

There are numerous reading texts and research articles which describe
the cognitive strategies used by skilled readers to identify words efficiently and automatically (e.g., Alexander & Heathington, 1988; Bateman, 1991; Choate & Rakes, 1989; Curtis & McCart, 1992; Durkin, 1981; Eckwall & Shanker, 1988; Henry, 1988; Lenz & Hughes, 1990; Lovett, Warren-Chaplin, Ransby, & Borden, 1990; Merry, & Peutrill, 1994; Samuels, 1988; Spiegel, 1985; Taylor et al., 1988; Wolf, Desberg, & Marsh, 1985). However, only one study could be found which sought to assess metacognitive abilities in word identification and their relationship to reading competence (Spedding and Chan, 1993, 1994). As discussed previously, cognitive word identification strategies used by skilled readers include the use of visual/orthographic analysis (automatic sight word recognition); graphophonological analysis (letter-sound correspondence); structural analysis (morpheme patterns and syllabification) and, occasionally, contextual analysis (syntactic and semantic cues). By way of contrast, poor readers at the upper primary level (the focus of this study) are likely to be employing slow and inaccurate decoding strategies and relying on context to compensate for their deficiencies in word identification skills (Goldsmith-Phillips, 1989; Spear-Swerling & Sternberg, 1994; Stanovich et al., 1986). Use of context cues is likely to be inefficient because their poor decoding skills may preclude them from accessing syntactic and semantic patterns in text unknown words, especially when reading unfamiliar material in the content areas (Goldsmith-Phillips, 1989; Lewkowicz, 1987; Kim, & Goetz, 1994; Nicholson, 1986; Schatz & Baldwin, 1986; Stanovich, 1986a; Taylor et al., 1988). As a consequence there is a need for specific strategy instruction in word identification skills for those students.

Research by Spedding and Chan (1993, 1994) into metacognitive abilities in word identification and its relationship to reading competence for Year Five poor readers, indicated that Year 5 poor reader's students' problems with word identification may reflect deficiencies in the metacognitive abilities that underlie this skill. The particular metacognitive abilities in which poor readers of this age group were found to be inferior were the use of orthographic cues, morphological cues and context cues. It was found that poor readers were less strategic than average readers in using these cues and were often unaware of the strategies they did use. From this research it seems evident that a training program for upper primary poor readers should include instruction in the strategic and flexible use of a variety of word identification cues so as to improve students' competence in identifying unfamiliar words, and hence improve their reading comprehension.

Improving Student Motivation

Borkowski et al. (1988) suggest that for poor readers, metacognitive instruction should include both specific strategy training and motivational/attributional retraining whereby students can learn to
Attribute their success and failure to factors within their personal control (Borkowski et al, 1988). It has also been suggested that attributional retraining for these students should focus not only on effort attributions, but more importantly on training students to attribute their successes and failures to the use or non-use of effective strategies (Chen, 1993, 1994; Clifford, 1986; Licht & Kistner, 1986). There is evidence that attributional training which focuses solely on effort attributions may be potentially negative for students experiencing difficulties in learning, particularly if they do not how to try harder and find themselves failing in spite of increased effort (Chan, 1994; Clifford, 1986; Clifford, Ahyoung, & McDonald, 1988; Craske, 1988; Cullen, 1985). To attribute failure to ineffective use of strategies has the advantages of not only reducing the guilt and shame associated with not trying, but also of turning failure outcomes into problem-solving situations where the search for a more effective strategy becomes the focus of attention (Clifford, 1986).

The few research studies found in the literature which combine specific strategy instruction with attributional training (eg. Borkowski et al, 1988; Ho & McMurtrie, 1991) have almost invariably focused only on effort (versus ability) attributions, with mixed results. Borkowski and associates (1988) reported improved academic performance as the result of training on paired-associate and sort-recall tasks, but no change in antecedent attributional beliefs, i.e. long-standing dysfunctional beliefs about personal causality. Ho and McMurtrie (1991) did report that as a result of attributional training during a task designed to improve students' organisational and self-monitoring skills, underachieving subjects were more likely to attribute success and failure to effort (or lack of it) and less likely to luck. However, as pointed out by Chan (1993) and Clifford (1986) attributions of failure to effort alone can lead to feelings of guilt and an increase in learned helplessness.

One of the few studies in which students were trained to attribute success to both effort and effective use of strategies was that of Chan (1993). This program used a self-questioning strategy to improve reading comprehension and was effective in improving the reading comprehension performance of poor readers and increasing their likelihood of attributing failure to ineffective use of strategies. As stated earlier attributing failure to ineffective use of strategies is preferable to attributing failure only to lack of effort, as students would then be more likely to perceive that they can achieve future success by effective use of the learned strategies.

Scaffolded Instruction/Reciprocal Teaching

Reciprocal teaching, a program designed by Palincsar & Brown (1983, 1984) to improve students' comprehension of text, emphasises the interactive communication and flow of information which is the hallmark of scaffolded instruction. Reciprocal teaching has been characterised as "a dialogue between teachers and students for the purpose of jointly constructing the meaning of text" (Palincsar, 1986a, p. 119). The
dialogue is structured by the use of four strategies that represent the kind of engagement experienced by successful readers: (1), predicting clarifying, (2) clarifying question generating, (3) question generating summarising, and (4) summarising predicting (Palincsar, 1983, 1986a, Palincsar & Brown, 1987).

In reciprocal teaching the teacher initially models and explains how to use the four strategies, together with providing information about their importance and the context in which they are useful. After this the initial days of instruction, students are asked to take turns being "the teacher" by leading in the dialogue for one segment at a time, while the teacher provides feedback and coaching as necessary. Thus, the dialogue acts as a kind of scaffold - a temporary and adjustable support to instruction, allowing the teacher to adjust instruction to the students' individual needs and to gradually withdraw support as the students acquire and refine the strategies being learned (Palincsar, 1986a, 1986b; Palincsar & Brown, 1987).

Reviews of the research into reciprocal teaching by Moore (1988) and Rosenshine & Meister (1994) indicated that such, in general, reciprocal teaching procedures produce significant show powerful effects that transfer and generalise.

A major criticism of the original reciprocal teaching program is that its was designed for students who are adequate decoders at grade level but poor comprehenders (Palincsar & Brown, 1983), hence it may not be entirely effective for its inapplicability to many most poor readers (Rosenshine & Meister, 1994). A recent study by Bruce & Chan (1991) sought to overcome this problem by rewriting the instructional materials for a group of Year Five and Year Six poor readers at their instructional reading level, (ie, at a Year Three level), with positive results. The results demonstrated the effectiveness of this modification of a reciprocal teaching program for enhancing the reading competence of poor readers. In addition, By combining reciprocal teaching with a transenvironmental program designed to promote transfer of learned strategies to the regular classroom, they were also able to provide an very effective means of facilitating poor reader's unprompted use of relevant text processing strategies for enhancing text processing. However, this study was probably of limited practical value for classroom teachers for two reasons. First, the decoding problems of the students were not addressed, and hence they would presumably continue to encounter difficulties in the comprehension of grade level materials. Second, time constraints would probably deter most teachers from the ongoing task of rewriting materials at the instructional level of the poor readers in their classrooms.

It follows then that an effective instructional program for upper primary poor readers would involve the use of an interactive, scaffolded instructional approach.

The success of reciprocal teaching procedures for enhancing comprehension of text, suggests it could be used to improve students' competence in word identification strategies. It is proposed that such
a program will involve an interactive scaffolded instructional approach to helping the students learn appropriate strategies for identifying the unfamiliar words, prior to using reciprocal teaching procedures for improving comprehension of written text. The particular word identification strategies to be targeted will be (1) Consider the Context (semantic and syntactic cues), (2) Compare with known words or word parts (phonemic and orthographic cues), and (3) Carve up the word parts (structural and morphological cues), and (4), if all else fails, Check with someone.

Using the motto "Be flexible. Look for the cues. Does it make sense?" the teacher will initially explain and model the use of the strategies, together with providing metacognitive information about their importance and how, when and where they can be used. As each new word is decoded the opportunity will be taken to list and discuss other words which can be identified by using the same cue (eg. have the same spelling or structural pattern). After the initial days of instruction, the students will be asked to take turns leading out in the dialogue one section at a time, with the teacher providing feedback and coaching as necessary. An important part of the feedback will be elements of attributional retraining, whereby the students will be led to understand that their success in identifying the words is because they are using the correct strategies.

Once the students have developed competency in word recognition they will be introduced to reciprocal teaching procedures for enhancing comprehension, as described by Palincsar (1986b, 1987) and Palincsar & Brown (1983, 1986), while continuing to practice the flexible use of cues for identifying unfamiliar words.

PURPOSES OF THIS PROJECT

A review of the literature revealed very few training programs which use a metacognitive approach to teaching word identification skills to poor readers. Of those that were found (Gaskins, Downer, Anderson, Cunningham, Gaskins, Schommer, & the Teacher of Benchmark School, et al, 1988; Gaskins, Gaskins, Anderson, & Schommer, 1995; Lenz & Hughes, 1990; Spiegel, Fitzgerald, & Reck, 1985; Taylor et al, 1988), none specifically targeted the upper primary age group. The general aim of the project proposed for this research therefore was to design and examine the effects of a metacognitive training program which uses an interactive, scaffolding instructional approach and attributional training for improving the word identification and reading comprehension skills of upper primary students with reading difficulties. The study also aimed to explore effective and efficient ways of implementing a program of this kind in the classroom setting. The proposed program is described briefly below.

Using the motto "Be flexible. Look for the cues. Does it make sense?" the teacher initially explains and models the use of the word
identification strategies, together with providing metacognitive information about their importance and how, when and where they can be used. As each new word is decoded, the opportunity is taken to list and discuss other words which can be identified using the same cue (eg. have the same spelling or structural pattern). After the initial days of instruction, the students are asked to take turns leading out in the dialogue one section at a time, with the teacher providing feedback and coaching as necessary. An important part of the feedback is elements of attributional retraining, whereby the students are led to understand that their success in identifying the words is because they are trying hard and using the correct strategies.

Once the students have developed competency in word recognition they are introduced to reciprocal teaching procedures for enhancing comprehension, as described by Palincsar (1986b, 1987) and Palincsar & Brown (1983, 1986), while continuing to practice the flexible use of cues for identifying unfamiliar words. Specifically tThe project sought to address the following research questions:
1. To what extent will a metacognitive word identification instructional program of the type outlined above, improve the metacognitive abilities in word identification and the word recognition skills of a group of upper primary poor readers?
2. How does the effectiveness of a metacognitive approach to teaching word identification skills compare with the effectiveness of the traditional approach to teaching unfamiliar words to a group of upper primary poor readers?
3. How does a program involving a metacognitive approach to teaching word identification skills followed by reciprocal teaching of comprehension skills, compare with a program focusing only on reciprocal teaching of comprehension and using the traditional approach to identifying unfamiliar words, in improving the reading comprehension of students with reading difficulties?
4. What organisational features best facilitate the implementation of the program by the regular class teacher in the classroom setting?

STUDY ONE - A METACOGNITIVE PROGRAM TO IMPROVE WORD IDENTIFICATION SKILLS

RATIONALE

The rationale underlying this study is based on research outlined previously which indicates that improvements in the word identification skills of poor readers may contribute to improvements in comprehension skills (eg Adams, 1990; Näslund & Samuels, 1992; Stanovich, 1986a; 1992). Furthermore, research evidence indicating that upper primary poor reader's problems with word identification may reflect
deficiencies in their metacognitive abilities in word identification (Spedding & Chan, 1993, 1994), suggests the need for specific metacognitive strategy instruction in word identification skills for those students.

Research has demonstrated the efficacy of reciprocal teaching procedures for improving the comprehension skills of students who were poor comprehenders but adequate decoders at grade level (Palincsar & Brown, 1983, 1984). It was hypothesised that a similar metacognitive instructional approach could be used for training poor readers who were deficient in both word identification and comprehension skills, in the flexible and strategic use of three lower-order word identification skills used automatically by successful readers: (1) Consider the Context (semantic and syntactic cues), (2) Compare with known words or word parts (phonemic and orthographic cues), and (3) Carve up the word parts (structural and morphological cues). Moreover, it was hypothesised that once children become familiar with the use of the word identification strategies they could be incorporated into a reciprocal teaching dialogue as part of the clarification process, thus increasing the likelihood of improvements in both word recognition and comprehension of grade level materials.

Based on this rationale Study One was designed to address research questions one to three listed above.

METHOD

Study One involved trialing of the metacognitive word identification and reading comprehension program described above. In this study subjects in the experimental group received the full program of metacognitive word identification strategies and reciprocal teaching of comprehension strategies, while the control subjects received only reciprocal teaching of comprehension strategies along with the traditional approach to teaching unfamiliar words. All training sessions were conducted by the experimenter using small groups on a withdrawal basis.

Subjects

The subjects were thirty-two poor readers selected from the Year 5 and Year 6 classrooms of two Public Schools in a country town in NSW. One of the schools was located in an area of lower socioeconomic status while the other was in a middle income area. Forty-two students were originally identified by class teachers as having reading difficulties, but three declined to participate, and one subsequently left the school before the study commenced. After preliminary testing with the St Lucia Graded Word Reading Test (Andrews, 1973) and the Progressive Achievement Tests in Reading Comprehension (Reid & Elley, 1986), six more children were eliminated from the study because their word recognition reading ages were very close to the expected average for
their chronological age, thus making them unsuitable for a program which aimed to remediate deficits in word recognition skills. The subjects came from eight classrooms (two Year 5 and one Year 6 classroom in one of the schools, and two Year 5 and three Year 6 classrooms in the other school). In each school the classrooms with subjects were randomly assigned to either the experimental or the control group. There were two small instructional groups in each school ranging in size from 7 to 9 pupils. Classroom rather than individual randomisation was used at the request of the teachers to avoid the possibility that some students from a particular classroom may have been assigned to the experimental group while others from the same classroom were assigned to the control group, thus necessitating absences from the same classroom in two different instructional time slots. In the first school there were eight Year 6 subjects in the experimental group and 7 Year 5 subjects in the control group. In the second school, to keep group sizes approximately even, six Year 5 and three Year 6 subjects were placed in the experimental group, and eight Year 6 subjects were placed in the control group.

As can be seen from Table 2.1 below, the mean reading age of the groups ranged from 90 to 99 months, which indicated that they were reading at approximately the Year 3 level. For this reason it was decided to pitch instructional materials at the Year 4 level, and gradually increase the difficulty as the experimental group became more proficient at word identification strategies.

Table 1 Descriptive statistics of the Subjects in the
Experimental and Control Groups in Study 1.

Experimental      Control
Year 5Year 6Year 5Year 6
(N=6)(N=11) (N=7) (N=8)

Chronological age (in months)
Mean123.00135.09124.14136.25
Range120-125129-140120-131130-147

Reading age (in months)
Mean 90.17 99.00 92.00 91.86
Range 76-99 88-128 80-105 77-108

Comprehension (percentile ranking)
Mean 25.17 16.18 10.58 11.25
Range 1-19 1-42 1-19 1-42

Sex ratio (boys to girls)
5:1 6:5 4:3 6:2
Experimental Design

An Instruction Type (2) x Grade (2) x Testing Occasion (4) repeated measures design was employed, with testing occasion being the within-subjects factor, as depicted in Figure 1 below. The sequence of phases for this study was as follows: (i) pretest which was spread over a period of 2 weeks; (ii) training phase 1 which consisted of an average of 24 sessions spread over a period of 9 weeks; (iii) midtest which was spread over 1 week; (iv) training phase 2 which consisted of an average of 13 sessions spread over a period of 5 weeks (and which had to be cut two weeks shorter than originally planned because of illness on the part of the experimenter); (v) posttest which was spread over 1 week; and (vi) maintenance test which was spread over a period of 2 weeks commencing 8 weeks after the posttest.

During training phase 1 the subjects mental group received metacognitive instruction in word identification to improve their word identification skills, while the subjects in the control group were trained in reciprocal teaching procedures to improve their reading comprehension skills. During training phase 2 both groups engaged in reciprocal teaching procedures to improve their comprehension skills. The same instructional materials were used for both groups during both training phases.

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
</tr>
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<tbody>
<tr>
<td>Pre-test</td>
<td>Reciprocal Teaching of Comprehension Strategies plus Metacognitive Instruction in Word Identification</td>
</tr>
<tr>
<td>Mid-test</td>
<td></td>
</tr>
<tr>
<td>Experi-mental Group (Years 5 &amp; 6)</td>
<td>Metacognitive Instruction in Word Identification</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main-ten-ance
Phase
Main-ten-
ance
Test

Control
Group

(Years
5 & 6)

Pre-test
Reciprocal Teaching of Comprehension Strategies plus Traditional
Methods of Teaching Word Identification

Mid-test
Reciprocal Teaching of Comprehension Strategies plus Traditional
Methods of Teaching Word Identification

Post-

test

Main-ten-
ance
Phase
Main-ten-
ance
Test

Weeks
Involved
2
9

1
5
1
8
2

Fig. 1 A schema of the experimental design for Study One
Measures

During the testing occasions, the subjects were administered a number of individual and group tests designed to measure three aspects of the reading process, namely (i) accuracy of word recognition; (ii) metacognitive abilities in word identification; (iii) reading comprehension. All pretesting on the first occasion and group testing on subsequent occasions was done by the experimenter. Individual testing was administered by an independent qualified person with no knowledge of group status of subjects.

Three assessment instruments were used during the testing phases, as described below.

1. St Lucia Graded Word Reading Test (Andrews, 1973) which is designed to provide a reading age for recognition of words read in isolation. It is an untimed, individually administered test consisting of one hundred words, graded in difficulty. Students proceed through the test until ten consecutive words are read incorrectly. The score for the number of words read correctly to this point may be converted to a reading age using the Table of Norms provided. Test-retest reliability has been calculated at $r = +.947$ (Andrews, 1973).

2. Metacognitive Abilities in Word Identification (Spedding & Chan, 1993, 1994) which is an individually administered test designed to assess metacognitive abilities in the knowledge and regulation of phonic, orthographic, morphological and context clues in word identification. Each of the four tasks in this test requires students to respond by using a specific word identification strategy. A correct response to a particular task would indicate that the student has recognised the particular clue and is using the appropriate word identification strategy. Following the completion of each task item, students are required to justify their responses in order to assess whether they are also aware of the strategy they have used. For example, to assess use of orthographic clues in unknown words, students are presented with a pseudoword containing all or part of a real word embedded in it (eg "meauty"). The student is asked to say the word. If required the student is shown the embedded or related word (eg, "beauty") as a cue. The student is then asked to justify his/her response. Two points are awarded for each item if the student is able to give the correct response and an acceptable justification, thereby indicating both usage of the strategy and metacognitive awareness and monitoring of its use. One point is awarded if the student is able to perform the task correctly, but is unable to provide an acceptable justification. A parallel form of the test was developed by the experimenter for the second testing occasion.

3. Progressive Achievement Tests (PAT) in Reading Comprehension, Forms A & B (Reid & Elley, 1986) which is a timed, standardised group test of silent reading comprehension. The test consists of a series of prose passages approximately two hundred to three hundred words in length,
and graded in complexity from simple to hard. Following each passage there are multiple-choice items designed to measure both factual and inferential comprehension. Tables of Norms are included which can be used to convert test raw scores to either percentile rank scores or stanine scores. The norms provided were derived in November, and as pretesting occurred in February it was considered that the most appropriate level for testing would be the grade level below the student's current level. Thus Year 5 students were tested on the Year 4 passages, and the Year 6 students were tested on the Year 5 passages. A different form of the test was used on each testing occasion.

Instructional Materials

Instructional materials consisted of a total of 27 short passages (173-387 words) written at the Grade 4 to Grade 5 readability level, as determined by the Rix readability formula (Anderson, 1983). The passages were adapted from reading kits and library books in common use in schools and contained factual information in narrative or descriptive form. The nineteen passages used during training phase 1 were structured to target the use of a particular word identification strategy. For example, the passage may contain a number of multisyllable words requiring students to make use of morphological and structural cues. The remaining nine passages used during training phase 2 were structured so as to revise and consolidate the use of these strategies. Each passage was accompanied by a short answer comprehension test consisting of eight questions. The questions were designed to probe both factual and inferential comprehension of the text.

THE TRAINING PROGRAM

The training sessions for each of the small instructional groups were conducted in a withdrawal situation two to three days a week. All training sessions for all groups were conducted by the experimenter. The sessions for both groups in the first school were conducted before recess, while in the second school the sessions were conducted between recess and lunchtime. In the first school sessions took place in a spare classroom where distractions were at a minimum, while in the other school sessions were conducted in a small store room off the library and in the staff room. During training phase 1 the subjects in the experimental group were trained in the use of three strategies (i) Consider the Context (semantic and syntactic cues), (ii) Compare with known words (phonemic and orthographic cues), and (iii) Carve up the word parts (structural and morphological cues). To help them monitor their use of those strategies the subjects were taught to (i) Be flexible, (ii) Look for the cues, and (iii) Ask: Does it make sense? A scaffolded instructional approach was used which involved modelling and explanation of the strategies by the experimenter using 'thinking aloud' techniques, followed by guided practice and feedback as subjects
used the strategies to identify unfamiliar words. During training phase 2, the experimental subjects were trained in the use of reciprocal teaching procedures as described by Palincsar (1987) and Palincsar and Brown (1983, 1984) to improve their comprehension competence while continuing their use of the word identification strategies.

Reciprocal teaching involved teacher and students taking turns leading a dialogue aimed at revealing the meaning of the text. During the dialogue the leader (teacher or student) uses four comprehension-fostering strategies: (i) clarifying any misunderstandings, (ii) questioning concerning the gist, (iii) summarising the content, and (iv) predicting future content. All these activities were embedded in as natural dialogue as possible, with the teacher and students giving feedback to each other.

In the present study, subjects in the experimental group were told to use the word identification strategies learned in Phase 1 of the training program as part of the clarification process in the reciprocal teaching dialogue. During both training phases the subjects in the control group used reciprocal teaching procedures to improve comprehension skills combined with traditional methods of teaching unfamiliar words. The traditional method of word identification consisted of writing difficult words from the instructional passage on the board and asking pupils to pronounce each word and give its meaning.

Two sessions were spent on each instructional passage, with the short answer comprehension test being given at the end of the second session. As a further measure of progress, approximately once a fortnight each subject was given an oral reading test using material in prepared passages which they had not yet studied, to see how many words they could read correctly in one minute. The results were graphed and shared with the students.

RESULTS AND DISCUSSION

The measures obtained from the different testing occasions were analysed using an Instruction Type (2) x Grade (2) x Testing Occasion (4) repeated measures design. As grade level was not found to be a significant factor a second analysis was made using only Instruction Type and Testing Occasion. Appendix A contains the group means and standard deviations for each of the measures. Summary ANOVA tables are shown in Tables 2-4. All statistical analyses were conducted on SPSSx, Release 4.1.

Word Reading

The St Lucia Graded Word Reading Test (Andrews, 1973) was used to measure accuracy of word recognition. The St Lucia measure was taken before intervention began and at the conclusion of the first training
phase. The results of repeated measures analysis of variance for St Lucia and IRI accuracy are shown in Table 2.

Table 2: Summary of Results of Group (2) x Occasion (2) Repeated Measures Analysis of Variance for St Lucia Accuracy Scores

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>733.13</td>
<td>733.13</td>
<td>4.23</td>
<td>.048</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>5194.73</td>
<td>173.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasion</td>
<td>1</td>
<td>1190.05</td>
<td>1190.05</td>
<td>66.28</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Group x Occ</td>
<td>1</td>
<td>286.68</td>
<td>286.68</td>
<td>15.97</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>538.68</td>
<td>17.96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results of the analysis for word reading in isolation (St Lucia) revealed a significant Group x Testing Occasion interaction, F(1,30) = 15.97, p<.001. An examination of the graph in Figure 2 shows that the experimental group demonstrated much greater improvement on the St Lucia measure than the control group at the end of the first training phase. As shown in Appendix A the mean raw score for the experimental group improved by almost 13 points from 32.94 to 45.82 which represents a mean improvement of word recognition reading age of approximately seventeen months. The mean raw score for the control group improved from 30.40 to 34.80 representing a mean improvement in reading age of approximately seven months.

The fact that the control group made 7 months gain in word recognition during the four months suggests that the daily exposure to word pronunciations and meanings which occurred in the traditional teaching process enabled these students to improve their word recognition performance. However, the results clearly demonstrated the greater facilitative effect of the metacognitive word identification intervention strategies for subjects in the experimental group.

Metacognitive Abilities in Word Identification

The metacognitive abilities in word identification measures were taken before intervention began and at the end of the first training phase to ascertain to what extent training in word identification strategies would increase the metacognitive awareness and monitoring of word identification strategies for the experimental students. The results
of repeated measures analyses of variance for Metacognitive Abilities in Word Identification are shown in Table 3.

Table 3: Summary of Results of Group (2) x Occasion (2) Repeated Measures Analysis of Variance for Metacognitive Abilities in Word Identification Scores in Study One

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonic Clues</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Between Subjects</td>
<td>1</td>
<td>21.69</td>
<td>21.69</td>
<td>1.15</td>
<td>.292</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>565.67</td>
<td>18.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>1</td>
<td>79.49</td>
<td>79.49</td>
<td>14.83</td>
<td>.001</td>
</tr>
<tr>
<td>Group x Occ</td>
<td>1</td>
<td>9.37</td>
<td>9.37</td>
<td>1.75</td>
<td>.196</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>160.87</td>
<td>5.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthographic Clues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Subjects</td>
<td>1</td>
<td>27.92</td>
<td>27.92</td>
<td>4.90</td>
<td>.035</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>170.95</td>
<td>5.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>1</td>
<td>1.92</td>
<td>1.92</td>
<td>.49</td>
<td>.488</td>
</tr>
<tr>
<td>Group x Occ</td>
<td>1</td>
<td>14.29</td>
<td>14.29</td>
<td>3.68</td>
<td>.065</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>116.56</td>
<td>3.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morphological Clues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Subjects</td>
<td>1</td>
<td>27.34</td>
<td>27.34</td>
<td>2.10</td>
<td>.158</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>390.41</td>
<td>13.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>1</td>
<td>20.61</td>
<td>20.61</td>
<td>9.79</td>
<td>.004</td>
</tr>
<tr>
<td>Group x Occ</td>
<td>1</td>
<td>10.30</td>
<td>10.30</td>
<td>4.89</td>
<td>.035</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>63.14</td>
<td>2.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Context Clues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Subjects</td>
<td>1</td>
<td>93.91</td>
<td>93.91</td>
<td>13.13</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>214.54</td>
<td>7.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>1</td>
<td>27.18</td>
<td>27.18</td>
<td>8.65</td>
<td>.006</td>
</tr>
<tr>
<td>Group x Occ</td>
<td>1</td>
<td>0.18</td>
<td>0.18</td>
<td>0.16</td>
<td>.813</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>94.26</td>
<td>3.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results of the analysis showed a significant Group x Occasion interaction for only one of the word identification clues tested, namely that of morphological clues, $F(1,30) = 4.89$, $p<.05$. Inspection of the graph in Figure 3 indicates that the experimental subjects had improved their awareness and monitoring of the use of morphological clues as a result of the intervention while the control subjects had not. There were also Occasion main effects for phonic and context clues, indicating that both groups benefited from their respective interventions with regard to awareness and monitoring of the use of these clues. In addition there was a significant Group main effect for orthographic clues favouring the experimental group, and the Group x Occasion interaction approached significance for orthographic clues.

These results seem to indicate that 'Carve up the word parts' (morphological clues) and 'Compare with known words' (orthographic clues) were the most useful strategies for improving the word identification skills of the subjects in the experimental group. This result could reflect the relevance of such skills to word identification requirements for year 5 and 6. Many of the difficult words encountered at the upper primary level require an awareness of morphology and/or of unique spelling patterns. When questioned informally at the end of the intervention the experimental subjects agreed almost unanimously that 'Carve up the word parts' was the most useful strategy they had learned.

The implication seems to be that poor readers at the upper primary level require specific training in the use of morphological and orthographic clues in order to improve their word identification skills (Alexander & Heathington, 1988; Durkin, 1981, 1983; Ekwall & Shanker, 1988; Spear-Swerling & Sternberg, 1994; Spedding & Chan, 1993, 1994; Taylor et al., 1988), and that metacognitive training is effective in achieving this. The improvement of both groups in the 'Consider the Context' strategy may reflect the fact that it is already used by most poor readers (Henshaw, 1992; Nicholson, 1991a; Perfetti, 1986; Stanovich, 1984,1986a; Yoon & Goetz, 1994), and as a result of the intervention both groups may have learned to use this strategy more efficiently irrespective of the method taught.

Reading Comprehension

Reading comprehension was measured using the Progressive Achievement Tests (PAT) in reading comprehension which measured silent reading comprehension and was administered before intervention began and eight weeks after the completion of the two training phases. The results for repeated measures analysis of variance are shown in Table 4.
Table 4: Summary of Results of Group (2) x Occasion (2) Analysis of Variance for PAT Comprehension Scores in Study One

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>191.2091</td>
<td>206.12</td>
<td>6.14</td>
<td>.019</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>445.551</td>
<td>14.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasion</td>
<td>1</td>
<td>1120.44</td>
<td>120.44</td>
<td>13.58</td>
<td>.001</td>
</tr>
<tr>
<td>Group x Occ</td>
<td>1</td>
<td>1.00</td>
<td>.00</td>
<td>.00</td>
<td>.983</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>266.008</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis of the results for the PAT Comprehension tests showed that there were Group and Occasion main effects but no significant interactions. As indicated in Figure 4, the experimental group performed significantly better than the control group on both testing occasions. Also, both groups increased their mean comprehension raw scores from pre- to maintenance test, by approximately 3 points, which represents an average improvement in percentile ranking for the experimental group of approximately 14 points from PR 19 to PR 33, and for the control group of approximately 13 points from PR 10 to PR 23.

These results suggest not only that the reciprocal teaching intervention was equally facilitative for both groups but, more importantly, the experimental subjects were able to achieve the same gains with only slightly more than a third of the training given to the control students. The implication seems to be that training in word identification strategies prior to training in comprehension strategies, facilitates the rate of acquisition of silent reading comprehension strategies for upper primary poor readers. This finding supports research evidence which indicates that a higher degree of word recognition efficiency allows for more cognitive resources to be devoted to the construction of meaning in text (Ackerman et al., 1989; Groff, 1991; Nöslund & Samuels, 1992; Perfetti, 1986; Perfetti & Lesgold, 1979; Stanovich, 1984; 1993,4).

SUMMARY OF FINDINGS

There are a number of findings and implications arising out of Study One in relation to the research questions posed at the beginning of the paper.
1. The metacognitive word identification program was clearly more effective than traditional methods of teaching word identification for improving the skill of recognizing words in isolation. This is an important finding in view of the argument that the hallmark of a good reader is the ability to read words accurately in isolation (Gough & Tunmer, 1986; Perfetti, 1986; Stanovich, 1986).

2. An important component in the effectiveness of the word identification program appeared to be the specific training of metacognitive awareness and monitoring of morphological and orthographic clues. This is consistent with research findings which suggest that poor readers need direct and systematic training in recognition of irregularly spelled words and segmentation of word parts (Adams, 1991; Alexander & Pate, 1991; Durkin, 1981, 1983; Henry, 1988, 1993).

3. A program combining metacognitive word identification training and metacognitive comprehension skills training was just as effective in improving the silent reading comprehension competence of subjects as a program focusing only on metacognitive teaching of comprehension skills. The subjects in the combined program not only improved their silent reading comprehension competence to the same extent as those receiving only comprehension training with only one third of the training time, but they had the added advantage of also improving their word identification skills.

STUDY TWO - ANALYSIS OF ORGANISATIONAL FEATURES FACILITATING PROGRAM IMPLEMENTATION

This study, which aimed to address research question four, listed above, took place during the 1994 school year.

RATIONALE

During the decades of the 1970's and 1980's numerous research studies confirmed the value of metacognitively strategy instruction for improving the performance of children with learning difficulties (Pressley, El-Dinary, Gaskins, Schuder, Bergman, Almasi, & Brown, 1992). However, much of this research has failed to translate into classroom practice due, in part, to the dichotomy between ideal laboratory type research conditions and the realities of the normal classroom (Marks, Pressley, Coley, Craig, Gardner, DePinto, & Rose, 1993). In addition, it has been found that strategies learned in a withdrawal situation often do not generalise into the classroom setting due to lack of follow-up instruction by the regular teacher (Anderson-Inman, 1986). For this reason much recent research is concerned with developing classroom based interventions so that all pupils may benefit from ongoing teacher-led instruction (Duffy, 1993a, 1993b; Gaskins et al., 1995; Marks et al., 1993; Pressley et al, 1992; Pressley, Schuder, Bergman, & El-Dinary, 1992).
The first study described in this paper came under the category of a researcher-based withdrawal program, rather than a classroom-based intervention. During Study One, which aimed to trial the effectiveness of the proposed metacognitive word identification program, poor readers were withdrawn for instruction by the experimenter. As no effort was made to involve the teachers, because of the exploratory nature of the study, presumably there was no follow up instruction in the classroom. The primary purpose of Study Two, therefore, was to explore ways of facilitating the implementation of the program into the regular classroom reading structure so that pupils would benefit from ongoing teacher-led strategy instruction.

METHOD

Subjects

The subjects for this study were seventy poor readers selected from eleven Year 5 and Year 6 classrooms in five public schools in a semi-urban area of NSW. Poor readers were defined as those having a discrepancy of 18 months or more between their chronological ages and their word recognition reading ages. Discrepancy scores were computed on the basis of scores on the St Lucia Graded Word Reading Test (Andrews, 1973) which was initially administered to all students in the participating classrooms. Six children who met the discrepancy definition, but who had known intellectual disability or sensory handicap, or whose reading deficit was due to learning English as a second language, were excluded from the subject sample. There were forty-six subjects in the Experimental Group and twenty-four subjects in the Control Group. Characteristics of the subjects in the experimental and control groups are presented in Table 5, below.

Experimental Design

An Instructional Type (2) x Year (2) x Testing Occasion (3) repeated measures design was employed, with testing occasions being the within-subjects factor, as depicted in Figure 5, below. The sequence of phases for this study was as follows: (i) pretest which was spread over a period of four weeks, and which formed the basis for identifying the poor reader subjects in each classroom; (ii) training phase 1 which consisted of an average of 24 lessons spread over a period of 9 weeks; (iii) training phase 2 which consisted of an average of 12 lessons spread over a period of 5 weeks; (iv) midterm which was spread over 2 weeks; (v) training phase 3 which consisted of an average of 24 lessons and was spread over a period of 8 weeks during term 3 and 2 weeks in term 4; (vi) and posttest which took place during weeks 3-5 of term 4. Phases one and two were considered to be the preparation stage (Experimenter Led). Phase three was considered to be the
classroom (Teacher Led) stage. Subjects in both the experimental and control groups were tested on each of the three testing occasions, while only the subjects in the experimental group participated in the training phases. During these phases the subjects in the control group received regular reading instruction from their classroom teacher. However, in discussion with the teachers it was discovered that approximately half of the poor readers from each school were withdrawn for special phonics-based remedial reading instruction for 30-45 minutes on 3 and 4 days per week, respectively.

Table 5 Characteristics of the Experimental and Control Groups in Study Two

<table>
<thead>
<tr>
<th></th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental</td>
<td>Control</td>
</tr>
<tr>
<td>(N=31)</td>
<td>(N=15)</td>
<td>(N=13)</td>
</tr>
<tr>
<td>Chronological age (in months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>125.10</td>
<td>123.20</td>
</tr>
<tr>
<td>Range</td>
<td>117-135</td>
<td>119-127</td>
</tr>
<tr>
<td>St Lucia word recognition reading age (in months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>96.10</td>
<td>99.80</td>
</tr>
<tr>
<td>Range</td>
<td>85-108</td>
<td>88-108</td>
</tr>
<tr>
<td>Discrepancy between chronological age and reading age (in months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>29.00</td>
<td>23.40</td>
</tr>
<tr>
<td>Range</td>
<td>18-47</td>
<td>18-33</td>
</tr>
<tr>
<td>Comprehension (TORCH Score)</td>
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<td></td>
</tr>
<tr>
<td>Mean</td>
<td>31.32</td>
<td>32.80</td>
</tr>
<tr>
<td>Range</td>
<td>13-51</td>
<td>7-51</td>
</tr>
<tr>
<td>Sex ratio (Boys to girls)</td>
<td>13:18</td>
<td>4:11</td>
</tr>
</tbody>
</table>

Phase 1
Small Group Instruction
Phase 2
Team Teaching

Phase 3
Class Teaching

Experimental Group

Pre-test
Metacognitive instruction in word identification in small groups

Experiment and assistant
Reciprocal teaching of comprehension strategies in small groups

Experimenter and assistant
Reciprocal teaching of comprehension strategies (including use of metacognitive word identification strategies)

Team teaching in groups by experimenter/assistant and class teachers, leading to incorporation of the program into the classroom reading group structure

Mid-test
Reciprocal teaching of comprehension strategies (including use of metacognitive word identification strategies)

Class teachers
Post-test

Preparation Stage (Experimenter Led)

Classroom Stage (Teacher Led)

Control Group

Pre-test
Regular classroom reading lessons
plus phonics-based remedial instruction

Class teachers
Mid-test

Regular classroom reading lessons
plus phonics-based remedial instruction

Class teachers
During training phase 1 the poor readers in the experimental group were withdrawn during the regular classroom reading period for small group instruction in the metacognitive word identification and comprehension program developed in Study 1. Instruction of the poor reader groups in this phase was undertaken by the experimenter and (for one class) a research assistant who was a qualified teacher.

During training phase 2 the program was extended to include all the children in the class. The class teachers and the experimenter or assistant shared the teaching during this phase, with responsibility for implementing the program gradually being shifted from the experimenter or assistant to the class teacher.

During training phase 3 the class teachers continued the program as part of their regular classroom reading instruction. During this phase the experimenter visited each classroom periodically to observe progress and discuss any difficulties being encountered. Also, during this phase, two or three lessons from each classroom were recorded and transcribed.

Measures

During the testing occasions the subjects in this study were administered a battery of individual and group tests designed to measure the same aspects of the reading process as those measured in Study 1. However, even though the same processes were being assessed
some of the assessment instruments used were different from those used in Study 1, as described below.
The measures which were common to both studies were, (i) St Lucia Graded Word Reading Test (Andrews, 1973); and (ii) Metacognitive Abilities in Word Identification (Spedding, 1993, 1994).
Comprehension of silent reading was measured in this study by using the Tests of Reading Comprehension (TORCH), (Mossenson, Hill, & Masters, 1987). This is an untimed silent reading test in which students are presented with a passage of text and a retelling of the passage in different words. The retelling of the passage contains gaps corresponding to details in the original text which students must fill in using one or more of their own words. The TORCH test has been designed so as to enable analysis of the child's proficiency on a variety of reading tasks ranging from simple literal interpretation of the main ideas in the story through to complex inferential and analytical skills. It was constructed in Australia using the Rasch model. Conversion of the raw score to the TORCH score allows for comparisons of student performance on parallel TORCH passages.

Instructional Materials

The instructional materials used for training phase 1 were those developed for Study 1, with some modifications to the wording of some of the stories. However, to provide extra interest and motivation each passage was accompanied by a cartoon picture depicting the theme of the passage. During training phase 2, three of the teachers (two Year 5 teachers and a Year 6 teacher) chose to continue using the instructional passages developed by the experimenter, while the remaining three chose to use other comprehension passages (eg. passages from the School Magazine, or from comprehension texts). During training phase 3 the same two Year 5 teachers chose to continue using the instructional materials developed by the experimenter along with other comprehension materials, while the remaining four teachers chose to use various other comprehension materials.

The Training Program

Training Phase 1
The aim of training phase 1 was to provide the experimental poor reader group with intensive instruction in the word identification strategies (5 weeks) and reciprocal teaching procedures (3 weeks) which form the basis of this study.
During this phase the poor readers in each classroom were instructed in small withdrawal groups by the experimenter, or (for one classroom) a research assistant who was a qualified teacher, for thirty minute sessions on two to three days a week. In general the training procedures during this phase followed closely those developed during
Study 1.

Training Phase 2
The aim of training phase 2 was to introduce reciprocal teaching procedures to the normally achieving students in the classroom while still providing for the instruction of the poor readers. During the first few days of this phase, the experimenter or research assistant took the lead in whole class reciprocal teaching so that all the children, and the class teacher, could become familiar with the procedures. After this initial introduction the class teacher began taking responsibility for the whole class lesson, with support and coaching from the experimenter or assistant as necessary. By the fourth week of training, the pupils in each classroom were divided into two groups with the experimenter or research assistant and the class teacher leading out in one group each.

Training Phase 3
The aim of training phase 3 was for the class teachers to continue with the program during term 3, after the assistance of the experimenter and research assistant has been faded out. Teachers were asked to continue the reciprocal teaching procedures, including use of the word identification strategies for the poor readers, as part of their ongoing reading program and in the way that best suited the structure of their reading lessons. They were also asked to cue the students to use the strategies at other times during the day when and where appropriate, eg. use of the questioning and summarising strategies in an Environmental Studies lesson. During this phase there were periodic (weekly and then fortnightly) visits by the researcher to check on progress and discuss any difficulties. Also during this phase two or three lessons from each classroom were recorded and transcribed. Although it was the intention that class teachers should continue to cue the poor readers to use the metacognitive word identification strategies as necessary during this phase, in actual fact there was very little evidence from the transcripts that this occurred. This may have been because the teachers were not actively involved in teaching word identification strategies during the first phase of the intervention, and thus were not familiar with the procedures of the program.

RESULTS AND DISCUSSION
As with Study 1, the measures obtained from the different testing occasions were analysed using a Group (2) x Year (2) x Testing Occasion (3) repeated measures design. Year level was found to be a significant factor only for the St Lucia measure, hence a second analysis was made for the other measures using only Group and Testing Occasion. Sample sizes for the variables may differ because of student absences during some testing occasions or because of missing data in some of the
scales. Appendix B contains the group means and standard deviations for the Year 5 and Year 6 subjects for the St Lucia measure, and the means and standard deviations for the other measures (where Year level was not found to be a significant factor). Summary ANOVA tables are reported in Tables 6-8. All statistical analyses were conducted on SPSSx, Release 4.1.

Analysis of the results revealed no significant three-way interactions at the multivariate level. However, there were a number of two-way interactions, most of which occurred in the contrast between the first and second testing occasions. These interactions will be discussed below.

Word Reading

The St Lucia Graded Word Reading Test (Andrews, 1973) was used to measure accuracy of word recognition. The St Lucia measure was taken on each of the three testing occasions. Results of repeated measures analyses of variance for both tests are shown in Table 6.

Table 6: Summary of Results of Group (2) x Occasion (3) Repeated Measures Analysis of Variance for St Lucia Scores

Source of df SS MS F p
Variation_______________________________________________________________

---

St Lucia
Between Subjects
   Group         1  8.69  8.69  0.08 .783
   Year         1 2403.73 2403.73 21.24 .001
   Group x Year 1 139.87 139.87 1.24 .270
   Error        64 7241.94 113.16
Within Subjects
   Occasion      2 4408.78 2204.39 165.63 .001
   Group x Occasion 2 380.83 190.41 14.31 .001
   Year x Occasion 2 115.41  57.71  4.34 .015
   Group x Year x Oc2 27.01  13.50  1.01 .365
   Error        128 1703.59 131.31

Results of the analysis for word reading in isolation (St Lucia) revealed two significant two-way interactions. First there was a significant Group x Testing Occasion interaction, F(2,128) = 14.31, p<.001. Univariate results showed that there were significant differences between the experimental and control groups on both the
midtesting occasion, F(1,64) = 18.86, p<.001, and the posttesting occasions, F(1,64) = 8.36, p<.05.

An examination of the graph in Figure 6a shows that the experimental subjects had lower mean scores than the control group on the pretest, but by the time of the midtest the mean scores of the experimental group were significantly higher than those of the control group. As shown in Appendix B the mean raw scores of the experimental group improved about 8 points from pre- to midtest representing a mean improvement in word recognition reading age of approximately 11 months during the four month period. During the same time period, the mean raw score of the control group improved about 4 points, representing a mean improvement in reading age of approximately 4 months.

During the four months between the mid- and posttesting occasions the experimental subjects continued to show a slightly greater mean improvement than the control subjects. An inspection of Appendix B reveals that the experimental subjects showed a mean improvement of approximately 6 points representing 8 months mean improvement in reading age, while the control subjects showed a mean improvement of approximately 5 points, representing a mean increase in word recognition reading age of 7 months. The slower rate of improvement for the experimental subjects during Phase 3 may be due to the fact that the class teachers did not appear to implement the metacognitive word identification strategies to any great extent, as discussed previously. On the other hand, the phonics based instruction (mentioned previously) provided for many of the control subjects may have influenced their relatively greater improvement by the time of the final testing occasion as rules of phonetic/syllabic analyses were mastered and word recognition became more proficient (Alexander & Heathington, 1988; Bateman, 1991; Choate & Rakes, 1989; Durkin, 1981, 1983; Ekwall & Shanker, 1988; Spiegel, 1985; Taylor et al., 1988).

These results for the St Lucia measure indicate the effectiveness of the metacognitive word identification program for improving word recognition skills. As discussed previously, improved accuracy of word recognition is likely to lead to improved comprehension due to the fact that more cognitive resources are available for the construction of meaning (Nilsson & Samuels, 1992; Perfetti, 1986; Perfetti & Lesgold, 1979; Spear-Swerling & Sternberg, 1994; Stanovich, 1984, 1986a, 1992). There was also a significant Year x Occasion interaction, F(2,128) = 4.34, p<.05. Univariate results revealed that the Year x Occasion interaction occurred on the contrast between the pre- and midtesting occasions, F(1,64) = 6.13, p<.05. An inspection of the graph in Figure 6b reveals that, regardless of ability level, the Year 6 subjects showed a greater rate of improvement than the Year 5 subjects, during this period. This may have been because the added maturity of the older students enabled them to profit more readily from their respective interventions (metacognitive strategy instruction for the experimental
group and phonics-based remedial instruction for the control group).

Metacognitive Abilities in Word Identification

The metacognitive abilities in word identification measures were taken on the pre- and mid-testing occasions. Separate analyses were made for the use of metacognitive clues in word identification and for the students' justification for the use of those clues. The results of repeated measures analyses of variance for both measures are shown in Table 7.

Table 7: Summary of Results of Group (2) x Occasion (2) Repeated Measures Analysis of Variance for Metacognitive Abilities in Word Identification Scores for the Pre- and Mid-Tests.

<table>
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<th>Source of df</th>
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<td>Use of Clues</td>
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<td></td>
</tr>
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Table 7: (Cont) Summary of Results of Group (2) x Occasion (2) Repeated Measures Analysis of Variance for Metacognitive Abilities in Word Identification Scores for the Pre- and Mid-Tests.

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Justification for Use of Clues

Phonic Clues

Between Subjects

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Within Subjects

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Orthographic Clues

Between Subjects

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<th>1.77</th>
<th>0.82</th>
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<tr>
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<td>139.202.17</td>
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Within Subjects

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Morphological Clues

Between Subjects

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<th>0.03</th>
<th>0.01</th>
<th>.930</th>
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<td>Error</td>
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<td>262.97</td>
<td>4.11</td>
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Within Subjects

<table>
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<th>12.49</th>
<th>15.08</th>
<th>.001</th>
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<td>Group x Occ</td>
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<td>12.49</td>
<td>15.08</td>
<td>.001</td>
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<tr>
<td>Error</td>
<td>64</td>
<td>53.020.83</td>
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</table>
Results showed significant Group x Occasion interactions on both the reported use measures and the justification for use of strategies measures.

A significant Group x Occasion interaction was found for use of orthographic clues, $F(1,64) = 8.28, p<.05$, and the use of context clues, $F(1,64) = 12.05, p<.001$ for identifying unknown words. As shown in the graph in Figure 7a the subjects in the experimental group showed greater improvement on these measures than did the subjects in the control group. In addition there was an Occasion main effect for the use of morphological clues in word identification. As shown in Figure 7a these results indicate that all subjects were more likely to make use of morphological clues in word identification by the mid-testing occasion.

Three significant Group x Occasion interactions were found for justification for the use of word identification clues. These were justification for the use of orthographic clues, $F(1,64) = 10.03, p<.05$; morphological clues, $F(1,64) = 15.08, p<.001$; and context clues, $F(1,64) = 38.04, p<.001$. As shown in the graph in Figure 7b the subjects in the experimental group, as a result of the intervention, were far more likely to show metacognitive awareness of their use of orthographic, morphological and context clues in word identification.

Research indicates that fluency in word recognition skills is facilitated by specific instruction in subword units of English orthography such as onset/rime spelling patterns (eg st/art), syllables, and root words and affixes (eg Barker et al., 1992; Goswami, 1994; Goswami & Bryant, 1992; Henry, 1993; Moustafa, 1995; Olson et al., 1989; Treiman, 1992). In particular, it has been suggested that upper primary poor readers (the subjects of this study) benefit from extended instruction in onset/rime analogy strategies (Goswami, 1994; Goswami & Bryant, 1992; Olson et al., 1989), and syllabic and
morphological patterns (Henry, 1988, 1993). In addition, as upper grade children become more proficient in the use of decoding strategies, they are more likely to use context to monitor comprehension (eg for self-corrections) rather than as a primary method of word identification (Goldsmith-Phillips, 1989; Simons & Leu, 1987; Stanovich, 1984; 1986a; Stanovich, 1993,4).

It would appear that the metacognitive word identification program used in this study facilitated subjects' use of each of these strategies, as well as their metacognitive ability to justify their use of the strategies. The Clever Kid's Cues, 'Compare with known words' and 'Carve up the word parts', were designed to cue the use of analogy strategies, and syllabic and morphological strategies, respectively. The Clever Kid's Motto, 'Ask, Does it make sense?' combined with the cue 'Consider the Context' was designed to cue subjects to use context as an aid to comprehension.

By way of contrast the control subjects improved significantly only in their use of (but not their justification for the use of) morphological strategies. This improvement was possibly because many of the phonetic/syllabic remedial instruction received by many of the control subjects, as mentioned previously.

The fact that significant improvement did not occur in the phonic area has a number of possible explanations. First, phonic rules were not specifically taught in this intervention. Second, many students seemed to find this section of the text very difficult and were confused about what was required of them.

Reading Comprehension

Competence in reading comprehension was measured with the Tests of Reading Comprehension (TORCH) which measured silent reading comprehension. Parallel forms of each test were administered on each of the three testing occasions. Summaries of the results of repeated measures analysis of variance is shown in Table 8,

<table>
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<td></td>
<td></td>
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<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
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<td>3.15</td>
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<tr>
<td>Error</td>
<td>63</td>
<td>7610.5312</td>
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Table 8: Summary of Results of Group (2) x Occasion (3) Repeated Measures Analysis of Variance for Comprehension Scores
Results of the analysis of the TORCH comprehension tests showed a significant Group x Occasion interaction, $F(2,126) = 4.83, p<.05$, which was situated in the contrast between the pre- and midtesting occasions, $F(1,63) = 7.65, p<.01$. As shown in Fig 8 the experimental students had lower mean scores than the control subjects on the pretesting occasion, but by the time of the midtest their mean scores were higher than those of the control subjects. The improvement in silent reading comprehension from pre- to midtest parallels the improvement in word recognition and oral reading measures during this same period. As indicated previously, it would seem that as the experimental subjects became more proficient at word recognition they were able to devote more of their cognitive resources to comprehension of text (Næslund & Samuels, 1992; Perfetti, 1986; Perfetti & Lesgold, 1987; S-Swerling & Sternberg, 1994; Stanovich, 1984, 1986a, 1992).

SUMMARY OF FINDINGS

This study consisted of two stages. First, an experimenter led stage in which the experimenter trained the poor readers in the use of the strategies, and then gradually transferred responsibility for implementing the program to the classroom teachers; and second, a teacher led stage in which the teachers took responsibility for continuing the program as part of their classroom reading structure. Subjects in control classrooms received their normal classroom reading instruction and/or phonics based remedial instruction. Results of the analysis revealed significant improvement in favour of the experimental subjects for both the word reading and comprehension measures. Experimental subjects, in comparison to controls, made significant improvement in reading words in isolation as measured by the St Lucia Graded Word Reading Test. In addition, experimental subjects showed significant improvement in their metacognitive abilities to use orthographic, morphological, and contextual clues for word identification, as well as in their ability to justify the use of those clues. Control subjects, on the other hand, improved only in the use, but not the justification of, morphological cues. Thus increased metacognitive abilities in word identification for the experimental subjects corresponded with improved performance in word identification ability as suggested by Spedding and Chan (1993, 1994).
Experimental subjects, in comparison to controls, also improved significantly on the silent reading comprehension measure (TORCH). The improvement in favour of the experimental subjects may reflect the fact that they were using the comprehension strategies targeted in reciprocal teaching procedures, i.e., predicting, clarifying, self-questioning and summarising.

Taken together these results indicate the effectiveness of a metacognitive approach to teaching word identification and comprehension skills at the upper primary level. However, all of these significant improvements for the experimental subjects, with one exception, occurred during the first, experimenter led, stage of the study. Only the St Lucia word recognition in isolation measure showed continued significant, albeit modest, improvement during the second, teacher led, stage. There may have been several reasons for failure to maintain significant rates of improvement during the second stage. It may have been partly because not so much time and attention was available for the poor readers when the program was moved from the withdrawal to the classroom setting. In a number of classrooms the program was taught as a whole class lesson so there would have been fewer opportunities for the poor readers to be involved. It may have been partly also that the teachers did not feel that they 'owned' the program, as they were not responsible for setting it up in the first place. In addition, it may have been also that teachers need more intensive training if they are to alter their style of teaching to reflect a metacognition approach (Pressley et al., 1993).

To explore some of these issues a third study is currently being conducted in which teachers have been trained in the use of the procedures and the asked to take responsibility for small group instruction of the poor readers right from the beginning of the intervention.

List of References


Biemiller, A. (1979). Changes in the use of graphic and contextual information as functions of passage difficulty and reading achievement


Cadman, A.G. (Chairman). (1976). Learning difficulties in children and...
adults. Report of the House of Representatives Select Committee on
Specific Learning Difficulties. Canberra: Australian Government
Publishing Service.
Calfee, R., & Drum, P. (1986). Research on teaching reading. In M.C.
Wittrock (Ed.), Handbook of research on teaching, 3rd edition (pp.
components of underachievement. Developmental Psychology, 27(1),
108-118.
Falls, NSW: Social Science Press.
McGraw-Hill.
Chan, L.K.S. (1993). Combined strategy and attributional training for
poor readers. Paper presented at the AARE Annual Conference,
Fremantle, Nov. 22-25.
Chan, L.K.S. (1994). Relationship of motivation, strategic learning,
and reading achievement in grades 5,7, and 9. Journal of Experimental
responsiveness to metacognition instruction in comprehension.
Department of Education, University of Newcastle, Australia.
special needs. Boston: Allyn and Bacon.
Clifford, M.M. (1986). The comparative effects of strategy and effort
attributions. British Journal of Educational Psychology, 56(1), 75-83.
failure as influenced by task attribution, outcome attribution, and
failure tolerance. The Journal of Experimental Education, 57(1),
19-37.
Craske, M. (1988). Learned helplessness, self-worth motivation and
attribution retraining for primary school children. British Journal of
Educational Psychology, 58, 152-164.
analyses of children's metacognition and reading comprehension.
Journal of Educational Psychology, 80(2), 131-142.
Forrest-Pressley, G.E. MacKinnon, & T.G. Waller, (Eds.), Metacognition,
Cullen, J.L. (1985). Children's ability to cope with failure:
Implications of a metacognitive approach for the classroom. In D.L.
Forrest-Pressley, G.E. MacKinnon, & T.G. Waller, (Eds.), Metacognition,
strategies on the manifestation of learned helplessness. Contemporary Educational Psychology, 7, 346-356.


Remedial and Special Education, 9(1), 36-41.


comprehension-monitoring activities (technical Report No. 269).
Champaign: University of Illinois, Centre for the Study of Reading.
comprehension fostering and monitoring activities. Cognition and
Instruction, 1(2), 117-175.
through attention to metacognition. Journal of Learning Disabilities,
20(2), 66-75.
Palincsar, A.S., & Klenk, L. (1992). Fostering literacy learning in
211-225,229.
academic learning and instruction. In B.J. Jones & L. Idol (Eds.),
Dimensions of thinking and cognitive instruction (pp. 15-51).
The external validity of age- versus IQ-discrepancy definitions of
 Disabilities, 25(9), 562-573.
Press.
skill, and reading disability. Remedial and Special Education, 7(1),
11-21.
Perfetti, C.A. (1991) The psychology, pedagogy, and politics of
reading. Psychological Science, 2(2), 70-76.
acquisition. In P.B. Gough, L.C. Ehri, & R. Treiman (Eds.), Reading
knowledge and learning to read are reciprocal: A longitudinal study of
skilled reading and implications for reading instruction. In L.B.
Resnick & P.A. Weaver (Eds.), Theory and practice in early reading
differences in Motivation and cognition in students with and without
learning disabilities. Journal of Learning Disabilities, 27(6),
360-370.
76-91.
Pressley, M., Johnson, C.R., Symons, S., McGoldrick, J.A., & Kurita,
unrecognised words. Reading Horizons, 26(2), 117-122.


of stages? Cognition, 30, 139-181.
in 10-year-old children related to prereading phonological abilities. 
comprehension interventions for students with learning disabilities. 
Torgesen, J.K. (1989). Why IQ is relevant to the definition of 
learning disabilities. Journal of Learning Disabilities, 22(8), 
484-486.
studies of phonological processing and reading. Journal of Learning 
Disabilities, 27(5), 276-286.
Treiman, R. (1992). The role of intrasyllabic units in learning to 
read and spell. In P.B. Gough, L.C. Ehri, & R. Treiman (Eds.), 
Reading acquisition (pp. 65-106). Hillsdale, NJ: Lawrence Erlbaum 
Associates.
abilities and beginning reading. Reading Research Quarterly, 23(2), 
134-158.
overlays, visual discomfort, visual search and classroom reading. 
Journal of Research in Reading, 18(1), 10-23.
Turnure, J.E. (1986). Instruction and cognitive development: 
Coordinating communication and cues. Exceptional Children, 53(2), 
109-117.
phonological awareness, and reading ability: Evidence from a 
longitudinal and experimental study. Merrill-Palmer Quarterly, 33(3), 
321-363.
phonological coding in poor and normal readers. Journal of 
Experimental Child Psychology, 59(1), 76-123.
processing and its causal role in the acquisition of reading skills. 
Psychological Bulletin, 101(2), 192-212.
Wagner, R.K., Torgesen, J.K., Laughon, P., Simmons, K., & Rashotte, C. 
(1993). The development of young readers’ phonological processing 
Recent theories of reading acquisition propose that normally achieving readers progress through several distinct yet overlapping developmental stages on the road to fluent word recognition (e.g., Adams, 1990; Adams & Bruck, 1995; Biemiller, 1970; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; Gough, Juel, & Griffith, 1992; Marsh, Friedman, Welch, & Desberg, 1981; Spear-Swerling & Sternberg, 1994). While there are differences among theorists as to the divisions between each stage and the focus of each (see Stuart & Coltheart, 1988 for a review), most models suggest a progression from visually-based, to phonological-based to orthographically-based word acquisition.
procedures, with particular emphasis on the fundamental importance of the phonological stage in beginning reading (e.g., Adams & Bruck, 1995; Byrne, 1992; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; Gough, Juel, & Griffith, 1992; Spear-Swerling & Sternberg, 1994).

A broad overview of each of these stages will now be provided.

The first stage, visually-based stage is often referred to as the logographic (Frith, 1985) or visual-cue (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994) stage, is characteristic of most preschool and some kindergarten children who are developing insights into the nature and function of print but who have little knowledge about letter names and sounds or of the phonological structure of speech or of how phonemes are represented by letters (Adams & Bruck, 1995; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991). Due to the fact that beginning readers tend to process words as visual wholes without accompanying insight into the (Adams & Bruck, 1995; Chall, 1983; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991).

Because logographic readers lack strategies for decoding new words, they must rely on rote memory of some arbitrarily selected, distinctive visual cue such as picture cues, shape, length of the word, colour, the font, the first letter, or a distinctive logo, which they associate with that word. For example, they may remember the word yellow because it has two sticks in the middle, or the road sign STOP because of the distinctive shape and colours of the sign post. Given the same words in a different context or in a different case (upper instead of lower, etc) the child would most likely be unable to read them (Ehri, 1992).

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novel words.
Children next enter the alphabetic stage (Frith, 1985) in which they learn to recognise and remember words on the basis of systematic visual-phonological connections between letters seen in words and sounds detected in their pronunciation (Ehri, 1992). Entry into this stage is dependent on at least two factors. First, a rudimentary level of phonological awareness, ie an awareness of the sounds within speech and the ability to isolate, blend, segment, or otherwise manipulate those sounds; and second, the attainment of alphabetic insight, or the realisation that specific speech sounds and letters map onto each other in a systematic way (Byrne, 1992; Ehri, 1991, 1992; Frith, 1985; McBride-Chang, 1995; Munro & Munro, 1993; Spear-Swerling & Sternberg, 1994). It has been argued that children who enter school with phonological knowledge and letter-sound knowledge, may launch straight into the alphabetic stage of reading (Ellis, 1993; Stuart & Coltheart, 1988). However, there is strong evidence that most children do not gain such insights independently, but require explicit and specific information about phonemic structure and how the phonemes are represented by graphemes (Byrne, 1992).

According to Ehri (1991, 1992) and Spear-Swerling and Sternberg (1994) there are two phases in the alphabetic stage. In the initial phonetic-cue phase, children make only partial and incomplete use of phonetic cues, such as using only the first and last letters in spellings, thus causing them to misread words with the same visual-phonetic cues. For example children using the initial b and final t may confuse boat with boot (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994). For this reason children in the early stages of beginning reading tend to rely heavily on contextual information (syntactic and semantic) to assist in word identification (Goldsmith-Phillips, 1989; Perfetti, 1986; Rayner, 1988; Simons & Leu, 1987; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a; Stanovich et al., 1986). Over time children progress to the more mature second phase of alphabetic reading which has been termed cipher reading (Ehri, 1991, 1992) or controlled word recognition (Swerling-Spear & Sternberg, 1994). During this phase they learn to use all the letters in a word as part of the identification process and are able to move from simple, invariant letter-sound relations (eg bat) to the use of increasingly complex graphophonological information, such as long vowels (tap vs tape), vowel digraphs (ea, ow), and permissible letter strings (-tion and -ight) (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994). As a result, decoding becomes increasingly accurate and there is correspondingly less reliance on contextual cues (Goldsmith-Phillips, 1989; Perfetti, 1986; Rayner, 1988; Simons & Leu, 1987; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a; Stanovich et al., 1986). However, word identification still requires considerable effort, thus drawing away attentional resources from higher-order comprehension skills.
In the third and final automatic word recognition (Spear-Swerling & Sternberg, 1994) or orthographic (Frith, 1985) stage words are recognised accurately and effortlessly through memory for specific visual/orthographic representations of the words or word parts (Barker et al, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). Automatic word recognition sets the stage for higher-order comprehension processes to operate efficiently (Nöslund & Samuels, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). It has been suggested that effective use of orthographic processing skills in the automatic word recognition stage is dependent on two factors. First, that the reader has adopted an analytical processing style that allows him or her to make use of the subword units of English orthography such as onset/rime spelling patterns, eg st/art, syllables, and root words and affixes (Barker et al, 1992; Goswami, 1994; Moustafa, 1995; Olson, Wise, Conners, Rack, & Fulker, 1989). Second, sufficient exposure to print to allow specific words and subword representations to become permanently stored in the mental lexicon (Cunningham & Stanovich, 1990; Ehri, 1991, 1992; Olson et al, 1989; Juel, Griffith, & Gough, 1986; Perfetti, 1986; Stanovich & West, 1989).

Automatisation can be domain specific so that while mature readers can recognise the vast majority of words automatically, they still make flexible and efficient use of a variety of graphophonic and contextual cues for unusual words from an unfamiliar domain (Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). It has been suggested that domain specific automatisation can be acquired by normally achieving readers as early as grade one (Perfetti, 1992), and that by second- to third-grade they can recognise most words that are in their spoken vocabularies automatically (Anderson, Hiebert, Scott, & Wilkinson, 1985; Chall, 1983).

APPENDIX A: Means and Standard Deviations of the Dependent Measures for the Experimental And Control Groups in Study One

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Appendix B: Means and Standard Deviations of the Dependent Measures for the Year 5 and Year 6 Poor Readers in the Experimental and Control Groups in Study Two.

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Appendix B: Means and Standard Deviations of the Dependent Measures for the Poor Readers in the Experimental and Control Groups.

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Metacognitive Abilities in Word Identification
Use of Strategies
Phonic Clues
Pretest 2.881

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**Justification for Use of Strategies**

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**TORCH**

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