METACOGNITION, READING AND CAUSAL ATTRIBUTIONS: A COMPARISON OF LEARNING DISABLED AND NON LEARNING DISABLED INTERMEDIATE SCHOOL CHILDREN

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ABSTRACT

Metacognitive knowledge, oral reading behaviour, comprehension monitoring, self perceptions of reading ability, and reading-related causal attributions in learning disabled (LD) and non learning disabled (NLD) children were investigated in this study. Sixty-nine Form Two pupils attending five intermediate schools in Palmerston North and Feilding were involved. The LD children were of average or above average intelligence, but underachieving in reading. The LD sample was operationally defined in terms of having a WISC-R IQ of 90 or above, with a PAT Reading Comprehension score equal to or less than the 16th percentile, or with a PAT Reading Comprehension score equal to or less than the 19th percentile and a PAT Reading Vocabulary score equal to or less than the 16th percentile. The LD sample (N=35) comprised 26 boys and 9 girls. The sample of NLD children was selected from pupils who had a WISC-R IQ score of 90 or above, with PAT Reading Comprehension and Reading Vocabulary scores greater than the 50th percentile and a Listening Comprehension score greater than the 30th percentile. As far as possible, the NLD group was matched to the LD group in terms of IQ. The NLD sample (N=34) comprised 19 boys and 15 girls.

Data on metacognitive knowledge of strategies was obtained by administering the Reading Strategies for Meaning Scale and the Reading Strategies for Decoding Scale. Oral reading and comprehension monitoring behaviours were collected on passages which reflected the children's individual "easy" and "difficult" level. Comprehension monitoring was investigated by focusing particular attention on self correction behaviour and by the use of the Monitoring Device (Bleep) which permitted the investigation of on-line monitoring at the word level. At the conclusion of the oral reading self report data on awareness of monitoring and corrective strategy use were collected. This was referred to as the Self Report of Oral Reading Behaviour. In addition, three different instruments were developed in order to examine children's perceptions of their reading achievement and causal beliefs for success and failure in reading. The measures were the Causal Attribution Rating Scales, Reading Perception and Attribution Questionnaire, and Task-linked Perceptions and Causal Attributions.

The study was conducted in two Phases. During Phase A the children's easy and difficult passage for oral reading was established and data on the children's reading-related perceptions and causal attributions were collected. Phase B consisted of administering the individual easy and difficult oral reading passages and the Monitoring Device (Bleep), collecting the Self Report of Oral Reading Behaviour data and administering the reading strategy scales.

The picture of LD readers that has emerged is one not dissimilar to that of NLD readers. LD readers were shown to have similar metacognitive knowledge of positive strategies for gaining meaning from a story and decoding an unknown word compared with NLD readers.

The evidence that LD readers have metacognitive knowledge was further supported by the results of the Self Report of Oral Reading Behaviour. In terms of describing monitoring and corrective strategy use, the reasons for such monitoring and for the selection of specific strategies and judgements about success and lack of success of fix-up activities, the LD readers revealed metacognitive competence. Therefore awareness of self-regulation was manifested by LD readers when specific self-generated reading events at two difficulty levels were examined.

The reading behaviour and comprehension monitoring of the LD readers were also often similar to that of the NLD readers. Where differences did occur they frequently reflected performance on the difficult passage level. However, the reading behaviour of LD children also tended to be very erratic and highly individual in nature. In terms of self correction, as an index of comprehension monitoring, the LD readers were as proficient as their peers, indicating awareness of comprehension failure and an ability to implement corrective strategies. However, when analyses were undertaken combining the variables of self correction and linguistic cue use and meaning cue use, no clear pattern of behaviour appeared. The LD readers were also aware of comprehension breakdown as indicated by use of the Monitoring Device. Errors were signaled as frequently by LD readers as by NLD readers. On the easy passage, LD readers signaled self corrections as often as the NLD readers, but less often on the difficult passage. Again then, LD readers may be portrayed as competent metacomprehenders. However, when analyses involved signaled monitoring and linguistic cue use and meaning cue use inconsistent patterns emerged across difficulty levels and for correction type.

Attributions for reading success to external factors and for reading failure to internal factors, coupled with low perceptions of in-class reading achievement were made by LD readers. These reflect a lack of self confidence and may lead to decreased persistence in effort, expectations of future failure and avoidance of tasks where difficulty has been previously experienced.

Attributions for other children's reading success and failure and personal reading success and failure collected in an open-ended manner revealed no significant group differences. Similarly, attributions for comprehension and oral reading revealed no group differences. Task difficulty also did not differentiate the attributions made for the Task-linked Perceptions and Causal Attributions by the two groups. Both groups perceived their understanding and oral reading on the easy passage as good or average, and as poor at the difficult level. Poor perceptions at the difficult level led to ascriptions of lack of ability by both groups.

Several educational implications arising from this study were discussed. These relate to both assessment and instruction of LD children. In addition, a number of suggestions for future research were made. Most of these suggestions related to refinement in methodology, however, additional reading-related variables were also considered for future examination.

Finally, while many similarities exist between LD and NLD readers in terms of metacognition, reading and causal attributions, this study has also revealed LD children need assistance with particular aspects of their reading and help in building a more positive self image. Meaningful learning opportunities where these concerns can become the focus of attention can only be achieved through suitable remedial intervention.

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TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

LIST OF APPENDICES

C H A P T E R O N E

INTRODUCTION

By the time New Zealand children enter their final year of primary school, at approximately twelve years of age, they have already mastered a number of highly sophisticated and complex skills in various curriculum areas. Form Two (Grade Seven) children are likely able to demonstrate competencies in reading, oral and written expression, mathematics, science, social studies, and physical and social-emotional development. However, within each of these areas of cognitive, physical and affective experience, individual differences will occur.

Where these individual differences involve unsatisfactory achievement levels in the classroom, there is considerable research interest. One group of children who have been receiving such research attention are those with learning disabilities, particularly learning disabled readers.

Learning disabled children are those children who underachieve in one or more curriculum areas, despite normal intelligence. This heterogeneous group of children has been variously defined and labelled. While there is no uniform agreement about who are referred to as learning disabled, most children so identified exhibit academic difficulties, particularly in relation to reading.

Recently, research into learning disabilities has seen an increasing interest in cognitive approaches (Hresko & Reid, 1981). This trend is particularly evident in the area of reading, where current studies of individual differences in reading performance have focused on analyzing the cognitive processes involved in reading (Spiro & Myers, 1984). Interest in the study of thinking, or cognition has led to the emergence of the study of "metacognition": knowledge or awareness of thinking and the control of thinking.

When applied to reading, one aspect of metacognition is concerned with the explicit knowledge of the different factors that influence reading. This "knowledge about cognition" Brown and Campione (1981) have suggested, is

> roughly concerned with a person's knowledge about his own cognitive resources and the compatibility between himself as a learner and the learning situation. (p.521)

Flavell (1978) and Paris and Lindauer (1982) have proposed that the factors relevant in a study of metacognitive knowledge include personal, task and strategy variables. Similarly, Brown, Armbruster and Baker (in press) have referred to text, task, strategies and learner characteristics. Knowledge of these variables is considered both stable and statable (Brown, 1978).

In addition to the ability to reflect on one's cognitive processes, the other main aspect of metacognition involves cognitive monitoring. Related specifically to reading, one type of cognitive monitoring concerns the monitoring of comprehension or metacomprehension. This process using "self regulatory mechanisms" (Brown, 1978), or executive functions, includes "checking, planning, monitoring, testing, revising and evaluation" (Brown, 1978). Brown and Campione (1981) have suggested that these "indices of metacognition" are "most likely to occur when the subprocesses that they control are relatively familiar or automatized" (p.521). Therefore, because they may occur at a level below conscious awareness they are not necessarily either stable or statable. Metacomprehension involves monitoring activities to determine if comprehension is occurring, and taking corrective action when comprehension failures are detected (Baker & Brown, 1984b; Brown, 1980).

Several authors (e.g., Clay, 1973; Isakson & Miller, 1976; Pflaum & Bryan, 1980; Paris & Myers, 1981; Garner, 1980; Winograd & Johnston, 1980) have investigated how well children monitor their understanding, how well they detect breakdowns in the comprehension of meaning, how they deal with comprehension failure, what strategies they use to overcome text disruptions, and how successful their correction attempts are.

Within the field of learning disabilities, there have been relatively few studies of metacognition. Because of the virtual absence of such research, it is not known whether learning disabled children are as metacognitively proficient as normal children. Torgesen (1977a) has suggested that learning disabled children are inactive learners in that either they lack the ability to use available strategies or they do not spontaneously use them. Flavell (1970) has termed the failure to apply strategies as "production deficiency". This means that while learning disabled children may have the metacognitive knowledge (e.g., about strategy use), they may not consciously control that knowledge, that is access and use it flexibly. Wong's (1980) research, for example, has supported this notion. She found that the monitoring of reading seemed to be difficult for learning disabled children and suggested that their performance in comprehension shows them to be inactive learners.

Several reasons have been proposed as to why LD children do not use strategies. Recently, Short and Ryan (1984) have suggested that while "lack of awareness of the purposes and goals of reading" may be one reason why less skilled readers do not employ strategies during a reading task, lack of motivation to employ these strategies may be another explanation. Short and Ryan (1984) have suggested that

> many of the cognitive and metacognitive differences among readers may result from differential willingness or ability to utilize metacognitive knowledge and strategies. (p.226)

Similarly, Paris and Cross (1982) have argued that failure by novices and young children to use relevant knowledge of strategies may be because "they lack cognitive resources or they do not have the inclination or knowledge to apply them appropriately" (p.25).

The lack of motivation or inclination to apply metacognitive knowledge and strategies may be the result of a number of factors--some of which may work interactively. These factors relate to the worthwhileness of the task, task difficulty, the amount of effort required to achieve the task, previous success or failure on the same or similar tasks by the learner or by others, the expectation of success, the possibility of failure and the self-perception or self-concept of the learner. Often the latter factor--self-perception--is based on or associated with the causal beliefs and perceptions of ability held by the learner.

Several authors (e.g., Chapman & Boersma, 1979; Pearl, Bryan & Donahue, 1980) have studied the causal beliefs of learning disabled children. It is suggested that learning disabled children blame themselves for failure, reporting that lack of ability, a stable, uncontrollable factor is a major cause of their failure performances. This perception of failure as stable and uncontrollable means that these children may well see failure as inevitable, with effort having no effect. This attitude is known as learned helplessness.

Based on the premise that the causal attributions of learning disabled children do reflect an attitude of learned helplessness (Canino, 1981; Grimes, 1981; Thomas, 1979), and furthermore do impinge on metacognitive knowledge and control, it seems fruitful to investigate metacognition-attribution links in a curriculum area where learning disabled children appear to have considerable difficulty and experience failure. That is, in the area of reading. In addition, the relationship between metacognition and reading, and of causal attributions and reading have separately been the focus of recent research, but studies of these constructs have not been so apparent in the learning disabled population.

In reviewing and interpreting the findings of each of the areas of metacognition, reading, and causal attributions in turn, several questions emerge where research attention, in relation to learning disabled children, may be directed.

Recent studies of metacognitive knowledge about reading highlight the age-and ability-related development of awareness of learner characteristics, task, text and strategies in reading. The lack of awareness of these variables by poor readers is accompanied by a perception that reading is mainly a decoding activity. Studies of knowledge of strategies, in particular, have shown that poor readers tend to refer most often to decoding rather than "meaning-getting" strategies. Some researchers have suggested that learning disabled children lack metacognitive knowledge, while others have proposed that learning disabled children have the knowledge but fail to apply it. One purpose of this study then is to investigate learning disabled children's knowledge about reading strategies. This will be examined, however, by separating out two distinct purposes for using reading strategies: to gain meaning from a story and to decode an unknown word. It appears that no study to date has been reported on learning disabled children's knowledge of reading strategies where two different reading purposes are involved.

The other component of metacognition related to reading, comprehension monitoring--which reflects the control aspect of metacognitive activity--has attracted wide research attention. Studies of comprehension monitoring using the error detection paradigm (e.g., Baker, 1979b; Markman, 1979; Winograd & Johnston, 1980) have examined the effects of experimenter-inserted errors. These studies reveal ability-related differences between groups. However, some studies show that not all "good" readers monitor their comprehension (e.g., Winograd & Johnston, 1980). With reference to learning disabled children, Bos and Filip (1984) found that they were able to monitor their comprehension, but failed to do so spontaneously.

Studies of comprehension monitoring have also been undertaken using "on line" measures. Some of these studies have investigated the role of artificially introduced errors (e.g., Baker, 1979c; Greeno & Noreen, 1974), while others have investigated the role of self-generated errors and self corrections.

In the field of reading, numerous studies have compared the percentages of errors and self corrections made by different types of readers. Self correction, an overt example of metacognitive activity, provides one measure of comprehension monitoring. In addition, to making comparisons of errors and self corrections, several studies have analyzed these miscues (that is, errors and self corrections) qualitatively. Typically, miscue analysis involves examining the influence of four linguistic sources of information (graphic, phonic, syntactic and semantic cues) on the miscues.

Despite the large number of studies of oral reading behaviours, in particular the analysis of errors and self corrections within a psycholinguistic framework, the results have been inconsistent. One of the possible reasons for this inconsistency may stem from the fact that in some studies where comparisons between readers of different abilities have been made, little attention has been paid to task difficulty.

In this study a method of equating text difficulty will be used. To date, no study of learning disabled children's oral reading behaviour has tackled this methodological problem in the manner adopted here. Further, while the research has indicated that different levels of task difficulty do effect the types and proportions of miscues made, legitimate comparisons of reading behaviours at two (or more) levels of difficulty can still be undertaken as long as task difficulty is equated at each level. The research into the reading of learning disabled readers shows a lack of studies that have compared these children's performances at an "easy" and "difficult" level. Therefore, in this study the effect of increased task difficulty on reading behaviour was investigated by having the children read at their individual "easy" and "difficult" level.

In using a linguistically based conceptualization of reading, several different taxonomies for analyzing reading miscues may be employed. In this study the aspects of various taxonomies used by several researchers (Clay, 1979; Goodman & Burke, 1973; Pohl, 1981) were amalgamated to provide a comprehensive taxonomy of reading behaviours. In addition, Pflaum's (1979) taxonomy was modified and used. This taxonomy is also based on linguistic principles and has been employed most frequently in the research of oral reading behaviour of the learning disabled (e.g., Pflaum, 1980, Pflaum, nd; Pflaum & Bryan, 1980). Pflaum's taxonomy offers simplicity in use, and more importantly, a more meaningful examination of the role of context on miscues. On the other hand, it is anticipated that the Goodman (and others) taxonomy will allow analysis of some of the finer gradations of linguistic cue use. This is particularly so with regard to graphic and phonemic cues. Thus, the taxonomies are seen as complimentary. The newly constructed taxonomy used in this study (a synthesis of the above taxonomies) will permit the analysis of miscues to be more complex than that seen in previous studies of the learning disabled reader.

The taxonomy involves the analysis of both errors and self corrections. While self correction in this study is regarded as one measure of comprehension monitoring, another measure of comprehension monitoring is also used. Pflaum (nd) has developed and used a signal emiting miscue monitoring device ("Bleep"), which allows the reader to signal awareness that an error has been made while monitoring. The instrument records a sound signal on audio-cassette tape when the button of the Monitoring Device is pressed. The sound is recorded silently, and is only audible when the tape is replayed. The Monitoring Device therefore, allows for the detection of errors and self corrections by the reader to be indicated without disrupting the flow of reading. In Pflaum's (nd) study learning disabled and non-learning disabled readers were assigned to a "bleep" or "no bleep" condition. An examination of awareness of miscues in relation to degrees of meaning change and phonic cue use was undertaken.

The use of the Monitoring Device is seen as a useful instrument in conducting on-line comprehension monitoring research. Not only does it permit the detection of awareness of errors, but when children are also explicitly instructed to signal self corrections, the researcher is able to determine awareness of an automatic monitoring event. Self corrections, by their very nature, presuppose that monitoring, the application of corrective strategies, and evaluation (all self regulating activities) have occured. The Monitoring Device allows self corrections to be marked and at that point, the researcher is able to examine awareness of an event, generally thought of as automatic and subconscious.

In extending Pflaum's study, all participants in the current study will be instructed to use the Monitoring Device. Signaled monitoring will not only be studied in relation to miscues at different levels of meaning change, but also in relation to the linguistic sources of information used during oral reading. The effect of task difficulty level on the signaled monitoring of miscues, again in relation to meaning cue use and linguistic cue use, will also be studied. These variables in combination have not been investigated previously.

To date, no study of metacognitive knowledge of reading appears to have been concerned with asking learning disabled children to describe their cognitive processes during monitoring of self-generated errors or self corrections. Several reading behaviours may be regarded as indices of monitoring, including self corrections and repetitions. In combination with instances of signaled monitoring using the Bleep, these events suggest that reflection about what is being understood is taking place. This reflection may be followed by checking, planning of strategy use, application of strategies, testing and evaluating. In the case of repetitions, the repetition itself provides the reader with reflection time to check what has been read or to silently apply strategies in order to work out an upcoming word. This study will investigate the reported use of cognitive activities which occur at these monitoring events, and how learning disabled children differ in their reported descriptions of cognitive activity from non learning disabled children. Several authors have indicated that learning disabled children are unable to employ their knowledge about strategies and have difficulty with "debugging activities" used during correction, but questions regarding metacognitive knowledge of corrective strategies related to very specific oral reading miscues at two levels of difficulty have not been examined. In addition, while some research has been undertaken concerning knowledge of corrective strategies, it has not yet been determined whether learning disabled children in fact differ in the knowledge they may have about the act of monitoring itself, prior to the application of corrective strategies. For example are learning disabled children less aware of the cause of an error that was signaled, corrected, or both signaled and corrected?

The methodology used in tapping cognitive processes, such as the use of the self report, has been criticized by some (e.g., Nisbett & Simon, 1977). However, others (e.g., Ericsson & Simon, 1980) have argued that the use of the self report is appropriate under particular conditions. The use of the measures of monitoring, such as the Bleep and self correction, means that the flow of reading and the deriving of comprehension is not disrupted. Use of a "retrospective interview" to obtain self report data is valid when the interval between the event and the request for introspection is short. The aid of "stimulated recall", by replaying the tape of the oral reading and comprehension monitoring behaviour, also allows the child to focus on specific events and directs thinking about them. In addition, establishing the veracity of the reported cognitive activities with actual reading behaviour is seen as a further necessary element in obtaining ecologically valid self report data on cognitive processes during reading.

The combination of these different techniques (that is, use of the Monitoring Device, a retrospective interview, and the stimulated recall) in this study to obtain information about cognitive processing at the level of specific, individual reading events, will make a unique contribution both in comprehension monitoring research, and in the research on learning disabled readers.

Recent theoretical writing in the area of metacognition has also suggested that attributions and motivational characteristics may impede the use of self monitoring behaviours. Theoretically it has been proposed, that aspects of knowledge of the self as learner, such as perceptions and causal beliefs, may manifest themselves as an unwillingness to use the self regulatory mechanisms. This may be particularly so when children believe that "lack of ability" is the major cause of their failure. Children with these beliefs, known as learned helpless children, regard the application of effort as being of no value in overcoming their failure. Thomas (1979) has suggested that learning disabled exhibit characteristics of learned helplessness.

The attributions of learning disabled children have been studied by several authors. The findings of these studies are equivocal, although in general, studies concerned with "locus of control" have indicated that learning disabled children make more external attributions for success and more internal attributions for failure. Very few attribution studies have concentrated specifically on the reasons children give for their success and failure in reading. A limitation of studies which have been reported is that they have not sought attributions after "real" reading tasks. Additionally, many attribution studies have employed only a limited range of causal attributions from which the children must make a forced-choice. The use of open-ended interviews provides the opportunity for a wider range of attributions to emerge. It is suggested here that such a format may indeed produce attributions more specifically related to the reading situation. However, when researchers are particularly interested in studying the contribution of specific attributions under two conditions (e.g., success and failure) it has been suggested that structured rating scales may be more appropriate, as well as being psychometrically superior to open-ended formats (Elig & Frieze, 1979). Thus two different purposes call for two different measurement techniques. In addition, no study of causal attributions has been undertaken with learning disabled children required to make attributions after reading at two levels of difficulty. The influence of task difficulty on causal attributions therefore also requires investigation.

To recapitulate, this study focuses on metacognition, reading and causal attributions of learning disabled and non learning disabled children. In the area of metacognition, attention is directed towards the study of knowledge of strategies for obtaining meaning from a story and decoding an unknown word, awareness of self monitoring and awareness of strategies for correction. Data on metacognitive knowledge will be collected using rating scales, and retrospective interviews set within a stimulated recall paradigm. Comprehension monitoring, another construct subsumed by metacognition, will also be investigated. The Monitoring Device (Bleep) and self correction, as measures of comprehension monitoring, will be employed. In addition, the linguistic sources of information (graphic, phonemic, syntactic and semantic) used during reading will be investigated. Signaled monitoring in relation to meaning cue use will also be examined.

In the area of attributions, children's perceptions of their achievement in reading and of the reasons for success and failure in reading will be studied. The instruments developed to collect the attributional data will serve different purposes. The open-ended questionnaires will give the participants the opportunity to express personally meaningful attributions, relevant to the reading situations and tasks faced. The structured scales will permit the comparison of the same attributions in two different contexts. In addition, the role of beliefs about causes of success and failure on comprehension monitoring and the application of strategies during oral reading will be explored.

Within each of the areas of concern in this study (metacognition, reading, causal attributions), the influence of task difficulty will be examined. It is suggested that task difficulty may be the variable where the differences between learning disabled and non learning disabled children's performance is most clearly seen.

Finally, the decision to study learning disabled children is particularly important in the New Zealand context. There is a lack of New Zealand research on this particular group of children, especially in terms of their reading behaviour. The selection of intermediate school age learning disabled children is also relevant. Reading instruction at this level is still a compulsory part of the school curriculum and is the final setting prior to high school in which the teaching of reading occurs.

In line with these concerns, the purpose of the present study is to investigate factors relating to metacognition, reading and causal attributions in Form Two learning disabled pupils. This research seeks to add to the knowledge of metacognitive abilities and skills necessary for proficient reading. In addition, study of reading-related causal attributions will perhaps highlight the role of motivational variables on metacognition. The results of this study in each area alone or in combination may provide information that will have implications for the instruction of intermediate school age learning disabled children.

CHAPTER TWO

REVIEW OF THE LITERATURE

Learning Disabilities

Special education is concerned with a wide variety of atypical children who require a range of educational services and programmes, either in special settings or in the regular classroom. In recent years one field within the area of special education that has received a great deal of attention is that of learning disabilities. The discipline of learning disabilities has been concerned with a group of children in the regular classroom who have problems with learning. Ysseldyke (1983) has stated that children with learning disabilities "perform poorly in school relative to others" (p.226) and can be considered as students who are "failing to meet the objectives of schooling..." (p.231). Concern for these children has led to the introduction in numerous countries (e.g., USA, Britain) of educational provisions and an increased research effort into topics relating to etiology, diagnosis and remedial procedures for the learning disabled. However, historically the learning disabilities field has been the subject of considerable argument and disagreement. As a multidisciplinary area, the terminology, etiology, diagnosis and remedial intervention procedures have been influenced by the different and sometimes competing interests or emphases of various disciplines, groups and individuals.

During the late nineteenth century and the early part of this century the notion that specific areas of the brain governed certain types of behaviour, particularly language, gained currency (Paul Broca, Hughlings Jackson, Carl Wernicke, cited in Penfield & Roberts, 1959). This belief led to a consideration of the relationship between localized brain damage and behaviour. From that notion it was hypothesized that since learning involves the brain, problems in learning must be the result of problems in brain functioning, probably resulting from brain injury (Strauss & Lehtinen, 1947; Werner, 1948).

Kurt Goldstein (1936, 1939) studied the functions of parts of the brain and applied his findings to his work with brain damaged soldiers after World War I. Goldstein investigated the psychological symptoms and behaviours of returned servicemen and found several common symptoms. These symptons of brain injury included perseveration, distractability, catastrophic reaction (i.e., extreme anxiety and behaviour disorganization) and figure-ground disturbances. The inability to differentiate between foreground and background led to the conclusion that those with brain damage had perceptual impairments.

From Goldstein's original studies of brain damaged individuals, inferences were made about children with learning problems. In the United States, Alfred Strauss and Heinz Werner took Goldstein's findings and applied them to the study of children. Many characteristics that Goldstein had observed in brain damaged soldiers were also found in children. Initial work with severely retarded children (Strauss, 1933) turned to further investigations of brain injured children who had milder intellectual impairment. Specifically, Werner and Strauss found evidence of hyperactive and distractible behaviours in the brain damaged children. This finding led to the claim that the brain damage was a major cause of mental retardation and that learning therefore may be inhibited by brain damage. Following these discoveries and their "logically" included corollaries, the term "Strauss syndrome" was applied to children who exhibited behaviours such as hyperactivity and distractability, and who were thus considered to be brain damaged.

Strauss and another colleague, Lehtinen, also initially worked with mentally retarded children. They identified two types of retardation: exogenous and endogenous. Where the retardation was the result of the child's environment the category "exogenous" was applied. Where the retardation was caused by neurological factors the term "endogenous" was used. The notion that endogenous retardation was due to neurological factors was central to the book which Strauss and Lehtinen published entitled Psychopathology and education of the brain-injured child in 1947. Here it was suggested that children with learning problems may have suffered brain damage, but that these learning problems could be organic rather than genetic. This publication, which is seen as seminal in the literature about children with brain damage, also proposed criteria by which these children could be identified. One major criterion by which brain damage (and by implication, learning problems) could be identified was through "the use of qualitative tests for perceptual and conceptual disturbances" (Strauss & Lehtinen, 1947). In fact, Strauss and Lehtinen (1947) defined a brain-injured child as "a child who before, during or after birth has received an injury to or suffered an infection of the brain". Strauss stated that such children showed difficulties in perception. As Ross (1977) points out, this was later inverted and taken to mean that children with perceptual problems had brain injury.

As a result of the assumption of a causal link between perceptual problems and brain damage, children who showed difficulty in perceptual-motor tasks were considered to have learning problems caused by brain injury. Further, because perceptual motor tasks were seen as fundamental to other thought processes, problems with these tasks implied difficulty for children in other higher cognitive tasks, such as reading.

The link between perceptual problems, brain damage and learning problems was also applied to other populations. Studies by Cruickshank (e.g., Dolphin & Cruickshank, 1951) of cerebral palsied children with brain damage found that these children also had difficulty with perceptual tasks. Kephart, another researcher in the area of cerebral palsied children, stressed that brain damage and perceptual motor skills were related. Kephart's work (1971) implied that remedial exercises in perceptual-motor skills would improve learning.

An educational response to the medical orientation of descriptions of children with learning problems was made in 1962 when Kirk and Bateman (1962) introduced the term "learning disabilities". They defined "learning disabilities" in terms of psychological processing disorders in speech, language, reading, writing arithmetic and/or other school subjects. The definition suggested that these disorders "might" be associated with cerebral dysfunction and/or emotional disturbances, but they were not caused by mental retardation, sensory deprivation, or cultural factors. Bateman (1965) later made a revision to the definition, including in it the notion of a discrepancy between achievement and potential ability as a primary distinguishing feature of learning disabilities.

In 1963, Kirk addressed a group of parents of children with learning problems and made use of the term learning disabilities. This group accepted this new descriptive label and voted to organize the Association for Children with Learning Disabilities (ACLD). During the 1960s in the United States, the ACLD began demanding government action in the form of legislation and funding for the provision of services for children with learning problems. As a result of the growing public pressure task forces sponsored by national agencies were set up. Task Force I in 1966, chaired by Samuel Clements, reported on the definitions, terminology and identification criteria used in the learning disabilities area. The Task Force produced their own definition, suggesting the relationship between brain dysfunction and learning problems. Clements (1966) proposed the term "minimal brain dysfunction" (MBD) to refer to children of "normal" intelligence, who as a result of brain damage displayed "various combinations of impairment in perception, conceptualization, language, memory, and control of attention, impulse or motor function" (Clements, 1966, pp.9-10). Although offering little direction for developing remedial assistance for children with learning problems, the new term was adopted by those with a medical or neurological background when describing these children.

In 1969, Task Force II's report under the chair of Haring and Miller (1969) discussed educational identification, assessment, and evaluation procedures. Educational, medical and health related services for these children were examined and included investigation of the educational programmes, administrative and classroom procedures, professional training and legislation.

In the same year Chalfant and Scheffelin (1969), in Task Force III, reviewed the research data on learning disabilities. These reports, along with public pressure, culminated in the Children with Learning Disabilities Act which amended Title IV (The Education of the Handicapped Act of 1967) of the Elementary and Secondary Act. This amendment specifically mentioned children with learning disabilities as a group who warranted the provision of special education or related services. Two years later Public Law 91-230 (The Children with Specific Disabilities Act of 1969, The Elementary and Secondary Amendments of 1969) was signed into law and made the Bureau of Education for the Handicapped of the United States Office of Education responsible for providing programmes for learning disabled children. Funds for research, teacher training and the establishment of model centres for the testing and remediation of learning disabilities were also guaranteed by this law. The definition provided by the 1969 Children with Specific Learning Disabilities Act stated that

> children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance, or to environmental disadvantage.

A closer look at his definition reveals four important components. Firstly, the definition states the areas in which learning disabilities may be apparent. Secondly, the term "specific learning disabilities" includes a number of previously named conditions. Thirdly, the definition incorporates the notion of a process factor. That is, the learning problem is a result of a disturbance in one of the psychological processes. The fourth component of the definition is the exclusion clause. That is, that children exhibiting primary characteristics of mental retardation, blindness, deafness, physical impairment or deprivation be excluded from the learning disability category.

However the 91-230 definition was not widely accepted and used. For example, Mercer, Forgnone and Wolking (1976) surveyed 42 state departments of education and found that only 19% of states had adopted the 91-230 definition. Modifications of the definition were used by 36%, 38% had developed there own, and 5% used no definition at all.

Therefore, there was no agreement among the states as to which children would be regarded as learning disabled. As a result quite different populations would have been selected and served as learning disabled in different states.

The PL 91-230 definition was incorporated into Public Law 94-142, The Education for All Handicapped Children Act of 1975. This Act attempted to define learning disabilities more concisely, but in fact the PL 91-230 definition was only modified slightly for inclusion in PL 94-142. The 1975 definition was hotly debated. It was regarded as unclear (Harber, 1981) and vague, and unsubstantiated (Bryan, 1980). Ross (1977) stated that the 1975 federal definition was unsuitable in school application, was not specific enough for a well-defined research sample, and too broad to allow for specific prescriptions for programmes for a particular child.

Another major criticism of the definition was its lack of operationalization. The purpose of any operational definition is to establish observable criteria which identify the construct being defined. Such a definition is necessary for individual diagnoses in the classroom, and in order to make replication of research studies both valid and more generalizable.

A survey by Gillespie, Miller and Fiedler (1975) of state laws, rules and regulations, regarding special education, and in particular learning disabilities, found that no state used a complete operational definition described in behavioural terms. Furthermore, rather than looking at the special needs of these children, states placed greater emphasis on "fitting" a child to a category in order to provide services.

An attempt by the U.S. Office of Education to operationalize the definition was made using the criteria that a learning disabled child must have normal intelligence, an academic achievement deficit and the absence of other primary handicapping conditions (Federal Register, 1976). This operationalization of the definition was so harshly criticized that although the severe discrepancy factor was retained, the formula offered for determining the discrepancy and the suggested figure of 50% discrepancy between achievement and ability was not included in the Federal Register (1977).

Another central area of criticism was related to the specific criteria or variables used in determining the discrepancy. Numerous reviews of the literature and of practices of both state and federal agencies and institutions involved with the learning disabled show the wide disparity in the types of variables used in the operationalization procedure (Adelman, 1979; Berler & Romanczyk, 1980; Harber, 1981; Kavale & Nye, 1981; Keogh, Major, Omori, Gandara & Reid, 1980; Olson & Mealor, 1981; Torgeson & Dice, 1980). Specifically, Olson and Mealor (1981), following a survey of 113 data-based articles published from 1975-1980 in four major research journals, concluded that there is a "lack of agreement and consistency surrounding the identification criteria" (p.392) as used by experts, practitioners and state departments of education in the United States. Harber (1981) stated that the criteria used in the 229 research reports that she analyzed in her study, were both ambiguous and contradictory. Kavale and Nye (1981) in another review of 307 experimental studies (about the learning disabled) from ten major research journals published from 1968-1980, also found a "lack of consensus regarding standard identification criteria for designating an LD sample" (p.386). These authors found both "diversity regarding the nature and the prevalence of criteria used for LD identifications" (p.386). Berler and Romanczyk (1980) in yet a further study of seven journals considered to be representative of psychological, psychiatric and educational publications (1972-1978) found a lack of consistency in assessment procedures and that "information describing the populations, the assessment instruments and the criteria, is often vague or missing" (p.538). A survey of Child Service Demonstration Centers which were established to assess and provide services for children with learning disabilities also showed great variability in the number of children served, the types of definitions used and kind of data used (Thurlow & Ysseldyke, 1979).

While the formal operationalizing guidelines for the definition were removed from the Federal Register (1977), classroom teachers, school districts and researchers still need to operationalize the learning disability definition. Typically in the literature, the specific criteria and variables used in operationalizing the definition have included: 1) the academic variable, 2) the discrepancy variable, 3) the exclusion clause, 4) the intelligence quotient variable, and 5) the psychological process variable.

In terms of academic indicators, the 1975 federal definition identified several areas in which children may demonstrate particular difficulties. These areas included verbal and written expression, listening, reading, spelling and mathematics. Generally, difficulties were established in these curriculum areas through the use of psychometric measures. These measures, often standardized achievement tests, were then used to determine a discrepancy of some type. The issues of reliability and validity of achievement tests are particularly important in this context. For example, Thurlow and Ysseldyke (1979) found that some of the major assessment devices that could be used to measure performance in subject areas (including the Key Math Diagnostic Arithmetic Test, the Peabody Individual Achievement Tests, the Wide Range Achievement Test and informal or "center-developed" devices) were technically inadequate.

The use of reliable and valid achievement measures is essential for any identification, placement or remedial decisions. This is also the case when identifying learning disabled children. Identification of these children has generally been made by means of a discrepancy between achievement or performance and potential or expected level of attainment, such as expected grade level or expected reading age. However, Bryan (1980) has reported that when federal guidelines which attempted to establish a discrepancy between potential (IQ) and achievement were operating, the degree of discrepancy varied from 6 months to 3 years, according to the wishes of the government and the numbers of children to be served. The degree of discrepancy, as Bryan (1980) correctly reported, does of course alter the population of those categorized as learning disabled to a great extent. Harber (1981) stated however that while the federal definition has appeared without guidelines for operationalization since 1977, the discrepancy notion is still deemed a major component of the identification criteria.

One of the most common practices of operationalizing the discrepancy is to identify those functioning below current grade level. Either a constant level of measured deviation between achievement scores and grade placement is utilized (e.g., one grade below current grade level), or a graduated deviation from grade level is used. That is, deviation between achievement scores and grade placement increases as grade placement increases. However, deviation from grade level does not take into account the chronological age of the pupil nor the fact that not all children progress from class level to class level at the same rate. The use of a constant level of measured deviation (e.g., one grade below current placement) is less widely accepted than a graduated deviation from grade level because it does not take into account "the gradually increasing range of variability of obtained scores as students progress to the upper grade levels" (Cone & Wilson, 1981, p.362).

The attempt to establish a significant difference between achievement and potential led to the development of numerous formulas (Bond & Tinker, 1973; Harris, 1970; Monroe, 1932) and the learning quotient of Myklebust (1968). The Harris (1970) expectancy age formula involves using both mental age or intelligence and chronological age to determine the discrepancy. Another formula, the Bond and Tinker formula (1973), takes into account years in school as well as IQ for computing a reading expectancy age. The learning quotient (Myklebust, 1968) is the ratio between present achievement and the expectancy age. The expectancy age is derived from the average of a child's mental age, chronological age and grade age. Myklebust (1968) stated that a child with a quotient below 96 should be considered learning disabled.

The inadequacies and problems of such formulas have been discussed by a number of writers (e.g., Campbell & Varvariv, 1979; Cone & Wilson, 1981; Hanna, Dyck & Holen, 1979; Lerner, 1981). Lerner (1981) has identified three major difficulties with discrepancy formulas. Firstly, due to the problem of measurement error it is difficult to ascertain a child's present level of functioning. Secondly, the measurement of a child's potential based on intelligence brings with it the problems of standardized intelligence tests and the outcome differences between group and individual tests, and verbal and non-verbal tests. Furthermore, Lerner (1981) stated that the uncertainty of the relationship between intelligence and potential, and between intelligence and mental age is still an issue under debate. Finally, the amount of "significant" discrepancy between achievement and potential varies from grade to grade, age to age. The amount regarded as "significant" for a young child may be less significant for an older child.

In commenting on age equivalent scores and the Harris (1970) formula in particular, Hanna et al. (1979) indicated that there are several limitations. These include the lack of a consistent unit of measurement that allows mathematical manipulations, the scores are invalid for older pupils and adults as they are only meaningful during the "years of rapid, relatively linear growth" (p.33), and grade or age cohorts are not used as comparable reference groups in this formula. In order to overcome the severe problems of mental age equivalents, formulas such as that of Bond and Tinker (1973) involving deviation IQs were substituted. However Cone and Wilson (1981) hold that this procedure produces an inaccurate and inflated achievement expectancy level and provides approximate reading scores for only the IQ range of 90-110. In additional, Fields (1979) found that children identified by the Bond and Tinker formula could also be just as well identified by a graduated deviation from grade level procedure. Cone and Wilson (1981) have stated in summary that these two procedures (i.e., Bond and Tinker and graduated deviation from grade level procedures) "identified basically the same population, i.e., one over-represented by slow learners" (p.362). Hanna et al. (1979), in discussing the use of the learning quotient (Myklebust, 1968), have noted that the use of fixed cut-off points is fraught with dangers due to "imperfect test reliability" (p.33) and that other sources of information should also be considered in the identification and decision making process. Following their critical analysis of different formulas, Cone and Wilson (1981) summarized by stating that

> each procedure tends to emphasize different critical variables, but none addresses errors of measurement,

> regression toward the mean, norm group comparability, a priori knowledge of incidence, or increased range and variability of obtained scores for students at higher grade levels. (p.363)

Furthermore, Cone and Wilson (1981) have noted that some of these formulas "are expressed as though they constituted an interval level of measurement" (p.363). In addition the authors stated that these formulas were not easy to administer and appeared to offer no more advantages than the deviation from grade-level method of identifying children.

Problems associated with techniques that incorporate either grade equivalent or age equivalent scores (i.e., derived score procedures) to quantify a discrepancy in achievement have resulted in the use of standard score procedures. Types of standard scores proposed include the z-score discrepancy method (Erickson, 1975) and a T-score (Hanna, et al., 1979). The standard score comparison procedure

> involves obtaining a standard-score value on a standardized test of mental ability and a comparable ... standard-score value on a standardized test of academic achievement. If the difference between the two obtained scores is greater than one or two standard errors of difference, the student is typically considered to be discrepant or under-achieving. (Cone & Wilson, 1981, p.364)

Thus the use of either a z score or T score overcomes the criticism that the variables used in expectancy formulas are often not comparable. Furthermore, the use of the standard error of measurement as part of the procedure to obtain a discrepancy, as Cone and Wilson (1981) have stated, "reduced the chance of measurement error constituting a major component of the LD identification" (p.365).

The use of regression analysis procedures in identifying learning disabled children have been advocated as the most preferred by Cone and Wilson (1981). One of the advantages of the regression approach is that it removes the failure of other procedures to control for regression toward the mean. Whereas expectancy formulas and standard score procedures are based on the assumption that IQ and achievement are perfectly correlated, regression analysis takes into account their imperfect correlation and facilitates a more accurate identification of the learning disabled population. Although Shepard (1980) has been critical of regression analysis techniques, Cone and Wilson (1981) point out that the weaknesses she attributes to the regression approach are common to other statistical techniques which may be used to identify a discrepancy including the use of the standard score procedure or expectancy formulas. The fact remains that of all the methods discussed here Cone and Wilson have suggested that it is the regression approach that takes into account most completely the factors of the increasing range and variability of scores in the upper school, the relationship of IQ and achievement, error of measurement, regression toward the mean, and _a priori_ estimation of approximate incidence.

Despite the limitations of all types of methods, procedures, and formulas, it is still recognized that some quantifiable discrepancy is required for operationalizing the learning disabilities definition. In fact, Kavale and Nye (1981) found that the research literature reflects an increasing trend to utilize the discrepancy component for operationalization. In addition, it is interesting to note that they observed a narrowing of the size of the discrepancy with an average of 1.76 years over the 209 studies they reviewed. (The modal figure provided was a 2 year discrepancy).

The exclusion clause as stated in the 1975 definition is also used often when operationalization has been attempted. Olson and Mealor (1981) found in their review of the literature that the categories of mental retardation, emotional disturbance and sensory disabilities were most often mentioned as variables not relevant to the description of the learning disabled samples. Cultural deprivation was mentioned only infrequently as an exclusory condition. Olson and Mealor (1981) suggest this may be due to the difficulty of defining exactly what constitutes such deprivation. In line with this, Kavale and Nye (1981) have commented that the exclusion factor is used in most research "because it remains easier to define what learning disabilities is not, than what it is" (p.387). While the exclusion clause suggested that learning disabled children did not have problems that were primarily caused by mental retardation, visual or hearing problems, social-emotional problems, physical problems, and cultural or environmental factors, at the same time it led to the notion that learning disabilities can not occur along with other handicapping conditions.

The exclusion variable of mental retardation means that children who are classified as learning disabled must at least have average intelligence. Intelligence is usually measured by a standardized test. Standardized intelligence tests are often group administered measures and require a high level of verbal ability. These two features of intelligence tests, specifically however, may make standardized tests less appropriate for learning disabled children. This reasoning follows from the evidence which suggests that children with learning disabilities also have language deficits (e.g., Kirk & Elkins, 1975; Vogel, 1974). Indeed, Lerner (1981) has suggested that "language deficits of one form or another are the basis for many learning disabilities" (p.265). Further, group intelligence tests maybe more handicapping to some children (e.g., those unused to test situations) than individual intelligence tests, and they allow no or little opportunity for direct observations of the behaviour of the participant nor for the identification of the reasons for atypical performance (Anastasi, 1976). These factors (opportunity for direct observation and identification of reasons for atypical performance) may however, be particularly important in identifying learning disabled children.

As average or above average intelligence is a factor characteristic of learning disabled children, some measure of intelligence (preferably through the use of an individual intelligence test) is required for the accurate selection of these children. A survey of the literature (Torgesen & Dice, 1980) found that many studies failed to control intelligence. Likewise, Kavale and Nye (1981), in contrast to a survey of the literature by Mercer, Forgnone and Wolking (1976), found that IQ data was less frequently reported. Kavale and Nye (1981) have suggested that

> this diminished importance of intelligence level may reflect a broadening intellectual range for LD as suggested by studies which have failed to support the normal IQ criterion, and have reported that anywhere from 25% to 40% of LD children exhibited depressed intellectual functioning ... (p.387)

It seems then, that researchers have difficulty discriminating between children with learning problems who have normal intelligence and children with learning problems who have low intellectual ability. The exclusion factor of mental retardation is often either too difficult to adhere to or the children with the particular learning difficulties under investigation tend also to have lower intelligence.

Another variable receiving decreased emphasis during recent years is that of the "psychological process". In LD definitions, disorders in the basic psychological processes have referred to attention, memory, perceptual and psycholinguistic problems. Olson and Mealor (1981) suggest that process variables were less frequently mentioned in the studies they reviewed because of the reliability and validity problems of process testing instruments. Kavale and Nye (1981) also suggest that the declining use of process variables may be due to problems of measurement. When process variables are mentioned however, such factors as attention, memory and cognitive style are often used as components in a learning disability (Kavale & Nye, 1981). The problems of measurement, and the issues of validity and reliablity of "process" instruments only added yet further to the list of reasons for growing concern over the adequacy of the 1975 learning disabilities definition.

Due to the continued dissatisfaction with the 1975 federal definition in the United States, a new definition, which attempted to eradicate the problems of the federal definition, was proposed in 1981 (Hammill, Leigh, McNutt & Larsen, 1981). The definition is referred to as <u>The Definition of the National Joint Committee for Learning Disabilities</u>, and states that:

> Learning disabilities is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of

> listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g., sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g., cultural differences, insufficient/inappropriate instruction, psychogenic factors) it is not the direct result of these conditions or influences. (Hammill et al., 1981, p.336)

A closer study of the definition shows that two of the major components causing controversy have been modified or omitted. Firstly the new definition attempts to eradicate the ambiguous tone of the exclusion clause. The definition now suggests that learning disabilities can be secondary and in addition to conditions such as cultural differences.

Secondly, the process deficit criterion has been eliminated. Hammill et al. (1981) suggest that rather than emphasizing the intra-individual nature of learning disabilities, the phrase "basic psychological processes" in the federal definition was regarded as a reference to "mentalistic process" and "perceptual motor ability" (Hammill et al., 1981, p.338).

One area of much debate in previous definitions, that of learning disabilities as a corollary of brain damage, has been further perpetuated in this definition. The definition suggests that learning disorders or problems are "presumed to be due to central nervous system dysfunction" (Hammill et al., 1981, p.340). The 1975 definition included "minimal brain dysfunction" (MBD) as one of the several labels supposedly synonymous with that of learning disabilities. It is obvious that the Hammil et al. definition seeks to further the traditional viewpoint that minimal brain damage may be one cause of learning disabilities. This is in spite of the fact there is a lack of evidence to show a causal relationship between neurological processing and learning disabilities (e.g., Arter & Jenkins, 1979; Coles, 1978; Hammill & Larsen, 1974; Hammill & Wiederholt, 1973).

The literature reviewed indicates the historical development of the various definitions suggested for identifying learning disabled children in the United States. In contrast, children with learning disabilities in New Zealand have no official recognition. Despite consistent advocacy by the New Zealand Federation of Specific Learning Disabilities (SPELD, 1981, 1985), minimal concern with and lack of provisions for children with learning disabilities in this country have been noted by several authors (Clay, 1972; Mitchell, 1977; Wilton, 1979). In 1972, Clay wrote that the concept of learning disabilities "has not yet made a significant impact on New Zealand education" (p.231). Seven years later, Wilton (1979) remarked that the situation had not changed and that Clay's observation was still applicable.

Just as little has been done by way of identifiying and providing for the learning disabled in New Zealand, research into specific aspects of learning disabilities is also sparse (Chapman & van Kraayenoord, in press). Because there are no delivery services for learning disabled children in New Zealand, researchers here are faced with the task of defining a group which does not formally exist. In New Zealand, researchers cannot identify samples in remedial-resource rooms, or use the diagnostic services of established learning disability programmes or centres, as can the North American researcher. Given this situation and aware of the difficulties of conceptualizing learning disabilites, the New Zealand researcher has sought to identify children with learning disabilities as those who are underachieving. Speaking about the U.S. context, Ysseldyke and Algozzine (1979) have stated "in spite of numerous attempts to create a more sophisticated disability, LD remains a category of underachievement" (p.3).

This notion of underachievement was adopted in the incidence survey undertaken in New Zealand by Walsh (1979) and Boswell (1981). Both used a compromise of the 1975 US federal definition that incorporated underachievement as the central feature. For these New Zealand studies the definition read:

> Children with specific learning difficulties are those of adequate intelligence who have unexplained difficulties in acquiring the basic skills of

> communication, specifically reading, spelling and mathematics. (Walsh, 1979, p.9)

However this definition still required operationalization. Walsh (1979) operationally defined a child with learning difficulties as one

> whose score on at least one of the Progressive Achievement Tests of Reading Vocabulary, Reading Comprehension or Mathematics was equal to or below the average score of children 2 years his junior; whose full IQ on the WISC-R was not less than 85; whose learning difficulties could not be attributed to difficulties of hearing or vision; [and] whose command of oral English language was not so limited as to present him or her with serious learning problems in a New Zealand classroom. (Walsh, 1979, p.28)

Because of the problems in defining and identifying learning disabled children in general, and in New Zealand in particular (Chapman, St. George, & van Kraayenoord, 1984), the concept of underachievement was used in the current study to select a learning disabled sample. Learning disabled children therefore, were seen as those children with normal intelligence who for whatever reason performed poorly in reading relative to their peers.

The two variables used in operationalizing this definition of learning disabilities were academic performance and achievement-potential discrepancy. The academic areas in which children may have particular difficulties included in this study were reading vocabulary and silent reading comprehension. Achievement in these areas was measured by the New Zealand Council for Educational Research (NZCER) series of Progressive Achievement Tests. A discrepancy, in terms of a significant difference between scores on an intelligence test and on the above named tests of pupil attainment was used in sample identification. The Wechsler Intelligence Scale for Children Revised (WISC-R: Wechsler, 1974) was used as an estimate of intellectual functioning.

Learning Disabilities and Reading

Difficulties in reading have long been recognized as one of the most common, frequent and distressing indications of learning disabilities in school aged children (Kass, 1977; Kirk & Elkins, 1975; Satz & Sparrow, 1970; Wallach & Goldsmith, 1977). Throughout the historical development of learning disability definitions, the component relating to disorders in understanding or using spoken or written language has remained constant. Indeed, one of the most commonly used techniques to identify a learning disability is an indication of underachievement of approximately two years below normal in reading level, plus average or above-average intelligence. In an analysis of research relating to learning or reading disabled children reported in eight education-psychology journals during 1976 to 1978, Torgesen and Dice (1980) found that, as well as an increased number of investigations into memory, studies of various reading subskills have received the greatest research attention.

Torgesen and Dice's (1980) review comprised research referring to both learning disabled and reading disabled children. The words learning disabled and reading disabled are often used interchangeably. However, numerous other terms have also been used when referring to children with academic difficulties in reading; for example, dyslexic, reading retarded and reading backwardness. The terminology can often be an indicator of the theoretical position of the researcher, the geographical location of the researcher (US versus Britain), and/or the occupational group of the researcher (learning disabilities-resource room specialist, reading specialist, medical doctor or educator). On other occasions, the use of the terminology associated with reading difficulties has been regarded as unsystematic and applied indiscriminantly. Some, however, have argued strongly for clear distinctions in the use of the terminology, with the application of certain terms only to certain children with particular traits or reading characteristics.

Lerner (1971, 1975a) has provided a discussion of "dyslexia" and the controversy surrounding the use of this term in describing children with severe difficulty in learning to read. Lerner (1981) has summarized the numerous different ways in which researchers have defined the term dyslexia. She has stated that typically the definitions include

> (a) evidence of an etiology of brain damage, (b) the observation of behavioral manifestations of central nervous system dysfunction, (c) the indication of a genetic or inherited cause of the reading problem, (d) the presence of a syndrome of maturational lag, (e) use as a synonym for reading retardation and (f) use to describe a child who has been unable to learn to read through regular classroom methods (Lerner, 1971, 1975b). (Lerner, 1981, p.295)

Lerner (1971) has also argued for a distinction between "learning disabilities" and "reading disabilities". She suggests that learning disabilities specialists are concerned with central processing dysfunctions intrinsic to the reader, whereas the reading specialists are concerned with environmental factors extrinsic to the reader. Whether or not this view is accepted, Tansley and Panckhurst (1981) have pointed out that "the concept of 'reading' is central" (p.129), and in addition, Lerner (1981) has herself noted that while the perspectives of each of these two disciplines is different, operationally similarities do exist between the two.

Further, Lerner (1981) has noted that currently dyslexia is viewed in the literature either from a medical or from an educational perspective. The medical view, originating mostly from Britain and Europe, sees dyslexia as an "inability to read due to brain damage or central nervous system dysfunction" (Lerner, 1981, p.295). The other, educationally orientated view, stemming largely from the United States holds that dyslexia is "a reading disability ... that ... 'simply means there is something wrong with the person's reading' or that dyslexics are 'children who are of average or better intelligence who are finding it difficult to learn to read'" (p.295).

Downing and Leong (1982) have also provided definitions of terms related to children who have "problems in processing print". These authors use the term "reading disabilities" to "denote the broad group of children with varying degrees of reading difficulties, whatever the cause" (p.301). These children are further described as those with average or above intelligence. The authors suggest that a cut off "zone" of an approximate IQ of 84/85 (one standard deviation below the mean on the Stanford Binet or the WISC-R) may be used to operationally define reading disabilities. Children referred to as those with "reading difficulties" or "reading backwardness" (although by exclusion when this operational definition is used, not mentally retarded children who are "backward" in reading) may be subsumed under the term reading disabilities. Within the group who experience reading difficulties is a further subgroup of severely disabled readers. Downing and Leong (1982) refer to them as children with "specific reading disability, reading retardation or developmental dyslexia" (p.301).

Downing and Leong (1982) have noted that while they make a distinction between reading difficulties and specfic reading disability, "no dichotomy is implied". Futhermore they suggest that "some of the problems in processing print are common to both poor readers and "retarded" readers. But, by and large, the etiology is different" (p.300).

While using the terms "specific reading disability", "developmental dyslexia" and "reading retardation" interchangeably to describe the same group of children with severe reading difficulties, Downing and Leong (1982) do not support the "... inclusion of 'brain injury', 'minimal brain dysfunction' and some other categories of structural damage" (p.323) in their operationalization of the definition. They state inclusion of these variables in the definition confuses, because such practices lead to the corollary that these children may be "irremediable" and that terms such as "minimal brain dysfunction" are in themselves imprecise. Rather, Downing and Leong (1982) suggest that a "conceptually sound and statistically defensible" operational definition of a specific reading disability is one involving a "discrepancy between reading scores and predicted intelligence scores and age ..." (p.324).

However, the use of the term "developmental dyslexia" in itself has also been criticized on several grounds. Aman and Werry (1982) state that difficulties with the term relate to the fact that it is a borrowed label "initially used much more restrictively as a bona fide neurological syndrome referring to the loss of the ability to read (usually in adults) through some form of cerebral pathology" (p.268). In addition, there is a great deal of debate about whether this cerebral pathology exists in children. Thirdly, dyslexia, while described as loss of ability to read in adults, is characterized in a variety of ways in children depending on the researcher, and finally, "the criteria for associated clinical symptomatology varies across diagnosticians as well as children" (Aman & Werry, 1982, p.268).

Rutter and Yule (1973, 1975) who do not use the term developmental dyslexia, and instead use reading retardation or reading backwardness, do have however a similar operational definition to that of Downing and Leong (1982). For Rutter and Yule, reading retardation refers to a discrepancy between reading age and mental age. The "amount of" discrepancy is usually 2 years. Reading backwardness is defined as a discrepancy between reading level and chronological age without reference to intelligence. Aman and Werry (1982) have commented on these categories stating

> It is clear from these definitions that some overlap occurs when children are identified by the two procedures. As a generalization, however, children who are reading retarded but not backward tend to be of average or above IQ with a specific handicap, whereas backward (but not retarded) readers tend to be of lower IQ with a more generalized learning problem. (p.268)

Jorm (1983) has pointed out that the concept of reading retardation is similar to that of developmental dyslexia, but he has suggested that it has some advantages over the developmental dyslexia label. For example, the operationalization of reading retardation involving both IQ and reading achievement test scores has been described in some detail by Rutter and Yule (1975), whereas the definition of dyslexia is generally not so clearly operationalized. Futhermore, Jorm (1983) has pointed out that the use of reading retardation "does not carry any connotations that the deficit necessarily has a purely biological basis, as the concept of dyslexia seems to" (p.3).

Reid and Hresko (1981) have also provided a discussion of the relationship between learning disabilities and dyslexia. These authors have suggested that the domains covered by "learning disabilities" and "reading problems" intersect where the reading problems are

> due to a disorder in one or more of the basic psychological processes, including problems that stem from brain injury and perceptual deficits ... [and] includes all children with specfic developmental dyslexia and some of the group for whom dyslexia is secondary. (p.231)

The authors, have elaborated on their understanding of the intersection between learning disabilities and reading problems by stating that the area of common ground, "does not, however, encompass all remedial reading problems any more than reading problems constitute the parameters of learning disabilities" (p.231). Nevertheless, Reid and Hresko have commented that in the United States most children who have been identified as learning disabled have problems associated with reading, which are often persistent in nature.

A similar distinction between primary and secondary reading disabilities has been made by Houck (1984). Citing the work of Kaluger and Kolson (1978) and Rabinovitch (1968), Houck has indicated that children's reading problems are either seen as caused by environmental factors or as a reflection of a neurological dysfunction, although there may be no demonstrable overt signs of brain injury. Children with reading problems caused by environmental factors are referred to as those with "primary reading disabilities" or "dyslexia". Houck (1984) also discusses the continuum of reading from developmental to corrective to remedial. Those with no difficulty in reading make up the first group, while those with "some but not great difficulty" and those with "severe reading problems" comprise the corrective and remedial groups respectively. Houck has suggested that the "remedial" readers parallel those with primary reading disabilities or dyslexia.

This review of the terminology variously used to describe learning disabilities in reading/reading disabilities, highlights not only the multiplicity of terms themselves, but also, that in some cases "the same terms may refer to different groups of children or different terms may be used for the same children" (Downing & Leong, 1982, p.304). In addition, the term used is often dependent on who is using the label and their particular theoretical orientation. Furthermore, while the distinction between reading and learning disabilities can be made in an abstract manner, in practice the distinction may be more difficult (and perhaps not necessary). Haring and Bateman (1977) consider, for example, that with minor exceptions the terms learning disabled and reading disabled apply to the same children - those who are not learning to read to expectation. As to the distinction between dyslexia and learning disabilities the word dyslexia is not used here because it relies on the notion of neurological impairment and this dependence on etiology and intrinsic deficits, which can often not be substantiated, has little to do with the educational remedial needs of the child.

As suggested, the terminology used to label children with difficulties in reading often points to the theoretical models from which researchers attempt to explain the acquisition and development of reading and reading problems. Within the area of the psychology of reading itself, several models of reading have been proposed. Generally, these are one of two types: developmental models or models of proficient reading. Developmental models have attempted to explain the development of reading chronologically, from pre-reading to mature reading. Proficient reading models have attempted to describe what occurs during proficient reading. Proponents of developmental models include Carroll (1976, 1977) and Chall (1979). In models of proficient reading, researchers have theorized about the roles of cognitive, linguistic and other processes during fluent reading. These proficient reading models have been further characterized as "bottom-up", "top-down", or "interactive".

In a "bottom-up" view of reading, the lower-level or perceptual processes are initally used prior to the higher level processes. For example, Gough (1972) and Gough and Cosky (1977) have suggested that the reader firstly perceives the letters and words before coding them phonemically. At this point the meanings of individual words are retrieved and syntactic and semantic rules are applied. From here the words which are processed into sentences are stored in the "Place Where Sentences Go When They Are Understood" (PWSGWTAU: Gough, 1972). Thus, this model follows a linear, sequential pattern from decoding to comprehension. La Berge and Samuels (1979) and Samuels and Eisenberg (1981) have also put forward a bottom-up model of reading which emphasizes the place of attention and automaticity in an information processing conceptualization of reading. This model assumes that written stimuli are transformed via the automatic processing of letter and word recognition into meanings. The models of reading proposed by Massaro (1975) and Perfetti and Lesgold (1979) are considered also largely to be bottom-up models.

In contrast to the bottom-up models, the top-down models consider the higher processes to have a greater role in the act of reading, while the lower processes are used only if they are required. Goodman (1967, 1976) and Smith (1971, 1973, 1978), the leading proponents of this conceptualization, suggest that the proficient reader makes hypotheses about the author's meaning based on the reader's prior knowledge. Predictions are made about the meaning and word form, before the text is sampled, so that the hypotheses and predictions may be confirmed. Thus, these theorists propose that the reader moves directly from the visual stimuli to the meaning, without firstly using phonemic coding.

Rumelhart (1977) has suggested that reading results, neither from a linear progression from sensory information to understanding, nor from the reader's prior knowledge to text comprehension, but through an interactive process where both bottom-up and top-down processes work in parallel. The reader makes an interpretation of the text by interactively bringing into play several components: perceptual information, orthographic knowledge, word knowledge, and syntactic and semantic knowledge.

In addition to theoretical considerations of how the act of reading is accomplished, researchers have also considered both what causes and what occurs during reading failure. In tracing the historical development of the learning disabilities definition in the previous section (Learning Disabilities), reference has already been made to the emergence of both a medical and an educational view of learning disabilities. This dichotomy is also seen in much of the research in the area of reading difficulties, with the medical orientation focusing most often on the investigation of single or multiple causal factors of reading difficulties.

Several writers have traced the historical progression of research in the field of reading disabilities (Chall, 1978; Guthrie & Seifert, 1978; Lipson & Wixson, 1985). Initially, studies of reading disabilities centred in a medical model (Hinshelwood, 1917; Morgan, 1896; Orton, 1925). These researchers were mostly concerned with examining neurological and physiological factors considered to be causally related to reading disabilities. Lipson and Wixson (1985) have reported that during the early 1900's there was a move away from viewing a reading disability as a defect within the reader to regarding instruction as the major source of difficulty.

However, this move was short lived, as at almost the same time researchers began to look again for a causative factor or factors involved in reading problems. Describing the situation during the 1960's, Chall (1978) has written that many of the reading researchers attempted to discern the "basic underlying psychoneurological factors that seemed to impede learning to read" (p.32). Chall describes that initially, the factors said to be causally related to reading disabilities were those of visual perception and visual motor skills. Later, to these two factors auditory perception was added, leading eventually to an emphasis focusing on "patterning, sequencing, and integrating auditory and visual factors" (Chall, 1978, p 32).

Newcomer and Hammill (1976) have provided a review of the debate regarding the validity of the assumption that the underlying processes are "meaningfully" related to reading achievement. Due to the lack of evidence supporting a relationship between the so-called underlying factors and reading achievement, Bateman (1971) called for a move away from this paradigm in both diagnosis and intervention to one that was concerned with task analysis and direct skills teaching. Black (1974) was even more blunt following his study of the relationship between visual perception and reading and spelling achievement, stating that "the most efficient way to remediate reading problems would seem to be the teaching of reading" (p.182).

Indeed, research has indicated that most children who have difficulty with reading are unlikely to be neurologically impaired (Chall, 1983; Downing & Leong, 1982). Yet the assumption of neurological dysfunction is still considered by some recent researchers to be a predominant cause of reading failure (e.g., Hynd & Hynd, 1984).

The dominant concern with etiology by many researchers has also lead to the categorization of children with reading disabilities into various groups. For example, located within a causal framework, Boder (1971) has proposed three categories of reading disabled children: those with visual perceptual deficits, those with auditory and language deficits, and a mixed group. Mattis, French and Rapin (1975) also proposed three subgroups: a group with articulatory and other phonological problems, one with naming and syntax difficulties, and the third with visual perceptual difficulties. To the three subgroups proposed by Mattis et al, Denckla (1977) found and added a fourth group, one with phonemic sequencing problems.

It appears that linguistic factors (language deficits, phonological problems, phonemic sequencing difficulties and syntactic difficulties) have been added to perceptual factors as causes of reading difficulty. However, Tarver and Ellsworth (1981) have stated that there is "a growing body of evidence which indicates that many of the so-called 'perceptual' deficits previously thought to be associated with reading failure actually reflect deficits in verbal functioning" (p.494). Much of this evidence, Tarver and Ellsworth report, stems from Vellutino's reconceptualization of perceptual deficits as verbal deficits. For example, problems of auditory perception experienced by poor readers have been reconceptualized as a lack of awareness of the phonetic structure of both oral and written language.

However, reading disabilities have also been seen in terms of strengths and weaknesses of specific reading skills. A difference-deficit model of reading disability has been proposed by Cromer and Wiener (Cromer, 1970; Cromer & Wiener, 1966; Wiener & Cromer, 1967; Oaken, Wiener & Cromer, 1971). In discussing good and poor readers, Cromer (1970) made the distinction between those with a "difference" because of a mismatch between an individual's mode of responses and the responses required in reading, and those with a "deficit" because of the lack of a particular function. In their studies, Cromer and Wiener found that the "difference" poor reader was good at reading single words, but failed to comprehend larger units of text, whereas the "deficit" poor reader had problems with both reading single vocabulary items and in comprehending material.

A further framework from which reading difficulties have been investigated involves studies of fast and accurate decoding and reading comprehension of skilled and less skilled readers (Perfetti, 1977; Hogaboam & Perfetti, 1978; Goldman, Hogaboam, Ball & Perfetti, 1980). Perfetti and his coauthors have indicated that the role of decoding is central in comprehending, that is they are interdependent. Good comprehenders tend to be fast accurate decoders and vice versa. They also found that it is decoding latency (not decoding per se) which is one primary indicator of the qualitative difference between skilled and less skilled readers. Speed of decoding is slower in less skilled readers.

Another researcher who has made comparisons between groups of readers in decoding and comprehension is Golinkoff (1975-1976). Specifically, Golinkoff studied good and poor comprehenders on tasks involving decoding, meaning of single words and meaning of larger units. She found poor comprehenders were deficient on the first and third type of task, but not on the second. Because speed is a central component to tasks one and three, but not task two, Golinkoff concluded that poor comprehenders were slow decoders which resulted in slow word-by-word reading. This laborious reading prohibits the chunking of text into syntactic units from which meaning is derived. Tarver and Ellsworth (1981) have suggested that this particular subgroup of poor comprehenders may consist mainly of "learning disabled" children.

Other theoretical frameworks have also been applied to the study of learning and/or reading disabilities. Wong (1979) has reported on various theoretical positions. They include theories that have hypothesized that learning and or reading disabilities are the result of the mismatch between the characteristics of the child and the classroom programme (Adelman, 1971), the involvement of the irregularities in the information-processing and information integrating system (Senf, 1972), the developmental lag in perceptual and linguistic skills (Satz & Van Nostrand, 1973), the developmental delay in selective attention (Ross, 1976) and the inactive learner view (Torgesen, 1977a). More recently, Johnston (1985) has pointed to theories of reading that focus on differences between good and poor readers in terms of the "higher mental processes such as strategic and metacognitive behavior" (p.4). Johnston has stated that

> models which fall into this category are in a substantial minority (Crowder, 1983) and have been described by Ceci (1982), Clay (1979), and Johnston and Winograd (1983). (pp.4-5)

It is clear then that the study of both the normal development of reading and of reading problems can be undertaken from a myriad of theoretical paradigms and models. These theoretical models form the basis from which particular aspects and characteristics of, or related to poor reading may be studied. Reviews of research into reading and learning disabilities are numerous (Arter & Jenkins, 1977; Benton & Pearl, 1978; Chall & Mirsky, 1978; Tarver & Dawson, 1978; Torgesen, 1975; Ysseldyke, 1973). Within these reviews, various characteristics commonly associated with difficulties in reading have been suggested. One of the most often studied characteristics is the relationship between learning disabilities and language deficits.

Findings are equivocal as to whether children retarded in reading have language dysfunctions or deficiencies. Some of the studies which support the relationship include those of Singleton (1976), Nelson (1974), Rabinovitch, Drew, DeJohn, Ingram and Withey (1954), while those which did not find language and reading abilities to be highly related include Martin (1955) and Silver (1968).

Bryan (1979) has reported an extensive review of the literature on verbal and non verbal communication in relation to learning disabilities. Studies dealing with the relationship of phonology, syntax and semantics (as the three predominant types of linguistic information available to the reader) and reading disabilities are described here.

In learning to read not only do children have to recognize that speech is made up of words, but also that individual words are composed of a synthesis of sounds. Several studies have suggested a link between the lack of ability to segment words into phonemes (a type of phonological awareness) and difficulties in learning to read (Calfee, 1977; Foss & Hakes, 1978; Fox & Routh, 1975, 1976; Helfgott, 1976; Gleitman & Rozin, 1977; Goldstein, 1976; Liberman, 1973; Mattingly, 1972; Savin, 1972; Wallach & Wallach, 1976). Vellutino's (1977) research also supports the findings that good readers are aware that individual sounds make up words, whereas poor readers are less aware of the component parts of words (Johnson & Hook, 1978; Liberman, 1973). Therefore, Vellutino (1977) has hypothesized that poor readers are unable to make the spoken language-written language connection.

With reference to syntactic abilities and reading performance, Bryan (1979) has commented

> Using subjects defined as learning-disabled and reading-disabled, investigators have consistently found both classifications of children to be less skilled in decoding sentences, in generating syntactically correct responses to a variety of verbal and visual stimuli, in using complex types of grammatical forms in sentences, in creating correct and/or imaginative sentences and stories from visual stimuli. (p.178)

Studies of sentence organization, a type of syntactic awareness, and reading comprehension have found a positive relationship between the two constructs (Cromer, 1970; Denner, 1970; Oaken, Wiener & Cromer, 1971; Resnick, 1970; Weinstein & Rabinovitch, 1971). Other types of syntactic awareness include the use and application of grammatical knowledge and structures. Valtin (1979) found that a task involving the conscious application of grammatical knowledge was more successfully achieved by normal readers than poor ("dyslexic") readers. Similarly, spontaneous use of strategies based on grammatical structures was shown by above average readers but not by average readers (Weaver, 1979). In addition, comprehension of some syntactic features proves to be difficult for learning disabled readers (Denner, 1970; Vogel, 1974, 1975; Wiig & Fleischmann, 1980; Wiig & Semel, 1976).

In summary then "there is considerable evidence that learning disabled, dyslexic and/or poor readers have less facility in syntax in comparison to good readers" (Hallahan & Bryan, 1981, p.151).

Bryan (1979) has remarked on the dirth of empirical research about the semantic skills of learning disabled children, with the research into syntax being cited frequently in discussions of semantics. She notes that as is the case with research into syntactic skills, "the results of the semantic studies, albeit sparse, support the notion that learning disabled children are at a disadvantage in comparison to nondisabled children in the acquisition of semantic skills" (Bryan, 1979, p.179). However, Hallahan and Bryan (1981) have commented that there is much debate as to whether the lack of ability in semantic skills is caused by deficits in phonology and/or syntax.

> Some researchers take the position that poor comprehension is the result of a child's being slow or inefficient at processing component units of words or chains of words. Because phonological and syntactic processing are not automatic, the child spends more time processing words and hence loses meaning (Vellutino, 1979, then in press). In contrast, other researchers view reading problems as the result of the child being overly attentive to the phonetic and orthographic features of words, to the disadvantagement of the use of context (Goodman, 1976; Smith, 1973). In this perspective the reading deficit is seen as the result of having a poorly developed meaning system; thus, the child comes to the reading task with limitations in ability to use the context of a passage to make sense of unknown words. (Hallahan & Bryan, 1981, p.152)

Rather than investigating differences in decoding and its relationship to comprehension, several aspects of the comprehension process itself have been studied in learning disabled children. Kavale (1980) has investigated the strategies used in comprehending written material of twenty sixth-grade learning disabled and non learning disabled children. Using the "think aloud" technique, the participants responded to a variety of comprehension questions (e.g., inference, main idea, cause and effect). As expected, the results showed that the learning disabled children differed from the non learning disabled children in terms of number of correct answers. However the learning disabled children also did not report using "differential strategies" to answer the different types of questions.

Hansen (1978) has also reported differences in comprehension between "specific learning disabled" and normal fifth- and sixth-grade students. The children orally read stories reflecting their independent reading level, selected at the grades one, three or seven difficulty level. Thereafter, the children were asked to retell the stories as a measure of comprehension. Hansen found that despite reading at their independent level, the learning disabled children demonstrated significantly less comprehension on the fifth-grade level in comparison to the third-grade level. Recall of story details and ability to identify the main ideas was significantly less for the learning disabled children.

Pflaum (1979) has also conducted a study of fourth- and fifth-grade learning disabled children's ability to infer information and thus comprehend a story. In order to be sure that the hypothesized deficits in comprehension were not due to other factors, Pflaum controlled the level of difficulty of reading. Pflaum found that the learning disabled children displayed less comprehension by performing less well on a retelling task and they were less likely to make the correct inference as to the main idea of the story. Pflaum concluded that in comparison to non learning disabled children, learning disabled children were less able to use the semantic cues in the story to make inferences.

While some researchers have suggested language deficits and weaknesses in comprehension to be characteristic of learning disabled children, Ross (1976), Hagen and Kail (1975), Luphart and Mulcahy (1984) and Hallahan and Cruickshank (1973) have argued that the reading problems of learning disabled children may be due to difficulty in attending to and maintaining attention to relevant stimuli when reading, that is to letter shapes and sounds.

One final area of investigation in terms of the characteristics of learning disabled children is the study of oral reading behaviours. In particular these studies have examined the linguistic features used by readers in making errors and self correcting. These investigations are discussed in a following chapter Metacognition and Reading. They are reviewed there because the strategies employed during reading are thought to rely on the interactive use of these linguistic sources of information and in this thesis the application or non application of these strategies is considered to be indicative of comprehension monitoring. Thus, the reading problems of learning disabled children are characterized in the literature as difficulties or deficits in oral language (phonology, syntax, semantics), decoding, comprehension and attention.

However, numerous studies purportedly investigating the reading problems of learning disabled children have used procedures that have not involved reading text. Batey and Sonnenschein (1981) have criticized the work of Tarver and Hallahan (1974) and Tarver, Hallahan, Kauffman and Ball (1976) who used picture recall tasks, Vellutino, Steger, DeSetto and Phillips (1975) who used letter recognition tasks, Pike (1977) and Vogel (1974) who used oral syntax decoding tasks, and Bauer (1977) and Pike (1977) who used auditory recognition tasks. Batey and Sonnenschein (1981) question the validity of using non reading tasks to make inferences about learning disabled children's reading abilities. While acknowledging that those studies involving the assessment of oral language skills are probably more closely related to the reading process because "both oral language and reading utilize whole word stimuli", the authors remark that "even so, a child's reading abilities or disabilities do not necessarily correspond directly with his or her oral language abilities or disabilities" (p.238).

One other area of concern relating to the reading of learning disabled children is the technical adequacy of measures of language and reading achievement. Concern about the reliability and validity of these instruments has been expressed by Smith and Rogers (1978), Hammill (1971), Salvia and Ysseldyke (1978) and Shepard (1980).

Therefore, in evaluating the findings of studies that have investigated the characteristics of learning disabled readers, the type of task used and the reliability and validity of the measures used should be borne in mind.

In summary, reading is seen as a curriculum area in which many learning disabled children have a particular difficulty. A variety of concepts including learning disabilities, reading disabilities, dyslexia, reading backwardness and reading difficulties have been used to refer to children with problems in reading. Many of these terms overlap when they are operationally defined, with the same terms being used for different children or different terms encompassing the same children. The diversity of terminology may be seen as a result of the different models of reading and the perspectives of learning and reading disabilities used by individual researchers. These researchers have often studied the characteristics most frequently linked to reading problems. These include: language ability, attention, decoding and comprehension skills. Within each of these domains the findings are not consistent with regards to their relative influence on the ability to read. In addition, doubts about the measures used and their reliability and validity have been raised. Nevertheless, as long as reading disabilities comprise a large portion of the difficulties experienced by children with learning disabilities and a lack of a clear picture about their strengths and weaknesses in relation to their difficulties exists, it seems important to continue to investigate the reading process of this group of children. Houck (1984), for example, has called for further investigation into the reading strategies of learning disabled children. This research thrust directs attention on the study of "strategic and metacognitive behavior" (Johnston, 1985) of the learning disabled child.

Metacognition

Cognition is concerned with what individuals know and think. The development of knowledge and behaviour in an individual are a result of the contribution of mental activities or cognitive processes. The particular processes are involved in receiving, interpreting, organizing, retrieving and using information or knowledge. A cognitive view of learning portrays the learner as actively engaged in acquiring, storing and retrieving stimulus inputs. In this view of learning the mind is seen as a complex cognitive system which processes information in various ways. Initially the information may be encoded, recoded or decoded. The transformed information may then be combined or compared with other information and stored, either to be forgotten or retrieved at a later date.

Several theories of learning propose that the learner plays an active role in processing information (Bruner, 1961, 1966; Piaget, 1963; Piaget & Inhelder, 1973). Soviet (Vygotsky, 1978), Piagetian (Case, 1978), information processing (Klahr & Wallace, 1976), and mediational (White, 1965) models of cognitive development, all describe the learner `acting' on information to gain understanding of it.

More recently, the field of developmental cognitive psychology has stimulated a spread of interest beyond the study of how people think to the study of how people think about their own thinking. Thus, the investigation of cognitive processes includes both the knowledge and control of thinking. These twin elements of knowledge and control of cognitive processes constitute "metacognition" (Brown, 1978; Flavell, 1976). The control or executive aspect coordinates, plans and monitors cognitive activity. Kagan and Lang (1978) have suggested that an executive process has several functions:

> (1) reflecting on actions, (2) recognising a problem, (3) appreciating the difficulty of a problem and adjusting effort accordingly, (4) maintaining flexibility, (5) using strategies, (6) controlling distraction and anxiety, (7) preferring to achieve elegant solutions and avoiding failure, (8) having faith in the power of thought, and (9) relating information to a larger structure. (p.219)

Viewed in this way, the executive function is a sophisticated monitoring system and is pivotal to any understanding of metacognition. Baran (1982) states that the executive function is "the process which coordinates and organizes the cognitive skills necessary to meet a problem solving goal" (p.8). It is demonstrated when an individual "spontaneously changes a control process or sequence of control processes as a reasonable response to an objective change in an information processing task" (Butterfield & Belmont, 1977, p.284). The self controlled knowing, which has this executive function, is a result of the learner actively developing a system of strategies that become internalized and controlled by the learner. Learning, according to the models described here, is not necessarily determined by using strategies or by "doing", but is determined by "knowing", that is by the internalized, automatic control of strategies by the learner, coordinated and organized by the executive function.

Several definitions of metacognition have been provided (Brown, 1978, 1980; Flavell, 1976, 1978, 1979; Meichenbaum & Asarnow, 1978; Moore, 1982; Paris, 1982; Paris & Lindauer, 1982). Flavell's (1976) research into memory knowledge gave impetus to much of the work in metacognition. He has defined metacognition as referring to

> knowledge concerning one's own cognitive processes and products or anything related to them...active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective. (p.232)

The key concepts in Flavell's (1979) conceptualization of metacognition include metacognitive knowledge and metacognitive experience. Metacognitive knowledge refers to knowledge about the factors or variables that effect performance. These include person, task and strategy variables. Person variables include what individuals know about their own and others' cognitive processes, and what they understand about universal properties of cognition; knowing, for example, that there are various kinds and degrees of understanding, such as attending or remembering. Task variables include knowledge about the task (e.g., quantity, quality, familiarity of the task), as well as an understanding of the implications that these differences in the task may have. Further, task variables include awareness about the nature of the task demands. Strategy variables are concerned with awareness about what strategies are available, and when and where these strategies are best employed. This also includes knowing when strategy change is required. The three variables (person, task, and strategy) may also work in combination and interact with one or both of the other variables.

Flavell (1979) sees metacognitive experiences as "any conscious cognitive or affective experiences that pertain to any intellectual enterprise" (p.906). For example, a realization that one has not understood what one has been reading. Metacognitive experiences may cause individuals to change or revise goals, modify the metacognitive knowledge base, and put into operation strategies aimed either at cognitive goals or metacognitive goals.

> Cognitive strategies are invoked to make cognitive progress, metacognitive strategies to monitor it. However it is possible in some cases, for the same strategy to be invoked for either purpose and also, regardless of why it was invoked, for it to achieve both goals. (Flavell, 1979, p.909)

Two components or features of metacognition are identified in Flavell's (1976) definition: reflective awareness of the cognitive processes and cognitive control. Similarly, Brown (1978) distinguishes two, not necessarily independent, groups of activities under the term metacognition: knowledge about cognition, and regulation of cognition. Brown (1978) has described metacognition as "knowledge about one's own cognitions rather than the cognitions themselves" (p.79). Later, when elaborating on this statement Brown (1980) noted that as applied to reading, knowledge about one's cognition consists of what individuals know about their own abilities and the way that that awareness fits in with the demands of different reading situations. Brown suggests this type of knowledge is relatively constant in that facts about a reading task (e.g., material made up of familiar words is easier to read than that containing unfamiliar words) continue to be "known" when a reader is asked about them. Also, such knowledge can be thought about and discussed. Further, this knowledge can also be incorrect (e.g., the facts "known" may be untrue).

The second group of activities identified by Brown under the term metacognition refers to the self regulatory mechanisms used by the active learner in solving problems. In contrast to knowledge about cognition, self regulatory mechanisms are not necessarily stable "in the sense that although they are more often used by older children and adults, they are not always used by them, and quite young children may monitor their activities on a single problem" (Brown, 1980, p.22). In addition, it is often difficult to express overtly many of the monitoring behaviours that take place during learning, because many of them are automatic.

Following Flavell and Brown, Paris (1982) has proposed another conceptualization of metacognition. Paris states that metacognition includes knowledge about a) one's own mental abilities, b) the parameters of tasks, and (c) cognitive strategies used for solving problems. "Metacognition includes a sensitivity to the need to be planful as well as the ability to orchestrate and regulate one's own thinking" (Paris, 1982, p.3). The most important feature of metacognition, according to Paris, is understanding how to direct one's own problem-solving behaviour. Therefore, Paris' conceptualization of metacognition includes evaluation, planning and regulation. Evaluation involves checking the state of self knowledge or ability; planning involves deciding how to best allocate effort in terms of strategy choice; and regulation involves monitoring the chosen strategy to determine its effectiveness. These three components work together in a cyclic fashion. In Paris' definition of metacognition, the notion of self regulation is crucial. Paris suggests that when individuals understand and see the value of a particular strategy they will internalize it and it will be self regulating.

In all the definitions discussed (Brown, 1978, 1980; Flavell, 1976, 1979; Paris, 1982) two features emerge. Metacognition is concerned with the ability to reflect on and control the cognitive processes involved in thinking. It consists of both metacognitive knowledge and self regulation; that is, knowledge about thinking and control of thinking.

Cavanaugh and Perlmutter (1982) have criticized the conceptual confusion which exists in many definitions of metacognition. Referring specifically to metamemory research, they have stated that metamemory should only refer to knowledge about memory and should not be confounded with or include executive processes which regulate this knowledge. Lawson (1984), drawing on the discussion of Cavanaugh and Perlmutter, has argued that "the knowledge and control dimensions of cognition should be seen as logically distinct" (p.92). Lawson has suggested that metacognitive knowledge is the result of reflection on cognitive activity. This reflection is considered to be "an executive operation" and thus "the source of metacognitive knowledge is executive processing" (Lawson, 1984, p.93). Lawson then, contends that metacognitive knowledge is not only distinct from but also a product of the control of cognition.

Robinson (1983) has also been critical of the definitions of Brown and Flavell. These definitions of metacognition subsume both "knowing how" and "knowing that" in the one category. Robinson considers "knowing that" to be an example of metacognitive knowledge, but does not regard the actual use of strategies (knowing how) to be indicative of metacognitive knowledge.

In discussing problems with the definitions of metacognition, Baird (1984) has stated that Brown's 1978 and 1980 definitions (being the most frequently cited definitions causing dissatisfaction) are confusing, if not inconsistent. Baird (1984) reports however, that Brown and Palincsar (1982) have more recently clarified the distinction between metacognitive knowledge and control. For Brown and Palincsar (1982), metacognition is both knowledge about cognition and regulation of cognition. Brown and Palincsar have commented that these two forms of metacognition are "closely related" and that "each supports the other recursively" (p.1). They suggest that any attempt to separate the two constructs results in "oversimplification". Nevertheless Brown and Palincsar believe that "they are readily distinguishable, and they do have quite different historical roots" (p.1).

The use of the term metacognition to refer only to metacognitive knowledge does not seem valid or useful. As it is used here metacognition consists of two constructs. Indeed, as Lawson (1984) has suggested, the act of reflecting on cognitive processes may simultaneously generate knowledge of these processes (metacognitive knowledge). Lawson however adopts Cavanaugh and Perlmutter's (1982) concept of metacognition in which executive processes are not seen as part of metacognition, but necessarily involved in it. Nevertheless, it is argued here, that metacognitive knowledge involves executive control and can be regarded as an integral part of it. Knowledge, reflection and control are interwoven components of metacognition. To argue theoretically that the components of metacognition are interwoven does not however imply that research into metacognition will not distinguish between knowledge of cognition and control of cognition. Lawson (1984), in fact, cites the research of Flavell (1981) and Brown (1981) who have acknowledged empirically the occurrence of both facets. It is suggested here however that the separate and joint contributions that each facet makes to the other are worthy of investigation, under the one label -- metacognition.

Another matter relating to the definition of metacognition is the issue of verbalization of metacognitive awareness and control. Metacognition is concerned with performance. Where that performance involves knowledge about thinking, it is conscious and therefore can be reported. On the other hand, because many of the control behaviours may be automatic, verbalization of these regulatory behaviours may be more difficult. This distinction indicating that metacognitive knowledge is statable, but that control of cognition may not be, has been noted by Brown (1980). It is also clearly stated in the following definition of metacognition by Forrest and Waller (1981a)

> "meta-cognition" is a construct which refers to what a person knows about his/her cognition (in the sense of being consciously aware of the processes and further of being able to tell you about them in some way), <u>and</u> his/her ability to control these cognitions (in the sense of planning cognitive

activities, choosing among alternative activities, monitoring the performance of activities, changing activities. (p.2)

This definition of metacognition highlights the features of knowledge and control evident in numerous definitions (Brown, 1978, 1980; Flavell, 1976, 1979; Paris, 1982) and incorporates the notion of verbalization.

The confusion over the definition of metacognition parallels a difficulty in distinguishing between metacognition and cognition. Feibel (1978), for example, has questioned whether there is a real distinction between the two constructs and if so whether the relationship between the two, as suggested by Myers and Paris (1978), is heirarchical. Brown, Bransford, Ferrara and Campione (1982) acknowledge the lack of a clear separation between metacognition and cognition, stating that reviews of the literature about metacognition and reading "...have been justly criticized on the grounds that they have encouraged the practice of dubbing as metacognitive any strategic action" (p.86).

Brown et al. (1982) describe several reading activities that previously were referred to as strategies but which now carry the label `metacognitive skill'. Examples of these activities include establishing the purpose for reading or modifying one's reading rate due to variations in purpose. Referring to the various reading activities Brown et al. (1982) state "just which of these activities should be deemed metacognitive, or more subtly, which components of these complex activities are meta, is not clear" (p.86).

Perhaps a resolution of the conflict is that proposed by Flavell (1979). To reiterate, Flavell suggests that progress towards a goal which is due to cognitive strategy application is different from the monitoring of progress towards a goal. The latter is deemed to involve metacognitive strategies. The `meta' label may be applied to a strategic action if it involves reflected self regulation towards a goal.

Another area of considerable debate in the area of metacognition is that of the age at which metacognition appears. Researchers have investigated the emergence of metacognitive skills across different age levels and content areas. The relationship between metacognitive and cognitive skills has been investigated by drawing heavily on the theories of cognitive development developed by Vygotsky and Piaget. Vygotsky (1962) argued that a child's internal maturation and informal and formal education, through the medium of language, contributed to a child's cognitive development. From his empirical investigations, Vygotsky identified a hierarchy of three stages between the preschool years and adolescence that children pass through in order to achieve what Vygotsky called "true conceptual thought". As children move through these stages cognitive skills change and become more intentional, eventually becoming internalized and automatic.

Piaget's (1963, 1970) theory of cognitive development suggests there are basic, qualitative changes in the way individuals think. His stages of cognitive development reveal a transformation in thinking skills from infancy to adolescence and adulthood that result from both maturation and experience. One of the most fundamental aspects of the change in intellectual abilities as the child moves from one stage to the next is the concomitant increase both in consciousness of the thought processes and the ability to introspect about such processes.

The work of Vygotsky and Piaget then supports a developmental change in cognition revealing an increasing cognitive flexibility as the learner matures. Metacognitive activities are by nature also controlled through the learner's decision whether or not to employ a strategy during a particular task. If the learner does decide to use a strategy, the next decision revolves around considering which strategy to engage. The increase in cognitive flexibility of Vygotsky's and Piaget's maturing individual then parallels the deliberate control of strategy use in metacognition.

Flavell (1977) and Hakes, Evans and Tunmer (1980) have noted the similarity between the characteristics of concrete operational thinking and metamemory and metalinguistic abilities respectively. In discussing metalinguistics specifically, Hakes et al. (1980) suggest that while empirically there is little evidence available concerning how the development of metalinguistic abilities might be related to other aspects of cognitive development, conceptually and empirically speaking it would seem that such a relationship may exist. Hakes et al. however, stress that there is no suggestion made that metalinguistic abilities only begin to emerge during middle childhood, the period of concrete operational cognitive development. Empirically, it has already become clear that metalinguistic abilities are evident quite early in language development and continue at least into adolescence (e.g., Clark, 1978; Gardner, Kircher, Winner, & Perkins, 1975; Gleitman, Gleitman & Shipley, 1972). Eson and Walmsley (1980) have also noted that between the ages of ten and twelve children's thinking undergoes a "shift" or transformation. They have used the word semiformal to describe the thinking during this period stating that the main characteristic of thinking and the language function during this shift is that it is metacognitive and metalinguistic. Similarly Myers and Paris (1978) have noted that children between the ages of six and twelve change in their ability to think about the cognitive and linguistic systems they use. Myers and Paris have suggested that during this time-span children acquire metacognitive knowledge about reading. Studies of oral expression (Gardner, 1973) and written expression (Leondar, 1977; Sutton-Smith, 1975) have also found developmental changes in complexity and coherence of expression that reflect changes in the individual awareness of the self and others as age increases.

While there is evidence of improvement in the development of metacognition from young children (Brown, 1980; Kurdek & Burt, 1981; Markman, 1977) to adolescence (Brown & Smiley, 1977; di Vesta, Hayward & Orlando, 1979; Winograd & Johnston, 1980), some studies have also shown that young children, university students and adults reveal a lack of metacognitive abilities (e.g., Anderson, 1980; Baker & Anderson, 1982). These findings have led to a suggestion that the deficiency may be regarded as the difference between novice and expert learners. Brown and De Loache (1983) have suggested that the reason for an apparent lack of metacognitive skill in children (Brown, 1978; Flavell & Wellman, 1977) and in adults (Chi, 1977) in many memory and problem solving tasks is that both groups are novices at the experimental tasks which are presented to them. It is the difficulty and newness of these problem solving tasks which leads to a lack of the metacognitive skills of self interrogation and self regulation. Furthermore, Brown (1982) has suggested that younger or immature learners may just fail to bring the strategies they have to bear on the task. Brown and De Loache (1983) following this line of argument suggest that novices may not recognize that the metacognitive skills that they have are useful and can be applied in numerous new situations. This belief has been supported in one study in the area of memory. Borkowski and Cavanaugh (1979) found that immature memorizers were able to use strategies but did not do so unless they were instructed to use them.

Flavell (1970) has suggested that children who appear unable to access the strategies available to them may be "production deficient". Production deficiency is characterized by the lack of spontaneously activating and applying task relevant strategies or skills for problem solving. Children regarded as production deficient "may not have the needed skill available to them to solve a given problem, or simply do not think to use what they already know,...or lack the intention to be strategic" (Barclay & Hagen, 1982, p.63).

The notion of a production deficiency has been applied to learning disabled children (Bauer, 1977, 1979; Torgesen, 1977a, 1977b). Leong (1981) has noted that learning disabled readers lack metacognitive knowledge. Meichenbaum (1980) has stated that learning disabled children have "defective metacognitive processes" (p.273). Wong (1982) has argued that investigation of the insufficient metacognitive processes found in learning disabled children will lead to a clearer understanding of learning disabled children's reading difficulties. Therefore one of the purposes of this study is to investigate the hypothesis that learning disabled children do have knowledge about appropriate strategies (metacognitive knowledge) but do not employ them spontaneously in the reading situation.

Finally, any study of the nature and value of metacognition research will depend largely on instrumentation. A survey of the literature into metacognition highlights the use of many different measures. These include interviews, questionnaires, verbal protocols, pictorial techniques as non-verbal measures, peer tutoring, computer and video studies and reaction time.

The most controversial of the various methods used in research on individuals' cognitive processes is the use of introspective reports. Much of the introspective data are obtained using verbal reports. The use of verbal reports as an index of cognitive processing has received considerable critical comment. The two most frequently cited discussions on the use of verbal reports are those of Nisbett and Wilson (1977) and Ericsson and Simon (1980). Nisbett and Wilson argue that individuals do not have access to their own thought processes. These authors suggest that verbal protocols reflect an individual's tacit knowledge about causes for his or her responses. In their discussion, they point to those studies where individuals gave inaccurate reports of their own mental processes (e.g., Nisbett & Schachter, 1966). The methodological difficulty of accessibility of cognitive processes for analysis then is coupled with the problem of accuracy or true representation of fact in verbal reporting.

In contrast, Ericsson and Simon (1980) have defended the use of verbal reports by saying that they are valid when they correspond to behaviour. These authors have presented research findings showing individuals commenting usefully on how they undertook different tasks. Ericsson and Simon while agreeing that the accuracy of verbal reporting varies with the nature of the task, suggest that verbal reports are most accurate when the interval between processing and reporting is minimized. The authors state that when individuals report information in short term memory they are likely to be more accurate than when retrieving information from long term memory. The relationship between saying and doing is important also in regard to expectations. Cavanaugh and Perlmutter (1982) have suggested that children may respond to the "demand characteristics, such as a perceived expectation to report effects of variables included in the experiment, even if none was experienced..." (p.17).

A further methodological issue is the problem of verbal ability itself. Cavanaugh and Perlmutter (1982) suggest that the use of verbal reports are particularly problematic when used with individuals with limited verbal ability (e.g., young children). They point out as well that not all types of knowledge are equally easy to discuss, even for articulate people.

Clearly, there are difficulties in the use of verbal report data. However, Gaier (1954, as cited in Baran, 1982, p.49) pioneered a procedure for minimizing these problems by having students listen to part of a tape recording of a recent lesson and write down their thinking. More recently Baran (1982) has tapped learning disabled children's knowledge of their cognitive processes also utilizing the retrospective interview technique. Baran requested pupils to imagine their last reading lesson and to use that as a frame of reference for answering reading related questions. These questions concerned the strategies the individual used in preparing for a reading task and questions focusing on pupil's knowledge or awareness of regulatory strategies which had been used. Similarly, in the current study verbal report data was obtained retrospectively using "stimulated recall". Specifically, the intention here was to obtain verbal reports on awareness of monitoring behaviour and strategy use immediately following completion of the reading task. Recall was prompted by a tape recording of the recently completed reading task.

In summary, much learning takes place when an individual engages purposefully in processing information. In the mind, cognitive processes are also reflected upon and controlled. Awareness or knowledge and the control of cognition is known as metacognition. This review has referred to some of the difficulties with the concept of metacognition including the problems of definition, the distinction between metacognition and cognition, and the issue of when metacognition emerges. The developmental relationship between metacognition and cognition, the notion of a production deficiency, and the use of verbal reports as a data source in studying metacognition have also briefly been discussed.

Metacognition and Reading

Reading is a cognitive activity or process involving the application of cognitive abilities (perception, attention, memory and comprehension) to written material. The purpose of reading is to gain meaning from print through the use of both visual and non-visual information. Reading is regarded as a form of information processing (Kolers, 1970) with the reader actively contributing to the reading process (Goodman, Goodman & Burke, 1978). A holistic, language-based view of reading, as promoted by Goodman, suggests that the reader's thinking and language help in constructing meaning from the text. Specifically, Goodman (1967, 1968, 1976) proposes that reading is a selective, active "psycholinguistic guessing game" in which readers use a variety of strategies of sampling, prediction, confirmation and correction to construct meaning. As the individual employs these strategies, graphophonic (that is, graphic, phonological, and phonic), syntactic and semantic cues, which are processed simultaneously and interactively, are used.

Several authors (e.g., Baker, 1979a, 1979b; Brown, 1980; Garner & Kraus, 1981-1982; Myers & Paris, 1978; Paris & Lindauer, 1982) have investigated the relationship between metacognition and reading. Applied to reading, metacognition is the knowledge <u>and</u> control learners have over their thinking and reading activities. Readers are considered as having displayed metacognitive knowledge if they demonstrate "an awareness of what skills, strategies, and resources" (Baker & Brown, 1984a, p.22) are required to gain meaning from text. In Flavell's (1979) terms, this is equivalent to knowledge of the person, task and strategy variables relevant to reading. These variables interact and affect reading performance. Brown, Armbruster and Baker (in press) have suggested that metacognitive knowledge when applied to reading concerns the variables of

> 1) <u>text</u>--the features of the reading materials that influence comprehension and memory (for example, difficulty, clarity, structure); 2) <u>task</u>--the requirements of the various tasks and purpose of reading that learners commonly encounter in school; 3) <u>strategies</u>--the activities engaged in by the learner to understand and remember information from the text; and 4) <u>learner characteristics</u>--such as ability, familiarity with the material, motivation and other person attributes and states that influence learning. (p.5)

However metacognition in reading also includes control or self regulation. Here the reader demonstrates an ability to apply control mechanisms to ensure that comprehension is successful. Brown, Armbruster and Baker (in press) have suggested that the learner coordinates the interaction of the variables of text, task, strategies and learner characteristics. Elsewhere, Baker and Brown (1984b) have stated that the self regulatory mechanisms include checking the outcome of any attempt to solve a problem, planning future moves, evaluating the effectiveness of any attempted action, testing and revising strategies, and remediating any difficulties by using compensatory strategies.

Flavell (1981) noted that the ability to regulate thinking, a component of metacognition, is known as cognitive monitoring. Baker and Brown (1984a) have stated that "since most of the cognitive activities involved in reading have as their goal successful comprehension, a large part of cognitive monitoring in reading is actually comprehension monitoring" (p.22). Comprehension monitoring, Baker (1979a, 1979b) has explained, involves evaluating the success or otherwise of comprehension during reading, making sure that the process proceeds smoothly, and applying corrective action if required. The constructs of metacognition, cognitive monitoring and comprehension monitoring are hierarchically related (Baker & Brown 1984a). Cognitive monitoring and comprehension in monitoring are subsumed under the construct of metacognition, with comprehension monitoring referring to a particular type of cognitive monitoring.

In this review of the literature of metacognition and reading, consideration is given firstly to studies involving investigation of knowledge about reading. Brown (1980) and Moore (1982) have provided extensive reviews of the literature into children's metacognitive knowledge about reading. Some of the more frequently cited studies are reviewed here.

During a one year longitudinal study Reid (1966) noted a change in children's notions about reading. Of interest was the emergence of influences that stem from the teaching of reading. Specifically, Reid (1966) interviewed five year olds as to their knowledge about reading.

She found that while children know they cannot read, they did not also know what reading consisted of. Some had not thought about the nature of spoken language, although some stated that writing involved the production of symbols as compared to drawings. It was found that such confusions were resolved when the difference between pictures or words (as the conveyors of information), and the difference between alphabetical and numerical symbols were learned during the school year.

Clay (1973) also studied children's knowledge about print and reading. In her New Zealand investigation, 66% of new entrants in the sample did not know that the print and not the pictures told the story. However, following six months of schooling most children had made this distinction. The purposes and nature of reading however were still unclear to some children despite one year of school attendance.

Several studies have also considered what older children know about reading. For example, Johns (1979) reviewed studies (e.g., Johns & Ellis, 1976; Johns & Johns 1971) that asked children "What is reading?" "What do you do when you read?" and "If someone didn't know how to read what would you tell him/her that he/she would need to learn?" Initially, analyses of the data in these studies indicated that many children lacked or had limited awareness of the reading process. However, a replication and extension of the earlier studies by Johns (1979) showed that both younger (2nd and 4th graders) and poor readers (2nd, 4th and 6th graders) generally saw reading as a decoding activity. For younger and poor readers reading was concerned with unlocking the text through decoding rather than through extracting meaning. Good 6th grade readers, in contrast, saw reading as a meaning getting activity. Similarly Canney and Winograd (1979) found that, in contrast to younger and poorer comprehenders, older and better reader's responses to metacognitive questions about reading reflected a "meaning" emphasis.

To discover whether or not metacognitive knowledge about reading did indeed increase with age, Myers and Paris (1978) developed an interview questionnaire assessing children's understanding of person, task and strategy variables involved in reading. The use of these variables is based on the research of Kreutzer, Leonard and Flavell (1975) who investigated metamemorial knowledge. Children in the Myers and Paris (1978) study included 20 second graders with a mean age of 7 years and 9 months, and 20 sixth graders with a mean age of 11 years and 9 months. The results of this study showed a disparity between the younger and older children in terms of metacognitive knowledge about reading. Young children in the study made fewer references to strategies or reasons for checking their reading progress. They were unaware of specific characteristics of better readers and did not mention factors such as motivation as a method of overcoming the environmental limitations of a reader. In addition, they were insensitive to features such as sequencing, common topics or the function of initial and final sentences in paragraphs. Finally, the younger children reported fewer reading strategies and indicated they knew less about when and how to use these strategies. Myers and Paris have suggested that implied in the younger children's answers to knowledge about reading questions is the view that younger readers regarded reading primarily as a decoding task. Whereas implications drawn from older reader's responses indicate that they saw reading as an activity to gain meaning.

The emphasis on reading as decoding by poor readers is also borne out in a later study of comprehension monitoring and study strategies by Paris and Myers (1981). These authors investigated the strategies used by good and poor readers when directed to read and remember a story containing some difficult vocabulary words. The authors found that good fourth grade readers asked questions, took notes and used the dictionary more than poor readers. In addition, only good readers asked for the meanings of unknown words; poor readers asked more about the pronunciation of words.

Another study of what types of strategies children use to figure out a word has been conducted by Forrest and Waller (1981b). They refer to the awareness of these strategies as "meta-decoding". Forrest and Waller (1981b) have suggested that this knowledge of decoding involves

> knowing that there are different ways in which to figure out what a word says and knowing that for any particular situation some decoding strategies are more efficient and appropriate than others. (p.2)

In their study of the relationship between metamemory and meta-decoding, Forrest and Waller (1981b) found that decoding ability increased with age and reading ability, with younger/poor readers lacking in decoding skills. When asked about knowledge of decoding strategies (that is, meta-decoding) again differences between younger/older and poor/better readers became apparent. While young/poor readers could generally identify one strategy to use when figuring out what a word "says", these were coping skills rather than metacognitive in nature (e.g., they would sound out a word because "the teacher wouldn't tell me anyway"). Young/poor readers also had few suggestions as to what to do when they did not understand a whole sentence, whereas older/better readers suggested the use of several decoding strategies that could be combined to establish sentence meaning.

In another study of strategies used in overcoming comprehension difficulties, seventh graders were asked by Garner and Kraus (1981-1982) "What do you do if you don't understand something you are reading?" A note was made of the different strategies mentioned and their frequency. It was found that strategies such as "ask someone" were mentioned by both good and poor readers. However, other strategies were mentioned solely by good comprehenders (e.g., "use context"), and others were suggested only by poor comprehenders (e.g., "skip it"). Good readers suggested rereading text as a corrective strategy more frequently than the poor readers. The remarks made by the good readers in the Garner and Kraus (1981-1982) study reflect a meaning-orientation. On the other hand, the remarks of the poor readers centred on decoding, vocabulary, and fluent oral reading. Garner and Reis (1981) have stated that the study of Garner and Kraus (1981-1982, then in press) shows that good and poor comprehenders differ not only in the way they detect comprehension obstacles, but also in how they resolve whatever problems they do detect.

Moore and Kirby (1981) also used the Myers and Paris (1978) interview schedule to study children's metacognitive knowledge about reading. In replicating the Myers and Paris (1978) study, Moore and Kirby (1981) again focused on second and sixth graders. However, within these age groups, Moore and Kirby investigated the influence of reading ability. In comparing these two studies, Moore (1982) has noted some variation in the way the children responded. However both studies found that younger children showed less metacognitive knowledge about reading than older children. Specifically, the younger readers showed less awareness of factors that lead to proficient reading, such as, "attentional focus during skimming, resolution of word comprehension failure, role of sentences in paragraphs, and strategy variation dependent upon task demands and reader goals" (Moore, 1982, p.126). Again, the variables in which younger readers showed a lack of awareness reflects their apparent perception of reading from an "orthographic verbal translation perspective" (Moore, 1982, p.126). An analysis of the results regarding the relationship between metacognitive knowledge and reading performance in the Moore and Kirby (1981) study revealed only two significant within-grade differences. Firstly, high ability sixth graders, in comparison with low ability, sixth graders, favoured searching for 'informative' words as a technique during skimming. Further analysis found that this finding was a real indicator of awareness and not a function of performance. Secondly, high ability second grade readers, more so than low ability second graders, reported that texts chosen by the teacher would be easier to remember than self-selected books. Scrutiny of justifications and/or amplifications made by the children, following statements of preference for teacher-selected texts, indicated that the children perceived stories chosen by the teacher as consisting of less pages and containing "rather stultified text". On this basis, Moore (1982) has argued that this latter finding "may be more a comment on selected teacher texts" (p.126).

A summary of the research reviewed here on metacognitive knowledge about reading indicates:

1. Knowledge about the parameters of reading increases with age and is related to the teaching of reading,

2. younger readers are less aware of person, task and strategy variables (Myers & Paris, 1978) which effect reading,

3. younger/poor readers generally perceive reading as a decoding task, while older/better readers regard reading as a meaning getting activity,

4. younger/poorer readers have less knowledge of decoding strategies, and when strategies were offered by young/poor readers they tended to be coping strategies and not metacognitive in nature (Forrest & Waller, 1981b),

5. when reporting on their own use of corrective strategies good readers indicate the use of more different types of strategies from poor readers, and

6. these corrective strategies reflect the meaning/decoding perception of reading held by good and poor readers respectively.

The differences between good and poor readers' knowledge about reading is clearly manifested then in the way that they view reading. Their knowledge of reading seen from these differing perspectives may also be related to the differences in good and poor readers' knowledge about strategies. An examination of knowledge (awareness) of strategies, separately, for decoding an unknown word <u>and</u> for reading for meaning seems to have been overlooked in studies of learning disabled children, yet would seem to offer important information on discrete elements of metacognitive knowledge of this group. In this way, the research of Myers and Paris and others into knowledge of reading strategies, where the purposes are decoding and comprehension, are separated out could be extended.

As described earlier, research into the relationship between metacognition and reading has not only investigated metacognitive knowledge about reading, but also cognitive monitoring. Applied to reading, the subset of cognitive monitoring of concern is that of comprehension monitoring. Baker (1979a) has suggested that the conceptualization of comprehension monitoring is included either explicitly or implicitly in several models of reading (e.g., Goodman, 1976; Ruddell, 1976). Brown (1980) explains that effective reading is usually a fluent and automatic process where the reader rapidly derives meaning. This skilled reading continues until a triggering event occurs when the comprehension process breaks down. Now the reader slows down and attends to the problem, employing "debugging devices" and "strategies" to correct or rectify the comprehension failure. Thus, the reader moves from a subconscious, immediate understanding of text to a "planful strategic state" where time and effort are expended as debugging activities are employed. Clay (1973) has likened the reader involved in this process of slowing down and bringing "match" and "check" strategies into action (when faced with a reading error) as one "who drops into a lower gear". Similarly, Holdaway (1979) suggests that when a reading error occurs the threshold between automatic/subconscious and conscious/deliberate attention is lowered. Holdaway states that when meaning based, for example, on syntactic and semantic expections has been distorted,

> at those moments when perceptual deliberation is required ... the threshold lowers and conscious attention is directed onto the problem details as if a searchlight had been thrown on them. (p.172)

Holdaway argues that the threshold lowers at these critical points (Brown's triggering events) because the "feedback processes of confirmation" are no longer working smoothly. When the created meanings are no longer confirmed the threshold lowers to allow greater attention to the study of visual detail. Various authors then have indicated how the comprehension monitoring aspect of reading involves a move from an automatic level of processing to an awareness and subsequent control of behaviour, characterized by the implementation of strategic activities.

Brown (1980) has not clearly delineated the difference between debugging devices and strategies. While she describes debugging devices as "skills of metacognition, skills that can be tailored to the purposes of reading" (p.455) and reading strategies as "any deliberate planful control of activities that give birth to comprehension" (p.456), she also mixes the terminology referring to "debugging strategies" and "debugging activities". It appears than that Brown uses the terms interchangeably. In Holdaway's "model for perceptual control in reading", described above, where syntactic and semantic cues alone no longer aid the reader to derive meaning, the reader engages other word recognition cues, specifically visual cues. Thus, in this example, the debugging process involves the application of graphic sources of information. It is suggested here that debugging strategies may rely heavily on the use of visual and linguistic cues as sources of information. When faced with a difficulty, a confusion or the need for self correction the reader may use strategies such as rereading or reading on and utilize individually or in combination information from graphic, phonic, syntactic and/or semantic linguistic knowledge. This position is reflected in Goodman's theory of reading where readers actively and constantly monitor their understanding. Goodman (1976) believes that individuals comprehend text when they use their internalized knowledge of spoken language to make predictions about the author's message. To extract the meaning, the reader employs as much or as little of each fo the linguistic sources of information. When errors occur and meaning breaks down the reader uses further graphophonic, syntactic and semantic cues to allow the "hypothesis-testing" process to continue.

Numerous studies have been undertaken in the area of comprehension monitoring and corrective strategy knowledge and use. Most studies in fact investigate knowledge of and use of strategy measures within the one study. Wagoner (1983) has provided an extensive review of the research literature on comprehension monitoring. The current review makes reference only to two broad areas of comprehension monitoring. Firstly, investigations within the error detection paradigm which have focused on the awareness and correction of deliberately inserted inconsistencies will be reported. Secondly, studies of "on-line" measures of comprehension monitoring involving investigations of deliberately inserted inconsistencies and investigations of self-generated oral reading errors, self corrections and linguistic cue use will be discussed. Reference will be made to studies of good and poor readers, as well as learning disabled children.

Thus, one area of investigation into comprehension monitoring has used measures of awareness of textual inconsistencies. Several studies of sensitivity to textual anomalies have involved the deliberate insertion of ambiguities, inconsistencies and errors in text. Studies have been concerned with whether subjects were aware of these violations, the effect of the disruptions and also what the reader did to solve the disruption or comprehension failure.

The most frequent method used for detecting pupils' awareness of text distortion has been the use of self report. However other indices of comprehension failure include button pressing (Markman & Gorin, 1981), rating comprehensibility (Garner, 1981) and replaying a recorded message (Flavell, Speer, Green & August, 1981).

Results of studies into awareness of anomalies provide some evidence that young and poor readers do not monitor their understanding during reading as well as older and more fluent readers. Specifically, Isakson and Miller (1976) found that fourth grade poor readers were not disrupted during oral reading when inappropriate words were deliberately inserted in the text. The goal of reading for meaning of better readers was apparent in the use they made of strategies.

In another study, Paris and Myers (1981) found that poor fourth grade readers did monitor their oral reading of anomalous words and phrases as measured by their hesitations, repetitions, self corrections and underlining. However their comprehension monitoring in comparison to that of good readers was less accurate. They neither evaluated the anomalous information to the same extent as good readers, nor monitored exactly the material that most needed comprehension checking.

Markman (1979) has also studied awareness of comprehension failure in written material. She found that preadolescents remained oblivious to numerous inconsistencies appearing in material to be read. Several reasons for this have been proposed by Markman (1979). She suggests that in order to be able to detect inconsistencies children must notice the implicit contradiction and draw the relevant inferences. In order to do this the meanings of the sentences must be held in memory and be related and compared. This requires effort and concentration. Perhaps, Markman suggests "children will exert themselves to this extent only under special circumstances" (p.653). A further reason why inconsistencies may be overlooked is because children may not have based their evaluations on logical consistencies but on some other criteria.

Baker (1979b) studied the comprehension monitoring abilities of college students using an error detection task, probed recall, and retrospective reports. Deliberately introduced confusions were considered to increase the likelihood of comprehension difficulties, probed recall was used to discover qualitative aspects of monitoring (that is, what kinds of strategies did the students use to deal with the confusions?), while retrospective reports were used to discover how the confusion affected their comprehension. Baker found that in general these adults did not report many of the confusions (namely, only 30% were reportedly noticed during reading). At first this finding seemed to be an indication of poor comprehension monitoring. However, the retrospective reports and inferences drawn from the recall protocols revealed that the students spontaneously repaired the confusions as they read or saw the errors as inconsistencies. Therefore the students were better comprehension monitors than had been thought initially. The monitoring procedures used by students included drawing upon prior knowledge when making inferences about the inconsistencies or detecting failures, assigning an alternative interpretation to the text, and deliberately failing to mention the inconsistencies during recall. Baker (1979b) has also suggested that students may have used "adaptive monitoring strategies". This suggestion refers to the fact that the reader does in fact monitor comprehension, but does not apply appropriate fixup strategies. Rather the reader seeks to resolve the difficulty in understanding in other ways. For example, some students reported rereading and making a mental note while continuing to read in the hope of illumination later. Other students reported also that they were reading for general ideas and this too could have caused some of the poor detection rates. Another student indicated that he was reading sentence by sentence, and hence not integrating them, and by doing so missed several errors. Finally, some students either attributed the errors to the author or typist, or blamed themselves for misreading or not understanding. Baker (1979b) has shown then that readers do monitor their comprehension and individual differences exist in the way they go about solving their comprehension failures.

In order to discover whether skilled readers monitor their understanding of a passage better than poorer readers, Winograd and Johnston (1980) also used an error detection task. These authors found that while good readers did detect more errors in the passages than poor readers, the good readers still did not overtly detect several of the errors. To discover whether children did spot the errors but failed to mention them, discussions were held with each child following the session. These discussions did not establish whether or not the errors were detected. These authors point out however that "to assume that metacognitive abilities are not well developed because subjects do poorly on the error detection tasks is unwarranted". Rather the authors point to the limitations of the error detection paradigm and as well suggest several reasons for why the subjects may have failed to notice the errors.

In another study of the comprehension monitoring abilities of good and poor readers, Garner (1980) also deliberately replaced words in passages of text that would make the passages inconsistent in meaning. When given to both good and poor readers, Garner found that the good readers noted the material which was inconsistent to a greater extent than the poor readers and could also state more readily why it was inconsistent. In line then with Winograd and Johnston (1980), Garner concluded that children with differing abilities also vary in their ability to know what they have and have not understood.

Other studies involving the use of the deliberate insertion of errors have also been undertaken. Danks and his colleagues have studied the effects of different types of embedded errors during oral reading (Danks, Fears, Bohn & Hill, 1978). More recently Danks (1982) deliberately inserted various sorts of violations (lexical, syntactic, semantic, factual) into pieces of text in order to induce errors in oral reading of second, fourth, and sixth grade pupils. It was found that lexical, syntactic and semantic violations proved to be the greater disrupters of fluent oral reading. The disruptions usually occurred at the critical word (that is, the violated word) and sometimes one word after it.

Hypothesizing that task demands may well effect the type of processing occurring during oral reading, Danks manipulated the tasks so that one group of children were given instructions prior to reading with a pronounciation emphasis, while the other group were instructed to read for meaning, that is, with a comprehension emphasis. The difficulty of the story was also manipulated. However it was found that neither of these manipulations produced "salient differences in the patterns of disruptions", with the major proportion of the disruptions occurring at the crucial word or one word unit after. As expected, lexical violations were more disruptive and this was particularly so when the material was difficult.

Bos and Filip (1984) have used the error detection paradigm to investigate the comprehension monitoring abilities of learning disabled children. This study compared the comprehension monitoring skills of learning disabled and average 7th grade pupils under two conditions. Each child was presented with text embedded with inconsistencies under a standard condition and a cued condition (that is, where pupils were directed to look for textual inconsistencies). Results of this study showed that under the standard set of instructions the learning disabled children did not activate monitoring strategies. However, when directly instructed to monitor for text distortions the learning disabled children did so. Thus although learning disabled children had the necessary strategies they did not spontaneously use them to monitor their comprehension. This finding supports Torgesen's (1977a, 1980) suggestion that learning disabled children may be inactive learners, and is consistent with Flavell's (1970) conception of the inability to spontaneously apply relevant strategies as a production deficiency. In contrast, the average children in this study automatically engaged in monitoring comprehension. In commenting on the implications of their study, Bos and Filip have concluded that learning disabled children's reading comprehension may be improved by "strengthening students' knowledge of when to activate the monitoring strategies they have in their repertoire" and by providing "instruction, which focuses on adjusting disabled students' schemata for reading" (p.232).

In sum, studies of comprehension monitoring where inconsistencies have been inserted in the text indicate:

1. Both good and poor readers do monitor their comprehension while reading, although learning disabled pupils do not do so spontaneously,

2. poor/young readers do not monitor as well as good/older readers,

3. good readers however do not always detect all errors in text, and

4. good readers are superior in their ability to know what is understood and/or not understood, and why.

With regard to the resolution of comprehension problems caused by the deliberate insertion of errors, findings show:

1. Older/better readers are more adept at detecting comprehension failure and resolving difficulties by employing corrective strategies.

The studies reviewed here have also proposed hypotheses as to why differences in detecting problems and solving anomalies or inconsistencies occur. These hypotheses are:

1. Comprehension failures are spontaneously repaired, ignored, or not reported, and/or

2. students use `adaptive' strategies, and

3. learning disabled students are 'inactive learners' and reflect behaviour that is consistent with that of a 'production deficiency'.

Studies of comprehension monitoring on tasks where inconsistencies have been inserted in text have also used "on-line" measures. These include studies of rereading and regressive eye-movements (Baker, 1979c; Carpenter & Just, 1977; Garrod & Sanford, 1977), time taken to read paragraphs which have violated conventional organizational structure (Greeno & Noreen, 1974; Kieras, 1978) and puzzled looks from younger children (Flavell et al., 1981), and interactive computer programmes (Baker & Anderson, 1982).

One of the richest sources of evidence for ongoing comprehension monitoring stems from studies of oral reading behaviour (Beebe, 1980; Clay, 1973; Fairbanks, 1937; Isakson & Miller, 1976; Kavale & Schreiner, 1979; Miller & Isakson, 1978; Paris & Myers, 1980; Weber, 1970a, 1970b). Much of our knowledge about differences between good and poor readers, and normally achieving readers and children with learning disabilities in reading, comes from studies which have examined oral reading errors and self corrections.

Self correction is an index of comprehension monitoring and is regarded as a positive reading behaviour. Clay (1973) has suggested that self correction is a distinguishing characteristic between good and poor readers. Similarly, Pflaum and Bryan (1980) have stated that

> Self correction requires a number of control strategies, including awareness that meaning has been disturbed, ability to reassess the context, ability to judge the success of the attempt. (p.253)

Therefore, as a metacognitive skill, self correction may involve any or a combination of the following components: rereading, reading on, attending to other contextual cues, attending to letter feature associations, attending to letter-sound associations and orthographic cues (McNaughton & Glynn, 1980). Before reviewing studies of performance in self correction of good and poor readers, investigations involving the use of strategies for correction will be discussed.

One strategy that has been researched with particular reference to how it is used as a "fixup" strategy is that of rereading or the look-back strategy. Alessi, Anderson and Goetz (1979) have examined this phenomenon with college students. In this study, questions interspersed in text were presented on a computer screen. When students gave an incorrect answer the computer forced them to look back to the relevant section of the text. The authors found that rereading was important as a corrective strategy following comprehension failure.

Garner and Reis (1981) have also studied comprehension monitoring strategies. In this investigation, the authors developed stories with inserted questions. The nature of the questions required the reader to look back at earlier segments of the story. In addition, nonverbal monitoring behaviours such as hesitations and facial distortions were coded by an observer. These authors found that not all the children in the study demonstrated monitoring behaviours, some appeared only to demonstrate monitoring behaviours, and some showed monitoring and look-back behaviours. Ability and age were also found to be positively related to both detecting <u>and</u> resolving comprehension problems. Specifically, the researchers found that there was a progression from knowing that you did not know to knowing what to do to solve the problem. Only the good comprehender was found to be able to recognise that a failure had occurred, and only the oldest good comprehenders could decide then whether or not to do something about the failure at the time <u>and</u> to use look-backs successfully.

Two other methods have been used to tap strategy use in reading. Wagner and Sternberg (1983), in two studies of executive control of reading with samples of college students, requested students at the conclusion of the reading task to provide written descriptions of their strategies. It was possible to determine the validity of the students written reports of some task strategies by comparing the actual strategy with written reports. In another study, strategy use was observed in a tutor-tutee situation. In a study of 6th grade good and poor comprehenders tutoring 4th graders Garner, Wagoner and Smith (1981) found that the good comprehenders encouraged their tutees to look-back and told them when and where to do so. Poor comprehenders, on the other hand, were less effective in their tutoring.

It appears then that as far as use of the lookback strategy as a corrective skill is concerned, good comprehenders are better at recognizing comprehension failure. In addition, older, good comprehenders use spontaneous lookbacks as a corrective procedure. Furthermore, good comprehenders will encourage tutees to use such a strategy. An investigation of which strategies, other than rereading, are reportedly used when correcting, in conjunction with an assessment of monitoring awareness of comprehension failure, would extend the findings of the studies of strategy use described here.

Rereading however, is just one corrective procedure that may be used during self correction. As an index of comprehension monitoring, self correction behaviour has received a great deal of research attention. In this section, studies of error and correction behaviour in good and poor readers will be examined. For example, Clay (1973) found in her study of errors and self corrections that young poor readers have a higher error rate and lower self correction rate. Earlier studies have also found differences in self correction in readers of differing abilities. For example, Fairbanks in 1937 noted that good adult readers more frequently attended to their errors through the use of self correction than poor adult readers. Weber's (1970b) study of oral reading errors that upset grammatical structure found that poor readers corrected an equal number of both grammatical and ungrammatical errors. Good readers, on the other hand, tended to correct only those errors which were ungrammatical. Weber concluded that poor readers utilize syntactic information less well than good readers. However, knowing that you have made an error does not always mean that you can correctly repair it. For example, Beebe (1980), Isakson and Miller (1976), and Kavale and Shreiner (1979) found that when poor readers substituted words as they read, they often inserted inappropriate or improbable words.

The sources of information (namely linguistic cues) that readers use during oral reading have also afforded much information about the reading process. Through a study of patterns across many miscues, one is able to make inferences about readers' strategies in relation to the use of information from the available cue sources. Much of this research has used a linguistically-based theoretical framework of reading (Biemiller, 1970; Clay, 1967, 1968, 1969; Goodman, 1965, 1973; Hood, 1975-1976; Weber, 1970a, 1970b).

Goodman (1965) was one of the first researchers to consider children's oral reading errors in terms of linguistic levels. Goodman (1973) uses the word "miscue" rather than error in order to describe deviations between the meaning in the mind of the reader and the expected response of the text. Goodman proposed this word so that the negative connotations of the word error would be removed. According to Goodman, miscues are "windows" of the reading process and as such show the reader's attempts at processing grapho-phonic, syntactic and semantic information provided by the text. Miscues occur when there is a mismatch between the observed response and the text. The miscues are generated by the same process as fluent and accurate reading and therefore good readers also make miscues.

Those studies involving the qualitative analysis of miscues have generally investigated graphic proximity, phonemic similarity and the syntactic and semantic acceptability of miscues (Clay, 1966, 1967; Goodman & Burke, 1973; Ng, 1979; Pohl, 1981; Shepherd, 1978; Williams, 1968). Studies by Clay (1966) and Williams (1968) of 5 and 7 year old readers respectively have shown that children mainly use syntactic and semantic cues. In Watson's (1974) study of third form pupils, the low progress readers made less use of syntactic and semantic cues. Errors of these children generally were neither syntactically nor semantically acceptable. Less skilled readers were also found to be more affected by context than better readers in studies by Perfetti, Goldman and Hogaboam (1979) and West and Stanovich (1978). Schvaneveldt, Ackerman and Semlear (1977) found that the good and poor and younger readers all used contextual information, although a slight negative correlation was found between reading ability and the context effect. Other studies (e.g., Cromer & Wiener, 1966; Isakson & Miller, 1976; Neville & Pugh, 1976-1977; Willows & Ryan, 1981; Weaver, 1978) have also demonstrated that while both good and poor readers use syntactic and semantic information when reading, good readers utilise these sources of information to a greater extent. In another study of average and below-average readers where miscue rates between the groups were equated, Leslie (1980) found that below average readers attempted to use graphic information more often than average readers. However the graphic cue use was frequently unsuccessful in decoding unknown words. In addition, the below-average readers made more contextually unacceptable (syntactically and semantically unacceptable) errors.

Rousch and Cambourne (1979) have reported on a developmental study of oral reading behaviours of proficient, average and low ability Australian children in Years 2, 4, 6 and 8. (They also included a learning disabled group in their study, which is referred to on p.85. In this study, Rousch and Cambourne found a strong trend towards noncorrection. That is, a failure to correct miscues was apparent at all levels of reading ability. While at some grade levels better readers corrected more of their miscues, as a group they corrected their miscues nearly to the same extent as non proficient readers.

In order to suggest why differences in proficiency levels existed between readers, Rousch and Cambourne examined the types of cues used by the different groups. Firstly, in examining graphophonic cues the authors found that lack of knowledge of graphophonic cues or lack of willingness and/or readiness to use such knowledge was not apparent in low average readers. In fact the authors have suggested that instead the low ability group may overemphasize the graphophonic aspects of reading. It was found that as low ability readers increased in age there was little variability in graphophonic cue use, whereas proficient readers had developed a flexible approach to cue use of that type. The authors have suggested then that low ability readers "handle the graphophonic system quite differently [from proficient readers] and the possibility of a causal relationship between their level of proficiency and their emphasis on graphophonic processing is high" (p.67).

One of the major differences between proficient, average and low ability readers is in their use of syntax. Proficient readers maintain a high rate of total syntactic acceptability in comparison with other readers. Rousch and Cambourne have hypothesized that this is because good readers tend to focus on and process larger units of language (larger than T-units), while low ability readers focus more on the fragments of language. Furthermore, proficient readers correct syntactic irregularities more often, and more successfully than low ability readers. Low ability readers were inconsistent in their correction of both syntactically acceptable and non-acceptable miscues.

However, the ability to "focus on and monitor the meaning of the material" being read, that is use of semantic linguistic knowledge, was the characteristic that most clearly distinguished proficient and average readers from low ability readers. The superiority of proficient readers on this variable was evident in Year two and was developed to an even greater extent through the grades. Furthermore when the rates of correction of miscues which have various degrees of semantic acceptability were analyzed, it was found that at all levels proficient readers were more likely to correct miscues that were judged to be totally unacceptable than those which were already fully acceptable. That is, superior readers corrected the errors that most seriously distorted meaning, whereas low ability readers generally corrected errors that were already acceptable in the context more often. The authors have suggested then that the conditions under which low ability readers correct is based on other conditions than semantic sensitivity. Low ability readers were quite inconsistent in their application of correction to either semantically totally acceptable and semantically unacceptable categories of miscue. Rousch and Cambourne have suggested that this finding indicates, that as is the case with syntax, low ability readers are "triggered by factors other than an awareness of semantic acceptability" (p.80) when they make corrections.

A second developmental study, conducted in Canadian schools, reveals very similar findings to that of Rousch and Cambourne (1979). Mulcahy, Lupart and Price (1983) undertook a study of good and poor readers in grades 3, 4, 5 and 6. They found that average and above average readers differed in their use of contextual information at all grade levels when compared with poor readers. That is good readers made proportionally more syntactically and semantically acceptable errors. This finding mirrors that of Rousch and Cambourne (1979). In addition, Mulcahy et al's findings on graphic and phonemic cues supported results by Rousch and Cambourne (1979) and showed that poor readers relied on grapho-phonemic information to a greater extent than good readers. Of interest also in Mulcahy et al's study is the finding that while good readers relied much more on contextual information than graphophonic cues, poor readers showed that they used either contextual or graphophonic information sources. Mulcahy et al suggest that this finding indicates "... it is not that the poor readers here are not making use of context but rather that the relative degree to which they do so appears to be the critical feature" (p.8).

Considered together, studies of oral reading performance, miscue types, linguistic cue use, and self correction in good and poor readers show the equivocal nature of the results across numerous studies. In 1982, Leu summarized many of the oral reading studies (some of which have been reported here) and highlighted the disparity between the studies by stating that with regard to linguistic cue use, on the one hand, some studies indicate that

> ...proficient readers use more contextual information during reading than less proficient readers (Au, 1977; K. Goodman, 1973; Smith, 1971),...[and] proficient readers use less graphic information during reading than less proficient readers (Au, 1977; K. Goodman, 1973; K. Goodman & C. Burke, 1973; K. Goodman & Y. Goodman, 1977; Smith, 1971)... (Leu, 1982, p.424)

While on the other hand, Leu noted some studies found that

> ...proficient readers use equal or less amounts of contextual information compared to less proficient readers (Allington & Strange, 1977; Biemiller, 1970; Cohen, 1974-75; Juel, 1980; Stanovich, 1980; Weber, 1970a, 1970b)...[and] proficient readers use equal or greater amounts of graphic information when compared to less proficient readers (Allington & Strange, 1977; Biemiller, 1970; E. Burke, 1976; Clay, 1968; Cohen, 1974-75; Weber, 1970a, 1970b). (Leu, 1982; p.424)

Leu (1982) has provided several reasons as to why differences in results may occur. An examination of the different methodologies used in the studies highlights one of the single most important factors contributing to the inconsistent results. Several authors (Leu, 1982; Shepherd, 1978; Thompson, 1984) have criticized studies whose individual designs are based on the assumption that children's miscue patterns are the same regardless of the difficulty level of the material being read. The lack of attention to the difficulty level of passages read continues to be one of the major methodological problems in miscue research. Carnine, Carnine and Gerten (1984) have noted that inappropriate conclusions may be drawn if passage difficulty is overlooked and cite the research of Biemiller (1970), Hood (1982), Leslie and Osol (1978) and Tamor (1981) to support their contention.

In fact the influence of text difficulty on the proportions of error types has been researched by several authors (Biemiller, 1968; Blaxall & Willows, 1984; Kibby, 1979; Schale, 1964; Schummers, 1956; Williamson & Young, 1974). Shepherd (1978), in his own study of high and low ability New Zealand readers at ages eight, nine and ten years found that oral reading behaviour (specifically, self corrections, insertion type errors, and grapho-phonic, syntactic and semantic acceptability scores) did alter significantly when children read at different levels of text difficulty. These findings are supported by several studies (Goodman, 1971; Goodman & Burke, 1973; Blaxall & Willows, 1984) and another New Zealand study (Ng, 1979). Specifically, Goodman and Burke (1973) found that as difficulty in reading increased there was a corresponding higher use of phonic cues. In line with the findings of Goodman and Burke (1973), Blaxall and Willows (1984) also found that as difficulty level increased, there was a higher use of graphic cues, with more errors graphically approximating the text words. Consistent with the findings of Williams and Young (1974), Blaxall and Willows found that syntactically and semantically acceptable errors decreased as text difficulty increased. Ng (1979) explains the influence of text difficulty and the accompanying differences in cue use in the following way.

> Logically it appears that easier texts rather than difficult texts provide more usable contextual cues which children use to help them in the process of anticipation, testing and checking, thereby facilitating the detection of error. ...On difficult texts children cannot use as many contextual cues and they will have to rely more on graphemic cues with processes that involve more direct use of the visual stimuli, than the ones involving anticipation and testing. (Ng, 1979, p.80-81)

An important finding in the Blaxall and Willow's (1984) study was the interaction effect of reading ability (poor, normal and good readers) and text difficulty (four levels for each group) on graphic, syntactic and semantic reading errors. The interaction effect showed that as reading difficulty increased the poor readers revealed less change in the proportions of all three types of error than the normal or good readers. The authors suggested that these results may reflect less flexibility of strategy use by the poor readers as reading material becomes more difficult.

In response to the issue of task difficulty, several researchers have attempted to equate reading task difficulty for the groups involved in their studies and so eliminate the influence of text difficulty on the proportions of errors and self corrections. For example, Pohl (1981) equated difficulty by comparing the performance of "low progress" readers on the first three passages of the Neale Analysis of Reading Ability (1969) with the performance of the "high progress" readers on the most difficult passage of the Neale (passage 6). The groups had similar accuracy scores. Pflaum and Bryan (1980) also tried to control for reading level experimentally. Firstly, a story was rewritten at eight different readability levels. Then a three step procedure was followed involving reading graded isolated words selected from the story and the beginning section of two of the rewritten passages. The beginning of the first passage to be read was the level at which the child read the list with up to three errors. The second beginning section to be read was determined by the number of errors made in the beginning section of the first passage. The number of errors made on the second passage was used as the guide for assigning the reading level at which the error analysis was conducted. This complex procedure however proved to be unsuccessful with the LD children making more errors than the NLD children. Pflaum (nd) also attempted to equate reading difficulty again by rewriting a story according to five readability levels and using both word recognition and comprehension scores as measures of equivalence. However equivalence was only successful in terms of comprehension. Thus the issue of obtaining equivalent difficulty in the reading task across groups remains a problem.

Leu (1982) has also argued that in order for legitimate comparisons of miscue studies to be made, individual studies must clarify decisions related to the unit of analysis (punctuation, letters, words, phrases) and the definition of error categories. Thus the classification system must be described in detail. Aspects of the taxonomies of Goodman and Burke (1973), Clay (1979), Pohl (1981) and Pflaum (1979) have been used in the present study.

While the research on comprehension monitoring has mainly been concerned with differences between good and poor readers, Baker (1982) and Baker and Brown (1980), in discussions of reading and metacognition, have also suggested that learning disabled children are ineffective in monitoring their comprehension during reading.

The lack of monitoring ability in learning disabled children is apparent in other academic tasks also. For example, Alley, Deshler, and Warner (1979) stated that learning disability specialists reported a deficit in the monitoring of spelling errors by learning disabled adolescents which was four times more frequent than for non learning disabled students. Similarly, Deshler, Ferrell and Kass (1978) also noted learning disabled high school pupils were deficient in monitoring academic tasks which required their detection of self-generated and externally-generated errors. For example, on a creative writing task learning disabled pupils detected only one-third of their errors.

In reading, one aspect of comprehension monitoring is realizing that an error has occurred and that it must be corrected. The "taking of corrective action when failures in comprehension are detected" (Brown, 1980, p.456) is a type of debugging activity that could be implemented by readers when they meet problems in the text. Hallahan and Bryan (1981) suggest that "many learning disabled children probably have difficulties in applying many of these debugging devices" (p.148).

The idea that learning disabled pupils have difficulty in applying debugging strategies, is supported by comments in the reviews of the research on learning disabled children by Hall (1980) and Reid and Hresko (1981). They have noted that many research studies show that learning disabled children seemed unable to <u>use</u> knowledge about strategies that they had obtained. Related specifically to reading for example, Wong (1979) found that when they were given questions embedded in a prose selection, learning disabled children performed equally well as normal children on a retelling (comprehension) task. However, when the inserted questions were removed, the learning disabled children were less able than the normally achieving pupils to recall the information. Such data suggests a lack of spontaneous use of strategies that would help understanding or learning of a task by learning disabled children. In support of this, Reid and Hresko (1981) also found that five, six and seven year old learning disabled children were less likely to use strategies that would help them make sense of their early reading experiences. Learning disabled children's inability to spontaneously use comprehension monitoring skills (Bos & Filip, 1984) has also been referred to in studies involving the error detection paradigm.

Extensive research into the reading performance of learning disabled children has been undertaken by Pflaum and her colleagues (Pflaum, 1979, 1980; Pflaum & Bryan, 1980; Pflaum & Pascarella, 1980; Pascarella & Pflaum, 1981; Pascarella, Pflaum, Bryan & Pearl, 1983). Much of Pflaum's research in the area of learning disabled children's reading behaviour has involved the study of oral reading errors and self corrections.

In 1980, Pflaum and Bryan reported on learning disabled children's use of self correction. The authors considered self correction to be a response to an awareness that the meaning of a sentence had been changed and that this awareness demanded from the reader an application of strategies concerned with reassessing meaning, reexamining and applying word recognition strategies, and noting whether or not the correction implemented was appropriate and correct. While not named as such by Pflaum and Bryan (1980), this awareness and subsequent application of correction strategies seems to be metacognitive in nature.

In their 1980 study, Pflaum and Bryan found that despite the experimental attempts to control for reading level, the learning disabled children had greater difficulty with the oral reading task than the non-learning disabled readers. The learning disabled children made more miscues than the non-learning disabled children. This was particularly evident in the learning disabled children's higher rate of meaning change errors, revealing that the learning disabled children were less able to use syntactic and semantic context when reading. Nevertheless, the learning disabled and non-learning disabled readers in Pflaum and Bryan's (1980) study had equal levels of phonic cue use. In particular, no difference between the groups was found in the proportion of high and partial phonic cues. In addition, and perhaps of greater interest, are the findings in their study related to the hypothesis that because self correction and the accompanying control strategies were thought to be complex processes they would be less evident in the learning disabled readers of their sample. Contrary to expectations, learning disabled readers made proportionally as many self corrections as the non-learning disabled readers. Further analysis however, revealed that the learning disabled readers were less effective in their use of self corrections of the more serious meaning change errors; that is, they had a lower rate of self correction of serious meaning change errors.

In another study of oral reading behaviour by Pflaum (nd), an attempt to equate reading difficulty levels for the two groups (learning disabled and average readers) was made. This time two measures were used. It was found however, that when mean accuracy rate was used, equivalence was not successful. Equivalence was successful only in terms of comprehension, with no group differences being evident on comprehension scores. This criteria therefore was used in the Pflaum (nd) study. In this unpublished study, Pflaum used an electronic signal emitting device developed to assist the detection of pupils' awareness of errors. The instrument involved the use of an attachment with a button connected to a tape recorder. When the button was pushed no sound was emitted, but a "bleep" signal was recorded on the tape. The participants were 3rd, 4th and 5th grade learning disabled and average readers who orally read text of equivalent difficulty in terms of comprehension. They were instructed to press the button when they knew they had made an error. Both actual errors and "bleeped errors" were recorded and coded. Analysis of the data found "the use of the bleep to be a valid representation of reading behavior" (p.9). The results indicated that the children bleeped every type of miscue under consideration in the study: serious meaning change errors, non severe meaning change errors, no-meaning change errors, repetitions and corrections of all types. Both groups in the study bleeped the serious meaning change errors more than any other single type of error.

More important however, was the finding that the learning disabled pupils bleeped fewer of the miscues than the average readers. In particular, they bleeped fewer of the serious meaning change errors. This finding then, indicates that although learning disabled poor readers read equally well in terms of comprehension and made just as many serious meaning change errors as the average readers, the learning disabled children monitored their reading less well at the level of words. That is, the learning disabled children showed less awareness of errors as measured by the use of the "bleep".

In addition the learning disabled children in the Pflaum (nd) study made as many self corrections as the average readers. This finding parallels that of Pflaum and Bryan (1980). The study also revealed that there were no differences between the groups in terms of meaning change errors.

Pflaum (nd) also investigated differences between the groups in terms of speed of response. The study found that many of the pupils did not bleep before or during a miscue (52.6% of the learning disabled, 41.7% of average readers). Due to this factor, Pflaum has commented that the findings about speed of response are only suggestive. The data showed that of the total number of bleeped miscues, 18.5% were bleeped before or during the miscue by the learning disabled pupils, whereas, the average readers bleeped 27% of the miscues. A difference in speed of bleeping was, however, noted for serious meaning change errors, with 15.8% being bleeped early by the learning disabled pupils, in comparison with 48.2% by the average readers.

However Pflaum also points out three major cautions in discussing and interpreting the results of her study. Firstly, the sample consisted of 35 learning disabled and 35 average readers assigned to two conditions: "bleep" and "no bleep". Secondly, in the bleep condition only 12 of the average readers made bleeps. Pflaum has commented that these children "made very few word recognition errors" and has tentatively suggested that perhaps "they read so automatically that their few reading break downs were automatically self corrected as the reading continued" (p.13). Pflaum has also noted that while both groups bleeped a high proportion of serious meaning change errors, they also bleeped errors that were not detrimental to meaning. Of the bleeps, 30% and 37.5% related to an awareness of non meaning change errors and corrections and repetitions as made by the learning disabled and average readers respectively. Thus, the author remarks that "questions remain about reading monitoring by elementary readers, when exploring at word error levels" (Pflaum, nd, p.13).

In another of her own studies, Pflaum (1980) has also investigated which of several specific oral reading behaviours, namely syntactic and/or semantic context, self correction and use of phonic cues, affected comprehension in learning disabled and non-learning disabled primary school pupils. Pflaum found that the type and amount of errors did not affect non-learning disabled children's ability to comprehend (as measured by a retelling comprehension measure). In contrast about 32% of the variance in comprehension in the learning disabled group could be attributed to their oral reading behaviours. While neither self correction nor error rate significantly predicted comprehension, two variables did predict comprehension performance for this group; specifically, high phonic cue use and meaning change error rate. Pflaum found that the comprehension of the learning disabled pupils appeared to depend heavily on high phonic cue usage. That is, for learning disabled children, high phonic cue use predicted high comprehension. As expected, problems with context were a negative predictor of comprehension. Results showed that the comprehension of the learning disabled group was affected by their high proportion of meaning change errors. In other words, the high meaning change error rate did indeed predict low comprehension.

In summary then, studies by Pflaum and her colleagues of learning disabled children's reading show that these children are less attentive to meaning change errors (Pflaum, 1979, 1980) and are less able to use syntactic and semantic context cues (Pflaum & Bryan, 1980). With reference to findings about self correction, Pflaum and her colleagues have found no significant differences between learning disabled and average readers. Research using the bleep has shown that it is a suitable tool for measuring awareness of errors and self corrections. Learning disabled children bleeped fewer miscues (errors and self corrections), and in particular they bleeped fewer of the serious meaning change errors, revealing poorer monitoring ability in contrast to the average readers. Finally, in summarizing her research Pflaum (1980) has commented that her studies have shown that learning disabled children's reading comprehension is influenced by their reading errors, particularly their reliance on phonic cues and the high proportion of meaning change errors they make.

Another study of oral reading behaviours which included a small group of learning disabled children is that of Rousch and Cambourne (1979). These authors use the term "Special Learning Disability" to refer to this group. The group consisted of ten children at differing grade levels. Results indicated that the characteristics of this group on different reading variables were similar to that of the 'normal' children (low, average and proficient readers) in their study. Specifically, when compared with the other groups the learning disabled children corrected their reading errors as often. This finding is similar to the findings of Pflaum and Bryan (1980) and Pflaum (nd). However, as a group they were the least successful (in comparison to proficient, average and low ability pupils) in their correction attempts. It was found that the ability to use graphophonic information was as evident for this group as the other groups included in the study. That is, graphophonic information was used by the learning disabled children to the same extent as the other groups. In addition, the correction rate for high graphic and phonemic proximity was within the range of that recorded by the other types of reader. The learning disabled group however, made a greater number of syntactically and semantically unacceptable miscues than the other children. The learning disabled group corrected totally unacceptable syntax to the same degree as low Year 2 and 6 groups, and corrected least errors (apart from Year 2s) when the syntax was totally acceptable. The percentage of corrections in the semantically unacceptable category for the learning disabled children was the lowest of all four groups. The authors have suggested that these results indicate that the reading behaviour of the learning disabled group is identical with that of 'normal' low ability children.

However, it must be remembered that the sample size used in the Rousch and Cambourne study was small and spread over four different year levels. Nevertheless, when taken together with Pflaum's findings several conclusions appear consistent. Rousch and Cambourne (1979), Pflaum and Bryan (1980) and Pflaum (nd) have found that there was no difference in the self correction rate between the learning disabled readers, and the low, average and good readers in their respective studies. Pflaum (1979), Pflaum and Bryan (1980), and Rousch and Cambourne (1979) found that the learning disabled children made more syntactically and semantically unacceptable errors than the other groups studied. Rousch and Cambourne also found that the learning disabled did not correct as many of their totally unacceptable errors as the low, average and good readers. This finding parallels that of Pflaum and Bryan (1980) who found that learning disabled children corrected the serious-meaning change errors less effectively than the average readers.

Pflaum (nd) has indicated that "questions remain about error monitoring" and this is particularly so with learning disabled children. Pflaum has developed a "bleep" instrument that appears to be useful as an unobtrusive detector of awareness. Further investigation of learning disabled children's awareness of errors as measured by use of the bleep will allow examination of the phenomenon that Pflaum (nd) found where many of the average readers did not bleep at all, and that 30% (LD) and 37.5% (average) of the bleeps pertained to no meaning change errors and corrections and repetitions. In addition, it seems that results of studies involving good and poor readers' use of linguistic cues are equivocal, yet the limited number of studies of Pflaum and her colleagues and Rousch and Cambourne of learning disabled children's oral reading behaviour appears remarkably consistent.

The current study will examine the errors, self corrections and linguistic cues used by a group of learning disabled children to further verify other findings. Investigations of comprehension monitoring ability in learning disabled children need to examine however not only awareness of difficulty, but awareness of recovery. Self correction is an overt indication of monitoring, but are learning disabled children aware of self correction? Does the detection of self correction occur at a level of consciousness similar to that of the detection of errors in learning disabled pupils, and furthermore are they able to describe the recovery process through the identification of the fixup strategies they engaged? Thus, study of the relationships between awareness of comprehension monitoring (that is, awareness of both errors and self corrections) and recovery through fixup strategies is required. These aspects of comprehension monitoring have not been examined in studies of learning disabled children to date.

Summary

This chapter has reviewed studies of the relationship between metacognition and reading. The application of the construct of metacognition to the study of reading has provided valuable insights into individual differences of good, poor and learning disabled readers.

Studies focusing on children's knowledge about reading have reflected differences in the views that children have of reading as either an activity involving comprehension or as primarily a decoding task. Differences in children's knowledge of strategies for coping with unknown words and correction are also apparent. This review of studies of metacognitive knowledge has shown that knowledge of strategies for decoding unknown words and for constructing meaning from the text have not been studied specifically in learning disabled children.

The other element of metacognition discussed in this chapter is that of control of reading through comprehension monitoring. Differences between good, poor and learning disabled readers have been reported in studies using the error detection paradigm. These differences are evident in monitoring abilities and resolution of difficulties. Several hypotheses have been suggested as explanations for the differences. In studies involving on-line measures, numerous researchers have concentrated on examining differences in the patterns of both oral reading errors and self corrections and in readers' strategies in relation to the use of information from linguistic cue sources. The results of these studies of good and poor readers are equivocal. Further, examination of errors, self corrections and strategies that indicate which specific types of linguistic cues are utilized by particular types of reader, while at the same time taking into account methodological factors that have led to the inconsistent results across studies, seems warranted.

With particular reference to studies of learning disabled children, this review has indicated that there is a lack of research into this particular group's knowledge about reading and awareness of strategies. Secondly, learning disabled children do not monitor their comprehension spontaneously and that this characteristic supports the conception of these children as 'inactive learners' and 'production deficient'. In terms of studies of the oral reading performance of learning disabled children, as investigated by on-line measures, results appear to be more consistent. Specifically, self correction rates of learning disabled and other readers was the same. Learning disabled readers' use of context was not particularly successful. That is, these children made more syntactically and semantically unacceptable errors than other groups of readers. These errors, which reflect serious meaning changes, were also found to be both corrected less and less effectively by the learning disabled children. However, more detailed study of the bleep as a measure of awareness of comprehension monitoring in conjunction with further investigation of learning disabled pupils' spontaneous corrections, and their awareness of strategies used when correction is required. Study of these variables will provide further information about the metacognitive skills of learning disabled children as exemplified by their awareness of comprehension breakdown, use of self corrections and knowledge of corrective strategies.

Causal Attributions

Metacognition, which is concerned with awareness and control of the thinking, includes not only knowledge of the parameters of a learning task and of the strategies that can be used in accomplishing the task, but also knowledge of and sensitivity to personal learner characteristics, such as abilities, attitudes, feelings and attributional beliefs. At the point at which self knowledge of this type involves aspects of both cognitive and affective knowledge states, the theories of metacognition and causal attributions become linked. Recently, Borkowski and Krause (1985) have argued that motivational factors such as attributional beliefs should be incorporated in metacognitive theory. Indeed, based on research on the relationship of metamemory and attributional theory, Borkowski, Johnston and Reid (in press) have constructed a model of metacognition in which "attributional beliefs, motivation, and self esteem" is incorporated as an "interactive mutually dependent" component.

Attribution theory focuses on the perceived causes of an event or action. The theory is concerned with the judgements which individuals make about the underlying causes of their own and other people's behaviour. A number of studies of causal attributions in the educational domain have been concerned with how these attributions effect academic performance. The relationship between causal attributions and reading performance is one focus of this study.

Attribution theory has generally been conceptually located within an information processing framework. In attribution theory individuals are viewed as active processors of information, gathering and using information to develop a cognitive explanation of the causal nature of the world (Heider, 1958; Nisbett & Ross, 1980).

Within an information processing framework, Frieze (1973, 1976a) has developed schematic models based on the attributions for the described performance of the self and others. In describing what occurs when observing someone else involved in an achievement situation, Frieze (1976a) has suggested that initially information about the task and the person undertaking the task is combined with the outcome of the task interpreted as a success or failure. This information is used to determine why a particular outcome has occurred. An assessment of the information is undertaken and an attempt in memory is made to match this to a previously developed schema. If a match is made a causal attribution is formed. If there is no schema which has worked before in a similar situation in memory a new information processing strategy is developed. In this case a new rule is generated with available information. If this again does not match an existing schema further additional information is sought. The information is systematically weighted and combined for use in determining whether or not the task had been achieved successfully. Once an acceptable processing rule has been developed it is put into memory and the causal attribution can be made. Frieze (1976a) has suggested that these causal elements may be classified into three dimensions: internality, stability, and intentionality or controllability. The way in which an event is viewed and its subsequent location on a causal dimension result in differing expectations for future achievement and differing affective responses. The attributions also simultaneously provide information for making attributions in other future achievement situations.

A similar model of causal attributions may also be constructed for self perceptions (Frieze, 1973). Before attempting a task individuals make self appraisals or assessments of the task and their own abilities. Combined with the information about the success or otherwise of the completed task a match is made with existing information (or schema) in memory. As a result of an acceptable match a causal attribution is made. These attributions have consequences for future behaviour also. In turn, the attributions influence both future academic achievement, future expectations for success or failure, and future motivation. The learners' attributions then have a mediational influence on both achievement - related cognitions and behaviours.

An historical review of the literature indicates that attributions or the perceived causes of an event or individuals' behaviours were first explained by Heider in the book The Psychology of Interpersonal Relations in 1958. In this work performance was perceived to be the result of personal and environmental factors. In

1966, Rotter suggested a one-dimensional classification scheme of the possible causes of success and failure. This 'locus of control' dimension was used to classify controls as either internal or external to the person. If individuals feel that they themselves determine outcomes they are said to have an internal locus of control. Internal attributions refer to ability, motivation, attitude and emotional state of the individuals that causally contribute to the behaviour. If, on the other hand, individuals perceive the cause of an event or behaviour as being the result of an environmental circumstance their locus of control is externally oriented. Examples of external attributions include task difficulty and luck. Studies by Rotter and his colleagues (James & Rotter, 1958; Phares, 1957; Rotter, Liverant & Crowne, 1961) have supported the distinction between internal and external perceptions.

Heider's initial theoretical analysis of human social behaviour has been applied in numerous contexts. One of the applications of Heider's theory has been in the field of educational achievement. Weiner and his colleagues (Weiner, 1972, 1974, 1979, 1980; Weiner, Frieze, Kukla, Reed, Rest & Rosenbaum, 1971; Weiner, Heckhausen, Meyer & Cook, 1972) have made an extensive study of attribution in this area. In 1971 and 1972 Weiner investigated the inferences that people make about the causality of their success and failure on a task. A two dimensional taxonomy distinguishing locus of control (internal/external) and stability (stable/unstable) was proposed. Weiner suggested that people make inferences about the causes of success and failure based on their perceptions of ability, effort, task difficulty, and luck. Weiner considered ability and effort to be internal loci of control, and task difficulty and luck external loci. Weiner et al. (1972), in a study of high and low achievers, found differences in the reasons they gave for success and failure. Specifically, high achievers attributed success to high ability and effort, while failure was attributed to lack of effort. On the other hand, low achievers regarded failure as a result of low ability, with no particular factor being seen as a cause of success.

The second dimension in this proposed taxonomy required the classification of the variables of ability, effort, task difficulty and luck as either unstable or stable. The temporal aspect of this dimension indicates whether a cause is constant or changing in nature. Whereas ability and task difficulty were seen as stable determinants, effort and luck were classified as unstable determinants.

In 1979, Weiner separated the locus and control constructs within his attributional model of classroom motivation and created a third dimension, controllability. He suggested that the way individuals react to an event may differ depending on whether they regard the event as being caused by something under their control or not.

The research of Bar-Tal and Darom (1977), Cooper and Burger (1978), Elig and Frieze (1979) and Frieze (1976a) later indicated that causal factors other than ability, effort, task difficulty and luck were frequently used in explaining success and failure. Therefore more recent attributional models have also included other causes such as mood, sickness, fatigue, teacher bias, having a good or bad personality and physical appearance (Elig & Frieze, 1979).

The past history of individuals often influences causal decisions. This is particularly so for ability attributions. For example, past success may cause individuals to suggest that present or future success is due to ability. Other "antecedent cues" used to infer causal attributions include social norms (through comparison with others), pattern of performance (descending or ascending levels of performance) peak or maximum performance, stimulus characteristics of the task, and incentive-outcome covariations (Weiner, 1974). In addition, causal schemata (necessary and sufficient causality) and individual differences in achievement-related needs also can be seen as antecedents to the causal attributions (Weiner, 1974).

Causal judgements also effect future expectations of success and failure. Weiner (1974) cites studies indicating that the size of expectancy shifts following success and failure are to a great extent determined by the causal attributions individuals make. In particular, causes that are relatively changeable or unstable are more likely to lead to expectancy shifts regarding outcomes on future similar tasks. On the other hand, McMahan (1973), Valle and Frieze (1976) and Weiner et al. (1972) found that stable attributions lead to experiences of similar outcome.

Weiner (1979) has also postulated that there is a link between the internal-external locus dimension of causality and affective consequences, in particular self-esteem. In addition to his findings that affective-reactions are associated with a particular outcome (success or failure) and that distinct emotions are related to specific attributions (e.g., given success, the unique attribution-affect link for ability is a feeling of competence and confidence), Weiner (1979) has found that particular affective states can be clustered with either internal or external causes. That is, internal attributions (e.g., ability, effort and personality) made as a consequence of a successful outcome will result more consistently in affective states such as pride, competence, confidence and satisfaction than when linked with external attributions (e.g., others and luck).

In addition, Weiner (1979) has argued that a connection exists between the dimension of control and that of interpersonal judgements. That is, decisions about helping others, making evaluations and sentiments towards others are connected with judgements as to whether the cause of someone's behaviour is under their control or not. For example, in the area of evaluations, Weiner (1979) reported that teachers rewarded high effort more than high ability in successful outcomes and punished lack of effort more than lack of ability given failure.

Weiner's attributional model involving the three dimensions (locus of causality, stability and controllability) has received some support in a study of university students. Forsyth and McMillan (1981) studied the relationship between attributions, affective reactions and future expectations following a course exam. These authors found that students who made internal attributions for success felt more positive about themselves (e.g., relaxed, confident), than students who made external attributions. In addition, more positive affective reactions were reported by students who made attributions relating to internal, stable, controllable factors. Further, the study revealed a link between the affective responses and students' expectations of future success and failure. Specifically, students who made internal attributions for success and felt more positive about themselves also held more positive expectations for future performance. However, in contrast to Weiner's model, Forsyth and McMillan found that the dimensions of locus of causality and controllability were significantly related to students' expectations, and that the dimension of stability did not have such a marked relationship. That is, where failure was thought to be due to external, environmental factors beyond personal control, students held lower expectations. Where positive expectations were expressed, these were generally held by students who felt their successful test outcome was the result of internal, controllable factors. The authors suggest that in educational settings, stability may not play such a significant role in future expectations. Rather, as long as students feel their failure was the result of controllable factors, they remain optomistic and motivated.

Before reviewing studies conducted within an attributional framework, some of the conceptual and methodological issues associated with researching in the area require discussion. Recent debate (Weiner, 1983; Covington & Omelich, 1984) highlights several difficulties, some of which are briefly summarized here.

Firstly, much of the attribution research has been undertaken in laboratory settings with artificial, rather than "real world" tasks. In particular, much of Weiner's work has been conducted using hypothetical situations, where the participants were asked to provide perceptions of simulated events. In addition, most of the research in the attribution area has been undertaken to test aspects of Weiner's original model (Weiner, Frieze, Kukla, Reed, Rest & Rosenbaum, 1971), where again results have been derived from artificially contrived situations. Such an approach limits the ecological validity of the attributions that are made. That is, the attributions made in response to such contrived contexts may be quite different from those made in response to "real life" outcomes.

Secondly, the researcher interested in tapping people's perceptions of causality, is also confronted with the fact that individuals do not necessarily give causal explanations. Indeed, explanations may be reasons (Buss, 1978), or descriptions (Antaki & Fielding, 1981) that do not involve causal attributions at all. Empirical evidence, that a request made by a researcher for an explanation of an event or behaviour may lead to the participants providing reasons and causes, comes from the research of Elig and Frieze (1979). These authors noted in their study that 17.5% of the total open-ended responses to the question "Why do you think you succeeded/failed on this task?" were uncodable as attributions. This was because

> most of these responses were from subjects who misunderstood the question as asking for reasons why they labeled the outcome as a success or failure rather than asking for the causes of the outcome. (Elig & Frieze, 1979, p.626)

While a more focused wording of the questions in attribution research may reduce the likelihood of reasons, rather than causes being offered by the participants, such a solution may jeopardize the integrity of the questions by being too directed. In turn, this may result in the participants responding in a way that they believe is expected (demand compliance: Orne, 1962).

Elig and Frieze (1979) have documented the variety of measures used for assessing causal attributions in the literature. Common techniques include open-ended responses, independent ratings, ipsative ratings, choice of one major cause and bipolar ratings. In discussing the advantages and disadvantages of the different measures, Elig and Frieze (1979) have noted that open-ended interviewing procedures allow participants to make their own causal ascriptions. This means that the causal explanations are generally wider than those defined by the researcher in a structured format. The authors comment that structured formats may cue participants into attributions that they would not naturally make. In addition, while the causal attributions of ability, effort, task difficulty and luck account for the majority of causal attributions in achievement situations (Frieze, 1976b), numerous other attributions have been spontaneously made in studies using open-ended questionnaires (e.g., Elig & Frieze, 1975; McHugh, 1978). Consequently, Elig and Frieze (1979) query the results of studies that have employed structured response measures limited to the original four causal factors. Elig and Frieze (1979) have also argued that because open-ended measures, in contrast to structured response measures, involve participant-reported attributions, they may be regarded as personally relevant and important. Such a characteristic is not necessarily present, for example, in forced choice situations.

Unstructured open-ended measures also allow for the natural use of language in replying, possibly providing for a more relaxed, rather than a test-like situation, and achieving correspondingly more natural perceptions.

Following from these observations about different attribution measures, Elig and Frieze (1979) conducted a causal attribution study involving the comparison of an open-ended and two structured response measures. The structured response measures were a unipolar 9-point rating scale and percentage ratings. The results of this study indicated that the open-ended response format was psychometrically weaker than the structured response methods. Specifically, the authors found that the open-ended procedure was less reliable and valid. In addition, of the two structured methods, Elig and Frieze regarded the structured independent rating scales as "superior" over the percentage method.

In concluding, Elig and Frieze noted that open-ended procedures in comparison to rating scales, may be more suitable for use when seeking attributions in a new situation or as validation of attribution rating scales. Rating scales, however may be a more appropriate measure when attempting to ascertain the contribution of a number of causal attributions (Elig & Frieze, 1979). Thus different kinds of data are obtained by different measures and the nature of the research hypotheses will dictate the type of procedures used.

The current study includes both open-ended interview questionnaires and structured rating scales as causal attribution measures. The open-ended format was selected because this type of measure is more suited to eliciting causal perceptions and avoids cueing people in to possible causes (Elig & Frieze, 1979). In addition, because different causes are associated with different events, the use of an open-ended measure would allow the naturally occurring and possibly a wider range of attributions, particularly relevant in a reading context, to be tapped. However, it was decided also to make use of structured rating scales. This was so that Weiner's original causal categories could be included in the scales and thus investigated in relation to reading. Furthermore, the research (Elig & Frieze, 1979) has indicated that structured scales have better psychometric properties than free response formats. Thus, two parallel rating scales designed to investigate the children's beliefs about the effect of a variety of causes on reading success and failure were also developed.

Finally, another issue is that attributional categories are essentially multidimensional and may vary in their dimensional location, depending on the context. For example, in some situations, ability may be seen as unstable rather than stable. This is particularly so when ability is confounded with effort (Weiner, Russell & Lerman, 1978). That is, ability may be perceived by an individual as unstable, for example, when facing a new or different task, where the individual knows that it requires the application of skill or knowledge and simple reliance on aptitude is not appropriate. This application of skill or knowledge demands effort. Similarly, effort, on occasion may also be perceived as stable (Ostrove, 1978). For example, the traits of "laziness" or "industriousness" may be perceived by individuals as invariable. Task difficulty may also be regarded as unstable. Task difficulty, Weiner (1983) has suggested may become destabilized when a task changes. Covington and Omelich (1984) have therefore suggested that it is necessary to equate perceptions of task difficulty from one task to the next. Valle and Frieze (1976) have suggested that the categories need to be placed at the point of a particular dimension best suited to that situation. That is, if task difficulty over a series of trials does change or is perceived by the "actor" as changing, then it should be viewed as fluctuating, and labelled accordingly as unstable.

In addition to the concern about labelling attributions on the stability/instability dimension, the problem of labelling attributions as internal/external has also been addressed. Specifically, Weiner (1983) has suggested that when task difficulty is confounded by ability attributions (that is, self perceptions of ability), it may be seen as partially internal. However, Covington and Omelich (1984) found that

> attributions to task difficulty were unrelated to effort or ability ascriptions, suggesting that task difficulty - however it is defined subjectively - is unrelated to variations in these internal elements. (p.1204)

In labelling the dimensions of the categories in the present study the situational contexts have been taken into consideration. For example, based on the fact that the children read at two levels of difficulty, task difficulty may be regarded as unstable across the two conditions. However, because an attempt was made to equate perceptions of task difficulty between groups, by having each child read at their individual easy and difficult level, task difficulty, viewed separately for the easy and the difficult level, has been labelled as stable.

Attribution theory, in particular the notions of control and stability, are particularly relevant to the study of "learned helplessness". This phenomenon has been studied by several resarchers (e.g., Hiroto, 1974; Hiroto & Seligman, 1975; Klein, Fencil-Morse & Seligman, 1976; Roth & Bootzin, 1974). Learned helplessness refers to individual beliefs that outcomes, including outcomes in achievement situations, are beyond personal control. This belief system is related to the expectation that one's responses do not influence the future probability of an environmental outcome (Dweck, 1975; Dweck & Licht, 1980). Learned helpless children have little positive expectation for future performance and therefore withdraw or desist from future performance all together.

Within an educational context, Dweck and her colleagues (Diener & Dweck, 1978; Dweck, 1975; Dweck & Bush, 1976; Dweck & Repucci, 1973) see learned helpless children as those who believe their failures are due to a lack of ability. Additional effort does not seem to compensate for failure and the performance of learned helpless children worsens following each failure. These children see little likelihood of a future change to success and give up. They see the failure outcome to be beyond their control and cope with the failure by devaluing the task and justifying lack of effort. These attitudes in turn contribute to further future failure. In addition, learned helpless children tend not to adopt appropriate task strategies but rather show ineffectual responses and make statements indicative of perceived lack of control over the outcome.

The belief that difficulties in performance are due to stable uncontrollable factors, particularly a lack of ability is seen as characteristic of learning disabled children. Thomas (1979) has suggested that learning disabled children manifest such a belief. Thomas makes reference to the fact that learning disabled children express feelings and perceptions that no matter how hard they try they will not be successful in achievement-related situations. Over time, the affective responses due to learned helplessness may in turn affect the academic performance of learning disabled children.

This suggestion that learning disabled children may make attributions of difficulty and failure to uncontrollable factors has led several researchers to study the differences in locus of control in learning disabled and non learning disabled children (Chapman & Boersma, 1979; Dunn, Pearl & Bryan, 1981; Finchman & Barling, 1978; Hallahan, Gajar, Cohen & Tarver, 1978; Pearl, Bryan & Donahue, 1980).

In their study of learning disabled and normally achieving children, Chapman and Boersma (1979) found that the learning disabled children made more external attributions for success. Both groups of children made relatively similar (internal) attributions for failure. In a replication of the Chapman and Boersma (1979) study, Pearl et al. (1980) also investigated the locus of control of children. Again the learning disabled children believed that success was due to external factors. These children were less likely to believe that their failures were due to a lack of effort and further they were more likely to believe their success at a task was because the task was easy, than to believe that failure was because the task was difficult. Pearl et al. suggest that the latter finding in particular is an indication that typically these children are pessimistic about their ability to change outcomes. In another study, Pearl (1982) showed that when compared with non learning disabled children, children labelled as learning disabled and receiving special education in resource rooms did not believe to the same extent that their failures in reading and on puzzles were due to a lack of effort. They believed that good luck was a factor in success and bad luck a factor in failure more often than non-disabled children.

Licht (1983) has commented that where studies of locus of control have examined explanations for success and failure separately, findings indicate that LD children tend to make external attributions primarily for success (e.g., Chapman & Boersma, 1979). However Licht has argued against those who have interpreted this finding "to mean that LD children do not differ from their non-LD peers with respect to their causal attributions for failure..." (p.484). She has suggested that locus of control scales obscure distinctions between effort and ability (both internal factors). While the distinction between the two causal attributions may not be so important in success situations, they are particularly important in explaining failure outcomes as the affective and motivation links and expectancy for future behaviour may be quite different for ability and effort following failure.

Further, some studies of learning disabled and non learning disabled samples (Canino, 1981; McGuire, 1983; Williams, Gaa, Liberman & Arnoni, 1985) have not found consistent differences in the locus of control of the two groups. Williams et al. (1985) have suggested that differences in the locus of control of the two groups may be limited to areas related specifically to the learning disability.

The beliefs that children have about success and failure in specific curriculum areas have also been investigated. Butkowsky and Willows (1979) looked at causal attributions and persistence of behaviour in good, average, poor and learning disabled male readers. These authors investigated initial expectancies of success, persistence in the face of difficulty, causal attributions of success and failure, and shifts in expectancy as a function of the outcome of a reading task and other tasks where success and failure were manipulated. These variables, it had been suggested by the literature, related to a child's self perception and were thought to be instrumental in contributing to the motivational and performance deficits observed in children who had reading difficulties. It was hypothesized that the poor readers would attribute success more to external factors and failure more to internal factors or causes beyond their control, specifically ability. This hypothesis is in line with the profiles of children in the research on learned helplessness (Dweck, 1975; Dweck & Repucci, 1973). Results of the research of Butkowsky and Willows (1979) revealed that the poor readers did attribute failure more often to internal causes. Poor readers consistently regarded their failure to be caused by lack of ability which was seen as a lack of personal competence. Success on the other hand, was attributed by the poor readers more to external causes. These findings are in line with those of Chapman and Boersma (1979) and Pearl et al. (1980). When poor readers did make internal attributions for success, they were more likely to make effort attributions. In contrast, average and good readers largely attributed success to ability. Further Butkowsky and Willows (1979) found that poor readers lacked confidence in their ability to achieve success in reading. Poor readers also indicated a greater expectancy of failure than average or good pupils following a failure experience. The poor readers attributed failure to low ability. Failure that was regarded as being due to low ability, plus an expectancy following failure of yet further failure, maintained and probably strengthened the low self concept of ability. These poor readers also showed a lack of persistence when faced with a difficult task. Therefore they may be less likely to persist at other future tasks, irrespective of difficulty.

A major limitation of this Butkowsky and Willows (1979) study is that the "reading task" consisted of a series of five five-letter anagrams which the children attempted to solve. The success condition consisted of solvable anagrams, in the failure condition anagrams were insoluble. While the authors have stated elsewhere (Butkowsky & Willows, 1980) that anagram solution is not exactly a reading task, it was used "because of the ease with which outcome could be manipulated and also because children could easily be made to construe it as a text of reading ability" (p.412). However a more accurate picture of children's reading-related causal attributions would likely be made if questioning about reasons for success and failure referred specifically to reading performance or directly followed on from a reading task.

Along these lines a recent study has investigated the effect of two different reading situations (reading for meaning and evaluation of reading for a grade) on the causal attributions of good and poor readers in the third and sixth grades. Hiebert, Winograd and Danner (1984) found that third and sixth graders attributed success and failure differently in different reading situations. In the attribution measure used in this study the single cause of effort was substituted by attributions of attention (because you did/did not pay close attention) and studying (because you did/did not study hard enough). Results indicate high attributions for these two causes regardless of a successful or failure outcome. The authors remark "these findings vary somewhat from those for the single cause of effort in that low-achieving children generally have not been found to attribute their successes to effort to such a high degree" (p.1146). The authors suggest that these results show that the effort attribution appears to involve a number of different aspects and warrants further study. Another finding from this study revealed that age and reading achievement interacted on the locus of control measure. High achieving third graders performed more similarly to sixth graders of both levels of achievement. This was not the case for the low achieving third graders. Low achieving third graders had a greater external locus of control than the high achieving third graders. This finding is consistent with the results of other studies. However the similarity in attributional patterns found for the low and high achievers in the sixth grade was an unexpected outcome. This finding remains unexplained. When the multivariate analysis of individual causes was conducted the results revealed that high achieving readers regarded ability more as a cause of success than of failure. Poor readers in this study regarded failure more as a result of a lack of assistance than the good readers. The authors of this study have called for future research in the causal attributions of children who differ in reading proficiency such as the learning disabled. One area that requires further investigation with the latter named group that arises out of the results of the Hiebert et al study include the effect of different reading situations on causal attributions. This is addressed in the current study.

Results of other studies of attributions of learning disabled and average readers (Hallahan, Gajar, Cohen & Tarver, 1978; Pearl et al., 1980) and of learning disabled and poor readers (Pascarella & Pflaum, 1981) have shown that learning disabled children do differ from the other groups in the attributions they make for success and failure. Indeed, learning disabled children were less internal than other types of reader. This finding however was not supported in another study of learning disabled and poor readers (Pascarella, Pflaum, Bryan & Pearl, 1983). The findings of the causal attributions for reading success and failure in the learning disabled population are equivocal. Thus further study of this group and possible links between their causal attributions in reading as possible indicators of learned helplessness in this curriculum area seems necessary.

As well as an investigation of the reading-related causal attributions in the learning disabled the present study was also concerned with the influence of reading task difficulty on attributions. One early study which focused on task difficulty in a single population is that of Frieze and Weiner (1971). These authors manipulated task difficulty by providing information about "the immediate outcome of the action, percentage of prior success and failure of others, time spent at the task, task structure, and whether the achievement activity was undertaken by oneself or others" (p.604). Significant findings indicated attributions to internal factors (ability and effort) were more likely in success than failure outcomes. While attributions of task ease or difficulty were given when performance was consistent with that of others, attributions to ability, effort, and luck were made when performance was inconsistent with that of others. Ability and task difficulty were main causes of consistency with one's own previous performance, whereas inconsistent results on the task led to luck or effort attributions.

Aponik and Dembo (1981) also focused on the effect of task difficulty on causal attributions. Their research investigated causal attributions given by learning disabled and normal children in success and failure conditions on tasks of easy, moderate and difficult levels. The findings showed that the normal children attributed their success more to ability, whereas learning disabled children considered ability as a reason for their failure but not success. Success was seen more as a consequence of luck by learning disabled pupils. When data were inspected comparing the differences between effort versus ability attributions, learning disabled children viewed effort as significant in their success but not in their failure. This finding, ascribing success to effort by the learning disabled children, the authors note was an unexpected outcome, inconsistent with previous research. As expected, lack of ability was seen by the learning disabled children as the main reason for failure. Another unexpected result was that the normal children placed more emphasis on lack of ability (rather than lack of effort) in the failure situation.

When task difficulty increased, in the success condition, both groups significantly altered their causal attributions to task difficulty, effort and luck. Task difficulty level did not affect attributions to ability. In contrast, following failure, task difficulty level related significantly to the attributions of ability, effort, task difficulty and luck by the normal children, and was related to effort and task difficulty attributions for the learning disabled group.

For the normal group, as task difficulty level in the success condition increased, effort and ability attribution increased (although the increase in ability attributions was not significant). On the other hand, task difficulty attributions decreased. The increase in task difficulty level in the failure condition for this group resulted in increased task difficulty attributions and decreased ability and effort attributions. For the learning disabled children when task difficulty level increased in the success condition, luck was given importance, while ability attributions remained stable. Surprisingly, the attribution on the success condition to effort increased between the easy and moderate tasks but remained the same for the difficult task. The hypothesis that the learning disabled group in the failure condition would place less emphasis on ability as task difficulty level increased was not supported, as ability attributions remained relatively constant.

A study of the effects of different levels of task difficulty in a reading situation seems warranted in order to establish whether the Aponik and Dembo findings can be supported in other situations. Thus in the present study pupils were asked to make causal attributions following predetermined easy and difficult (for each individual) reading tasks.

Causal attributions of success and failure and their effect on motivation and subsequent behaviour may also be influenced by metacognitive knowledge and control. This may be particularly so in groups such as the learning disabled. The theoretical proposition that the concept of metacognition is closely related to the construct of causal attributions has been supported in the literature on metamemory. Borkowski and Krause (1985) have suggested that metamemory and causal attributions are "interrelated concepts" and "help explain individual differences in strategy generalisation". Kurtz and Borkowski (1984) have investigated the effects of causal attributions on metamemory. They found that children who attributed success to controllable factors, such as effort were more strategic, when confronted by challenging academic tasks than the children who attributed task outcomes to non-controllable factors, such as ability and task difficulty. The children who attributed success to controllable factors were also found to have higher metamemorial knowledge in comparison to children who attributed success to non-controllable factors. Borkowski and Krause (1985) commented that

> generalisation is influence [sic] not only by the availability of viable strategies but also by the recognition that effort leads to success. In addition, metamemorial knowledge provides the child with an understanding of why beliefs about effort and success are important. Children with high metamemorial knowledge were less likely to attribute their academic success to the stable dimension "easy to do". Instead, they realized the necessity of effort in producing successful learning outcomes. Children low in metamemory did not seem as able to comprehend the effort-success formula. (p.564)

Schneider, Körkel and Weinert (1984) also found that the self concept/causal attribution construct directly influenced both task-specific and general metamemory.

Attention to affective, motivational variables and metacognition has also been given by other researchers (Brown, 1978; Paris & Lindauer, 1982). Brown (1978) comments on the relationship between the ability to regulate knowledge and the affective dimension, specifically one's self concept. She states that "because self evaluation of one's own performance can not be objective ... self interrogation is contaminated by one's own feelings of competence" (p.81). The areas of personality development which Brown (1978) suggests are linked to evaluating one's performance include fear of failure, need for achievement, loci of control, learned helplessness and aspiration levels. Along similar lines, Paris and Lindauer (1982) have stated that the central notion in any research into metacognitive development is the issue of understanding the self (self-knowledge, self-concept, self-perception) and "subsequent behavioural regulation". This being the case, Paris and Lindauer see motivation as being a crucial factor in the acquisition of cognitive strategies. The children must see that a strategy is going to be potentially useful and that there is a direct relationship between the use of a particular strategy and achieving the goal of the task successfully.

Oka (1985) studied the relationship between metacognition and comprehension in under- and overachievers in reading at the third and fifth grades. The cognitive and metacognitive variables studied were verbal aptitude, comprehension, and reading awareness. The motivational variables included self perceptions of reading, cognitive self perceptions, social self perceptions and motivational orientation. Results revealed that while both groups had similar metacognitive knowledge there were differences on the motivational variables, suggesting that

> when children perceive themselves as cognitively competent they are enabled to effectively use and benefit from their metacognitive knowledge. Children with comparable metacognitive knowledge who performed below expected levels of performance may fail to put their awareness about reading to work because they lack a sense of efficacy and self-competence. (Oka, 1985, p.14)

Pearl, Bryan and Herzog (1981) have studied strategy use as a metacognitive skill and causal attributions in a learning disabled sample. They found that learning disabled children made no attempt to determine whether the strategies they used were successful or not. Therefore they did not adjust their attributions for success or failure according to the outcome, as was the case with the non learning disabled children.

It seems important to continue studying whether affective variables, including causal attributions are associated with reading. Specifically, what role do these causal attributions have in influencing the use of monitoring strategies in learning disabled children? It seems that awareness and flexible use of monitoring and corrective strategies may be influenced by the reading-related causal attributions that children make. Further it seems likely that individuals' causal attributions for success or failure and the causal dimensions have behavioural consequences which involve whether or not corrective strategies are employed or are even thought worthy of engaging.

Thus this review of the literature reveals several areas for further investigation. They include study of causal attributions in reading and the link between reading-related causal attributions and learned helplessness in learning disabled children. In addition, investigation of the effect of different reading situations on causal attributions seems warranted. For example, study of attributions made as a response to self perceptions of reading ability and attributions made as a response to a specific reading task. Finally, the contribution of reading task difficulty on causal attributions and the role of causal attributions in metacognitive knowledge and control in reading requires further investigation.

Summary and Statement of Hypotheses

Recent interest in the study of how individuals think about their own thinking has lead to the development of a new area of enquiry in cognitive psychology--metacognition. Current conceptualizations of metacognition include two key elements: metacognitive knowledge, and executive control. When linked to the school subject of reading, metacognitive knowledge refers to awareness or knowledge of variables that affect reading performance. Comprehension monitoring, as an example of cognitive self-regulation or control in reading, involves "checking, planning, monitoring, testing, revising and evaluation" (Brown, 1978). While the review of theoretical discussions and empirical studies of metacognition has highlighted several problems with the definition (Cavanaugh & Perlmutter, 1982; Lawson, 1984; Robinson, 1983), use of the concept seems appropriate as a focal point for studying the consciousness of the thought processes through introspection.

Metacognitive Knowledge of Strategies

Studies of metacognitive knowledge about reading have generally compared good/poor and younger/older readers. These studies have noted that children's awareness of what reading is reflected their perceptions of reading either as an activity involving the construction of meaning, or as a decoding activity. Younger and poorer readers tended to view reading in terms of decoding (Canney & Winograd, 1979; Johns, 1979). Poor readers were also less aware of the variables that influence reading performance, in particular: person, task and strategy variables (Moore & Kirby, 1981; Myers & Paris, 1978). Forrest and Waller (1981b) and Garner and Kraus (1981-1982) found poor readers/comprehenders had less knowledge of certain types of strategies.

Turning specifically to learning disabled readers, Leong (1981) has noted a lack of metacognitive knowledge in learning disabled children, while Meichenbaum (1980) has stated that learning disabled children have "defective metacognitive processes" (p.273). Torgesen (1977b) has suggested that knowledge about appropriate strategies is not lacking in learning disabled children; rather it is not spontaneously applied. Therefore, one of the purposes of this study was to investigate learning disabled children's knowledge about reading. Further, if it appears that poor readers, by regarding reading as a decoding, rather than a meaning-getting activity, distinguish themselves from good readers, would the differences between good and poor readers disappear if one were to separate out these two purposes for strategy use in reading?

An examination of knowledge of strategies required for gaining meaning from a story and decoding an unknown word, has not been undertaken with a learning disabled sample. One way of examining metacognitive knowledge of strategies is by investigating the reader's awareness of positive and negative strategies, both internal and external. Paris and Myers (1981) have employed the "positive-negative", "self-other" dichotomies in a study of knowledge of strategies for remembering stories. The application of these dichotomies seems appropriate for investigating knowledge of strategies for gaining meaning from a story and for decoding an unknown word. If learning disabled children are actually lacking metacognitive knowledge, rather than merely being unable to apply it (and this may particularly refer to knowledge of strategies) it can be predicted that:

1.1 LD children will indicate less awareness of the importance of positive strategies for gaining meaning from a story than NLD children.

1.2 LD children will indicate less awareness for the unimportance of negative strategies for gaining meaning from a story than NLD children.

2.1 LD children will indicate less awareness of the importance of positive strategies for decoding an unknown word than NLD children.

2.2 LD children will indicate less awareness of the unimportance of negative strategies for decoding an unknown word than NLD children.

Comprehension Monitoring

The second aspect of metacognition in reading comprehension monitoring, has involved studies employing an error-detection paradigm and on-line measures. Studies of awareness of deliberately inserted ambiguities, inconsistencies and errors (Baker, 1979b; Bos & Filip, 1984; Danks et al, 1978; Garner, 1980; Markman, 1979; Winograd & Johnston, 1980) have shown that both good and poor readers do monitor their comprehension; that is, detect inconsistencies. However, learning disabled pupils do not monitor their reading spontaneously (e.g., Bos & Filip, 1984). In addition, while these studies have found that monitoring is related to age and ability, good readers do not always detect all textual errors (e.g., Winograd & Johnston, 1980). Research has also shown that when older/better readers do detect comprehension failure, they are superior to younger/poor readers in utilizing corrective strategies.

While these findings relate specifically to artificially contrived reading passages, with the deliberate insertion of errors, it is interesting to note that similar findings have also been observed in studies of comprehension monitoring using on-line measures. Investigations of monitoring, where behaviours such as hesitations, facial distortion and rereading (or "lookbacks") are used as indicators of the detection of comprehension difficulties (Alessi, Anderson & Goetz, 1979; Garner & Reis, 1981; Garner, Wagoner & Smith, 1981; Wagner & Sternberg, 1983), show that the recognition of comprehension problems and their resolution are age and ability related. Older, good comprehenders show that they know meaning has been disrupted and they can successfully apply a corrective strategy, such as rereading, to a greater extent than younger, poor comprehenders.

Another on-line measure of comprehension monitoring utilizes the analysis of miscues--both errors and self corrections. The study of self correction, as an overt example of metacognitive processing, has provided some of the most detailed evidence for ongoing comprehension monitoring. Studies of good and poor readers, and non learning disabled and learning disabled readers, reveal inconsistent results. Some studies have found poor readers to have lower self correction rates (e.g., Clay, 1973; Watson & Clay, 1975). On the other hand, several studies have shown that poor and learning disabled readers corrected their errors to the same extent as proficient readers (e.g., Pflaum, nd; Pflaum & Bryan, 1980; Pohl, 1981; Rousch & Cambourne, 1979).

Relating to comprehension monitoring, as indicated by errors and self corrections, the hypotheses are as follows:

3.1 There will be no differences between the groups in terms of the range of miscues made.

3.2 LD children will make more of each miscue type (except for "repetitions") per 100 words than NLD children.

3.3 LD children will make fewer "repetitions" per 100 words than NLD children.

Previous studies (e.g., Clay, 1973; Goodman, 1973; Goodman & Burke, 1973) have indicated that poor readers make more errors than good readers. In terms of the rate of self correction, Watson (1974) and Clay (1973) found poor readers were inferior to good readers. Therefore it is hypothesized that:

4.1 LD children will read less accurately (i.e., make more errors) than NLD children.

4.2 LD children will self correct less than NLD children.

4.3 Both groups will self correct more frequently at the easy passage level than at the difficult passage level.

Linguistic cue use and meaning change. In addition to making comparisons, of the percentage of errors and corrections, between different groups of readers, analyses of miscues have also been undertaken at a qualitative level. These analyses have investigated the cognitive and linguistic cues, used by the reader when interacting with the text. Studies of graphophonic, syntactic and semantic cues, as sources of information used in monitoring the understanding of text and in the application of corrective strategies, have pointed to some of the differences between groups of readers. The studies reviewed here, however, clearly show the highly equivocal nature of the other results. Some studies have shown that good readers use syntactic and semantic cues more than graphic information (e.g., Au, 1977; Goodman, 1973). Others have indicated that contextual information and graphic information are used by good readers to an equal or greater extent than by poor readers (e.g., Biemiller, 1970; Clay, 1968; Weber 1970a, 1970b).

One of the reasons, for the differences in findings across studies, is that, in some cases, level of passage difficulty has been overlooked. Several authors (Blaxall & Willows, 1984; Goodman, 1971; Goodman & Burke, 1973; Ng, 1979; Shepherd, 1978) have noted that oral reading behaviour does alter significantly when children read at different levels of text difficulty. In response to this issue of text difficulty, several studies have attempted to equate difficulty levels, with varying degrees of success (e.g., Pflaum, nd; Pflaum & Bryan, 1980; Pohl, 1981).

One way of dealing with the issue of difficulty levels is to have children read at both their own "easy" and "difficult" levels. By doing so, comparisons can be made on passages of equivalent difficulty, as well as allowing differences between "easy" and "difficult" level reading behaviours to be observed. Further, the use of both accuracy and comprehension scores, as components of the criteria used in establishing difficulty level, will reflect a more complete picture of reading performance. To date, no study of learning disabled children's oral reading behaviour appears to have attempted to overcome the problem of task difficulty in this way.

In order to make valid comparisons between miscue studies, the miscue classification systems used should be similar. In this regard clear descriptions of the units of analysis and definitions of errors are important (Leu, 1982). The taxonomy used in this study consists of aspects of various other taxonomies (Clay, 1979; Goodman & Burke, 1973; Pohl,1981). In addition, Pflaum's (1979) taxonomy was modified and used.

In light of the inconsistent findings, further examination of oral reading errors, self corrections and the use of linguistic cues seems warranted. By incorporating the innovation of varying levels of reading difficulty and by employing a comprehensive taxonomy, the miscues of learning disabled children can be examined at a more comprehensive level than previously.

In line with the findings of miscue studies and linguistic cue use it is predicted that:

5.1 Both groups will use all four linguistic cue sources (graphic, phonemic, syntactic and semantic) when making errors and self corrections (Goodman & Burke, 1973; Pohl, 1981; Rousch & Cambourne, 1979).

5.2 In comparison to NLD children, LD children will make fewer errors having "high graphic proximity" (Au, 1973; Goodman, 1973).

5.3 In comparison to NLD children, LD children will make fewer errors having "high phonemic similarity".

5.4 In comparison to NLD children, LD children will make more "syntactically unacceptable" errors (Goodman & Burke, 1973; Watson & Clay, 1975).

5.5 In comparison to NLD children, LD children will make more "semantically unacceptable" errors (Goodman & Burke, 1973; Watson & Clay, 1975).

5.6 In comparison to LD children, NLD children will make more errors having "high syntactic acceptability" (Ng, 1979; Watson & Clay, 1975).

5.7 In comparison to LD children, NLD children will make more errors having "high semantic acceptability" (Ng, 1979; Watson & Clay, 1975).

With reference to self correction ability, it is predicted that:

6.1 In comparison to NLD children, LD children will self correct fewer errors having "no graphic proximity", "no phonemic similarity", "no syntactic acceptability" and "no semantic acceptability" (Goodman & Burke, 1973; Rousch & Cambourne, 1979; Weber, 1970b).

In terms of the influence of text difficulty on linguistic cue use, it is anticipated that:

7.1 Both groups will make more errors having "high graphic" and "high phonemic" proximity on the difficult passage level compared with the easy passage level (Goodman & Burke, 1973; Ng, 1979).

7.2 Both groups will make fewer errors having "high syntactic" and "high semantic" acceptability on the difficult passage level compared with the easy passage level (Ng, 1979).

7.3 Both groups will self correct fewer errors having "high graphic" and "high phonemic" proximity, and "high syntactic" and "high semantic" acceptability on the difficult passage level compared with the easy passage level.

The level of meaning change of the miscues was examined. It is hypothesized that as a proportion of total "tallied" miscues the

8.1 LD children will make more "severe meaning change" miscues than the NLD children (Pflaum & Bryan, 1980).

8.2 LD children will make more uncorrected "severe meaning change" errors than the NLD children.

8.3 LD children will make more unsuccessfully corrected "severe meaning change" errors than NLD children.

8.4 In comparison to NLD children, LD children will make more errors that are both uncorrected and unsuccessfully corrected "severe meaning change" errors.

8.5 LD children will self correct "severe meaning change" errors less than NLD children.

8.6 Both groups will make more "severe meaning change" miscues on the difficult passage level compared with the easy passage level.

Signaled Monitoring

Several authors have noted that learning disabled children lack, or are not as effective as non learning disabled children in monitoring their comprehension during reading (Baker, 1982; Baker & Brown, 1980; Hallahan & Bryan, 1981). While correction behaviour may be one measure of the ability to monitor comprehension, Pflaum's (nd) development of an electronic signal emiting device allows comprehension monitoring of self-generated errors and corrections to be studied without disrupting the flow of reading. Pflaum (nd) found that both LD and average readers indicated awareness of all the miscue types in her study, with the serious meaning-change errors being signaled more than any other type of error. She found LD children bleeped fewer miscues than average readers.

In terms of methodology, Pflaum (nd) assigned the children to two conditions: "bleep" or "no bleep". Pflaum (nd) also attempted to equate passage difficulty and, while this was not successful in terms of accuracy, the children did read passages of equivalent difficulty in terms of their comprehension scores.

In the present study by comparison, both groups of children were directed to use the Monitoring Device and the children read at their own "easy" and "difficult" levels. In order to minimize the "newness" of introducing the Monitoring Device, a training sequence was developed. The relationships between monitoring, correction, linguistic cue use, and meaning cue use were examined. In addition to investigating the relationship of monitoring and correction (errors and successful corrections), the levels of correction, with regard to uncorrected and unsuccessfully corrected errors, were examined separately. The relationship between signaled monitoring and linguistic cue use for both errors and corrections has not been examined to date. The hypotheses related to comprehension monitoring as indicated by use of the Bleep are as follows:

9.1 There will be no differences between the groups in terms of the range of bleep types made.

9.2 In comparison to NLD children, LD children will make more "unbleeped" miscues and more "bleeps where there is no miscue" per 100 words.

9.3 In comparison to NLD children, LD children will bleep less "prior to", "during", "immediately after" and "one or more words after" the miscues per 100 words.

Extrapolated from the findings of research into linguistic cue use, and seen in conjunction with Pflaum's (nd) study, hypotheses relating to the awareness of monitoring and linguistic cue use are as follows:

10.1 In comparison to NLD children, LD children will be less aware that comprehension has failed (i.e., they will bleep errors less).

10.2 In comparison to NLD children, LD children will be less aware of self corrections (i.e., they will bleep self corrections less).

10.3 In comparison to NLD children, LD children will signal monitoring of errors having "no graphic" and "no phonemic" proximity, and "no syntactic" and "no semantic" acceptability less.

10.4 In comparison to NLD children, LD children will signal monitoring of self correction of errors bearing "no graphic" and "no phonemic" proximity, and "no syntactic" and "no semantic" acceptability less.

Based on the Pflaum (nd) study, in relation to the use of the Monitoring Device and meaning cue use, it is hypothesized that as a proportion of the total number of occasions that monitoring was signaled:

11.1 Both groups will signal monitoring of all types of meaning cue use: "no meaning change", "non severe meaning change" and "severe meaning change" miscues.

11.2 In comparison to NLD children, LD children will bleep fewer uncorrected "severe meaning change" errors.

11.3 In comparison to NLD children, LD children will bleep fewer unsuccessfully "corrected severe meaning change" errors.

11.4 In comparison to NLD children, LD children will bleep fewer uncorrected and unsuccessfully corrected "severe meaning change" errors combined.

11.5 In comparison to NLD children, LD children will bleep fewer self corrections of "severe meaning change" errors.

11.6 Both groups will bleep the total of "severe meaning change" miscues more at the easy than at the difficult passage level.

As a proportion of the total of each of the types of meaning cue use, it is hypothesized:

12.1 In comparison to NLD children, LD children will bleep fewer of the uncorrected "severe meaning change" errors.

12.2 In comparison to NLD children, LD children will bleep fewer of the unsuccessfully corrected "severe meaning change" errors.

12.3 In comparison to NLD children, LD children will bleep fewer of both the uncorrected and unsuccessfully corrected "severe meaning change" errors combined.

12.4 In comparison to NLD children, LD children will bleep fewer of the self corrected "severe meaning change" miscues.

12.5 Both groups will bleep more of the total number of "severe meaning change" miscues at the easy passage level than at the difficult passage level.

Metacognitive Knowledge: Self Report

While self correction and the Monitoring Device do allow comprehension monitoring and the detection of monitoring of self-generated miscues to be examined, it is not clear how these behaviours reflect cognitive processing. A further purpose of this study is to examine metacognitive knowledge of the processes used during an actual oral reading task.

To date, the procedures used in comprehension monitoring studies have included verbal and written self-reports, studies of regressive eye movements and rereading, videotape observations, interactive computer programmes and tutor-tutee situations. Criticism of the use of verbal self-reports has been made by Nisbett and Wilson (1977). Ericsson and Simon (1980) however, have argued that the use of self-reports is appropriate when the reporting corresponds to behaviour. The authors have suggested that one way of achieving greater ecological validity when using self reports is by minimizing the interval between processing and reporting. Disruptions by the investigator are a further difficulty encountered when measuring cognitive processes. When the participant is required to describe processing activities, interference with comprehension may occur. When studying the reported awareness of cognitive processes involved in comprehension monitoring, three major procedural concerns must be addressed. These are: the interval between processing and reporting must be short, monitoring must be indicated in such a way as to be unobtrusive, and verification of the reported statements must be made with the actual behaviours. Therefore, in addition to recording oral reading behaviours, including self corrections, use will be made of the Monitoring Device. Secondly, "stimulated recall", immediately following the completion of a reading task, will be used. Recall will be prompted by the replaying of a tape. The tape will be a recording of both the oral reading and the signaled monitoring. Finally, correspondence between aspects of the self report and particular reading behaviours will be evaluated.

To date no study has involved such a comprehensive investigation of knowledge of comprehension monitoring. In particular, no examination has been undertaken of knowledge of cognitive monitoring during oral reading. Several authors (Bos & Filip, 1984; Reid & Hresko, 1981; Wong, 1979) have suggested that learning disabled children are unable to use knowledge about strategies. Similarly, Hallahan and Bryan (1981) have suggested that LD children have difficulty with "debugging activities" involved in making corrections. While it is important to study LD children's knowledge of corrective strategies, in relation to self-generated errors, it is also important to study possible differences in other aspects of metacognitive knowledge. Little is known about awareness of cognitive activities occuring prior to taking corrective action in oral reading. Are LD children able to describe the cognitive skills involved in monitoring? Are they aware, in fact of what triggered the monitoring response in the first place? These questions have not been previously addressed. Furthermore, they have not been examined at the level of specific, individual, self-generated reading events or behaviours. Aspects of knowledge about comprehension monitoring requiring investigation, include descriptions of monitoring and the reasons for it. Knowledge of the types of strategies used during correction and the establishing of reasons, why these corrective strategies are used, need study. It also seems important to investigate whether readers can determine the success and lack of success of corrective strategies and how they do so. In addition, the sources of strategy knowledge need to be examined. Furthermore, correspondence should be established between the descriptions of comprehension monitoring and actual reading behaviour. Finally, correspondence between knowledge of successful and unsuccessful strategies and reading behaviour should also be ascertained.

Ability to report on problems in the text has been taken as evidence of comprehension monitoring in studies using an error detection paradigm (Baker, 1979b; Garner, 1980; Markman, 1979; Winograd & Johnston, 1980). These studies suggest that those less able to report on difficulties in text do not monitor their comprehension or are poor comprehension monitors. Based on this assumption, it is hypothesized that:

13.1 In comparison to NLD children, LD children will be less able to provide descriptions of comprehension monitoring.

13.2 When LD children do provide descriptions of comprehension monitoring, in comparison to NLD children' descriptions, the LD children's will be global rather than specific.

Studies of metacognitive knowledge of reading have found that good and poor readers have different conceptions about reading. Good readers believe that the purpose of reading is to derive meaning from text, whereas poor readers perceive reading as primarily a decoding activity (Canney & Winograd, 1979; Clay, 1973; Garner & Kraus, 1981-1982; Myers & Paris, 1978). From these studies, it is hypothesized that:

13.3 In comparison to NLD children, LD children will provide more reasons for comprehension monitoring which mirror their conception of reading as a decoding process, rather than a meaning-getting activity.

The findings relating to the differential use of strategies during reading, reveal that good readers and mature readers are more likely to use context to figure out words, using such strategies as rereading (Baker & Anderson, 1982; Garner & Kraus, 1981-1982). In addition, as a strategy for dealing with failure to understand, older readers are more likely to continue reading, seeking later clarification of the text (Baker, 1979b; di Vesta, Hayward & Orlando. 1979). Stemming from these findings and from those indicating a meaning-getting conception of reading by good readers, it is hypothesized that:

13.4 In comparison to NLD children, LD children will more often report the use of corrective strategies that focus on word solving strategies that do not involve the use of context (e.g., syllabification rather than rereading).

In line with the above rationale and hypothesis (13.4), it is also anticipated that the two groups of children will differ in their reasons why particular types of corrective strategy are used. Therefore:

13.5 In comparison to NLD children, LD children's reasons why particular types of corrective strategy are used will reflect their conception of reading as a decoding activity.

In relation to assessing one's level of comprehension, Forrest and Waller (1979) found that young and poor readers were less able to judge how well they had comprehended a story. That is, they did not always know when they did or did not understand. Derived from this study, it is hypothesized that:

13.6 In comparison to NLD children, LD children will show less awareness that corrective strategies were both successfully and unsuccessfully applied.

It is also anticipated that the different reasons for knowing that correction attempts had been successful and unsuccessful will reflect the meaning/decoding focus of reading as perceived by good/poor readers. Therefore it is hypothesized that:

13.7 In comparison to NLD children, LD children's reasons for knowing that corrective strategies were both successfully and unsuccessfully applied will more often reflect a reliance on internal-word features (e.g., graphic cues), rather than sentence or story features(e.g., semantic cues/meaning).

The research on causal attributions for success of LD children have indicated that these children make more external attributions than their NLD peers (Chapman & Boersma, 1979; Pearl, Bryan & Donahue, 1980). Thus these children may see teachers and parents as playing significant roles in their reading success also. As the ability to apply corrective strategies may be seen as something that is taught by teachers and parents (that is, external agents), it is hypothesized that:

13.8 In comparison to NLD children, LD children will regard external agents as influential in acquiring knowledge about strategies.

In addition, it is predicted that:

14.1 In comparison to NLD children, LD children's specific descriptions of comprehension monitoring will correspond less with actual reading behaviour.

14.2 In comparison to NLD children, LD children's "reported knowledge" of successful and unsuccessful corrective strategy application will correspond less with actual reading behaviour.

Perceptions and Causal Attributions

Awareness of the task, text and strategies is part of metacognitive knowledge and this awareness may well have an important role in determining whether or not comprehension monitoring occurs. However, knowledge of personal reader characteristics may have an even greater role in the use of comprehension monitoring. Recently, the literature has indicated that there may be theoretical links between attributions and motivational aspects of learning and metacognitive factors (Borkowski, Johnston & Reid, in press; Borkowski & Krause, 1985; Brown, 1978; Paris & Lindauer, 1982).

Several authors have suggested that causal attributions, and their effect on motivation and subsequent behaviour, may also influence both metacognitive knowledge and executive control (Paris & Cross, 1982; Paris & Lindauer, 1982; Short & Ryan, 1984).

Findings from causal attribution studies of learning disabled children are equivocal (Hallahan, Gajar, Cohen & Tarver, 1978; Pascarella & Pflaum, 1981; Williams, Gaa, Liberman & Arnoni, 1985). However, locus of control studies seem consistent in finding that learning disabled children attribute success more often to external factors and failure to internal factors (e.g., Chapman & Boersma, 1979; Pearl, Bryan & Donahue, 1980). In addition, there has been some suggestion that the attributions for failure of learning disabled children, especially those due to lack of ability, may also characterize this group of children as "learned helpless" (Canino, 1981; Grimes, 1981; Thomas, 1979).

With regard to causal attributions in the reading area, only a few studies have been undertaken (e.g., Butkowsky & Willows, 1979;

Hiebert, Winograd & Danner,1984). Some of the findings of the "reading" studies must, however, be viewed with caution, as they have not involved "real" reading tasks (e.g., Butkowsky & Willows, 1979). The effect of task difficulty on causal attributions has also been studied only infrequently (e.g., Aponik & Dembo, 1981; Frieze & Weiner, 1971). To date no study has reported examining the influence of reading task difficulty on learning disabled children's perceptions and causal attributions.

In the present study both open-ended and structured formats were employed. The structured rating scales were used to compare the groups on specific types of attributions. The open-ended formats were used to compare free response attributions.

In examining the causal attributions for success and failure in reading of learning disabled children, using the rating scales, it is hypothesized that:

15.1 In comparison to NLD children, LD children will make more attributions for reading success to external causes (Butkowsky & Willows, 1979; Chapman & Boersma, 1979; Finchman & Barling, 1978; Hallahan, Gajar, Cohen & Tarver, 1978; Pearl et al., 1980).

15.2 In comparison to NLD children, LD children will make more attributions for reading failure to internal causes (Hallahan, et al., 1978; Pearl et al., 1980; Pearl, 1982).

In addition, the children's perceptions of their reading achievement were determined in relation to their peers. Studies of LD children have indicated that these children generally score lower than normally achieving children on measures of self concept (Chapman & Boersma, 1980; Hiebert, Wong & Hunter, 1982). Because self concept refers to how individuals perceive themselves it is predicted that:

16.1 In comparison to NLD children, LD children will report lower perceptions of their level of reading achievement.

An open-ended questionnaire was used to investigate the reasons for other children's reading success and failure. The research of Nicholls (1979) found that children's understanding and reasoning about causes of other people's success and failure followed a developmental trend, becoming more logical with age. It is argued here that these 12 year olds will make sense of their own successes and failures by believing that other people's successes and failures are due to reasons different from the causes of their own success and failure. For example, if as hypothesized, LD children make more attributions to external causes for success in reading (15.1), they will attribute other children's reading success more to internal causes. That is, success for other s is due to inherent qualities such as ability, not to an attribute for which they have no responsibility. Based on this argument, it is hypothesized that:

17.1 In comparison to NLD children, LD children will more often attribute their peers' reading success to internal causes.

17.2 In comparison to NLD children, LD children will more often attribute their peers' reading failure to external causes.

With respect to reasons for personal success and failure in reading as measured by the open-ended questionnaire, it is predicted that:

18.1 In comparison to NLD children, LD children will more often attribute their own reading success to external causes.

18.2 In comparison to NLD children, LD children will more often attribute their own reading failure to internal causes.

The contribution of task difficulty, on reading-related perceptions and causal attributions, was also investigated. It is hypothesized that:

19.1 Both groups will have high preceptions (that is "good" or "average" perceptions) of their understanding and oral reading performance at the easy passage level.

19.2 Both groups will have low perceptions (that is "poor" perceptions) of their understanding and oral reading performance at the difficult passage level.

However, despite having similar perceptions of their understanding and oral reading performance at the two difficulty levels, it is hypothesized that the groups will differ in their causal attributions. These attributions will be in line with their attributions for success and failure in reading (see Hypotheses 15.1 and 15.2). It is hypothesized that:

20.1 In comparison to NLD children, LD children will make more external attributions for their understanding and their oral reading performance at the easy passage level.

20.2 In comparison to NLD children, LD children will make more internal attributions for their understanding and their oral reading performance at the difficult passage level.

In examining the relationships between perceptions of understanding and causal attributions, and between perceptions of oral reading performance and causal attributions, it is predicted that:

21.1 The LD children who have "low" perceptions of their understanding and oral reading performance at the difficult passage level will make attributions to internal factors, especially to "lack of ability" (Butkowsky & Willows, 1979; Nicholls, 1979).

C H A P T E R T H R E E

METHOD

Overview

The role of metacognition, perceptions and causal attributions in reading was studied in a sample of learning disabled and non-learning disabled pupils from five intermediate schools in Palmerston North and Feilding.

Initially a sample of learning disabled children was identified. From this group a further sample of learning disabled children underachieving in reading was selected. A sample of non-learning disabled children, matched on IQ, with achievement in reading consistent with class level placement was also identified.

The data were collected in late 1983 in two phases: A and B. During Phase A data on the children's perceptions of reading ability and achievement, reading-related causal attributions, and task-linked perceptions and causal attributions were obtained. In addition, the children orally read a series of reading passages, graduated in difficulty, from which their individual easy and difficult Oral Reading Passage were determined. Between Phases A and B verification, complete transcription and coding of the oral reading behaviours collected during Phase A was undertaken. An inter-rater reliability check of these data was also completed. In Phase B, the children read passages at their own easy and difficult level. This provided data on various types of oral reading behaviour, including errors, self corrections, linguistic cue use, and meaning cue use. In addition, while the children read, comprehension monitoring was indicated. Self report data of reading behaviour were collected subsequently, and finally knowledge about positive and negative reading strategies was evaluated. Following Phase B, data coding was undertaken and coding reliability established. Thereafter, analyses of the data proceeded.

The following shows the organization of this chapter.

Sample Selection and Characteristics
Learning Disabled Sample Non-learning Disabled Sample

Instruments
Oral Reading Passages Monitoring Device (Bleep) Self Report of Oral Reading Behaviour Reading Strategies - Reading Strategies for Meaning Scale - Reading Strategies for Decoding an Unknown Word Reading Related Causal Attributions - Causal Attribution Rating Scales - Reading Perception and Attribution Questionnaire - Task-linked Perceptions and Causal Attributions

Pilot Study

Procedure
Phase A Phase B

Data Coding
(information is presented in the same order as for Instruments with the omission of the two Reading Strategies Scales and the two Causal Attribution Rating Scales)

Data Analysis
(information is presented in same order as for Instruments).

Sample

In 1983 sixty-nine Form Two pupils (45 males and 24 females) were selected from pupils attending five intermediate schools in Palmerston North and Feilding. The sample identification procedure initially involved obtaining information regarding the children's ability and achievement. The Wechsler Intelligence Scale for Children - Revised (WISC-R: Wechsler, 1974) was used as a measure of intellectual functioning. In addition, the Test of Scholastic Abilities (TOSCA: Reid, Jackson, Gilmore & Croft, 1981) and four of the Progressive Achievement Test series (PAT) were used. The PATs were Reading Comprehension (Elley & Reid, 1969a), Reading Vocabulary (Elley & Reid, 1969b), Listening Comprehension (Elley & Reid, 1971) and Mathematics (Reid & Hughes, 1974). The procedures for selecting a learning disabled (LD) group and non-learning disabled (NLD) group are described in Chapman, St. George and van Kraayenoord (1984), and summarized below.

Learning Disabled Sample

The identification procedures for selecting a learning disabled group involved screening for children of normal intelligence with poor achievement. The conceptualization of LD children as underachieving is consistent with the views of Ysseldyke and Algozzine (1979) and most LD definitions have been operationalized using the notion of a discrepancy between ability and achievement (Mercer, 1983).

Step 1. Initially, the screening procedure identified pupils who had at least one PAT score below the 20th percentile with either a TOSCA score above 15 raw score points or at least one PAT score above the 30th percentile. A TOSCA raw score of 15 as the cut-off was used because of its prediction of a WISC-R IQ score of 85, that is one standard deviation below the mean (100). Children with a TOSCA raw score of below 15 would be unlikely to score in the normal IQ range of 85 or above. However pupils with a TOSCA raw score of less than 15, but with at least one PAT result equal to or greater than the 30th percentile were also included in the belief that such achievement may indicate average intelligence. The 30th percentile represents one-half a standard deviation below the mean.

In order not to include slow learning, rather than learning disabled children, individuals with all PAT scores below the 20th percentile and a TOSCA raw score below 15 were dropped from further screening. Shepherd (1976) has suggested pupils with these characteristics are either unlikely to have a normal IQ or their poor achievement in all areas, including IQ, should be considered as indicative of a slow learner.

This screen provided pupils who were achieving at a level approximately two years below the average Form 1 age range (11-12 years) in at least one academic subject but who gave some indication of average intelligence.

All pupils meeting the above criteria (N=164) were then tested with the short form of the WISC-R. The short form of the WISC-R comprised the Information, Vocabulary, Picture Completion, and Block Design subtests. These subtests have relatively high correlations with the Full Scale IQ and are easy to administer. Sattler (1974) shows that the correlation coefficients of this combination of four subtests is about .94 with the Full Scale IQ. Testing was conducted in the schools during the second term of 1982 by three trained administrators.

Step 2. A further procedure deleted those individuals whose prorated IQs were less than 90. Full Scale IQ scores were prorated from the summed scaled scores, following the procedure suggested by Tellegen and Briggs (1967). The cut-off point of 90 was chosen because the score is approximately equal to 85 plus one standard error of estimate for the four subtest short form (SEy.x = 4.99). Furthermore a prorated IQ of 90 or above (rather than 85, the usual cut-off point for a normal IQ) was decided on as a conservative cut-off point to increase the chances that the pupils would be within the normal IQ range.

To this point, the group identified through the screening procedure, outlined above, consisted of pupils with prorated IQs of 90 or above and at least one PAT score below the 20th percentile.

Kavale and Nye (1981) have reported that in 209 studies involving the identification of LD pupils, the size of IQ-achievement discrepancies ranged from 1 to 5 years below grade level. The mean was 1.76 years. In New Zealand there is a lack of interpretable data for determining class level equivalents in the PATs and therefore a more stringent criterion was used as a cut-off point. The cut-off point was reduced from a PAT score at the 19th percentile to one at the 16th percentile. This is equivalent to one standard deviation below the age corrected national mean and represents an achievement discrepancy of approximately two years at the Intermediate school level.

The IQ-achievement discrepancy approach for defining learning disabilities described here, also involved the use of the regression procedure. This is regarded as the most appropriate for the identification of this group (Cone & Wilson, 1981). Thus, the LD group was defined in terms of having a prorated WISC-R IQ score of 90 or above, and at least one PAT score at or below the 16th percentile. These LD children met the regression method criteria, in that they had at least one PAT score that was below the lower standard error of estimate confidence bound (at the 10% level) predicted from their IQ score. The children were in normal classrooms, and no child with a major handicapping condition, with major social/emotional problems, or with English-as-a-second-language difficulties was included in the group.

Step 3. From this LD group a further sample of LD children was selected. The emphasis now turned to those LD children underachieving in reading. Of particular concern was performance in reading comprehension. The LD sample which is the focus of this study was therefore selected using the following criteria:

(a) a prorated WISC-R IQ of 90 or above,
(b) with a PAT Reading Comprehension score equal to or less than the 16th percentile,

(c) <u>or</u> with a PAT Reading Comprehension score equal to or less than the 19th percentile and a PAT Reading Vocabulary score equal to or less than the 16th percentile.

Due to the fact that a smaller number of LD children met the criteria of a prorated IQ score of 90 or above and a PAT Reading Comprehension score equal to or less than the 16th percentile than expected, children with a prorated IQ score of 90 or above with a PAT Reading Comprehension score equal to or less than the 19th percentile and a PAT Reading Vocabulary score equal to or less than the 16th percentile were also included. This criteria is still consistent with the decision to identify children whose performance is approximately two years below class level.

<u>Non-learning Disabled Sample</u>

<u>Step 1</u>. The NLD group was selected from children who had been administered the same ability and achievement tests as the LD group. The NLD children all had a prorated WISC-R IQ score of 90 or above.

<u>Step 2</u>. From this group, children included in the final NLD sample met the following criteria:

(a) a prorated IQ of 90 or above on the WISC-R,
(b) with PAT Reading Comprehension and Reading Vocabulary scores greater than the 50th percentile and a Listening Comprehension score greater than the 30th percentile.

The cut-off point of the 50th percentile in Reading Comprehension and Reading Vocabulary represents average to above average achievement. The cut-off point of the 30th percentile in Listening Comprehension indicates that these children were performing at a level no less than one-half a standard deviation below the mean. As far as possible the NLD group was matched to the LD group in terms of IQ.

The LD sample (N=35) comprised 26 boys and 9 girls. The proportion of males to females in the LD sample is consistent with research indicating that boys make up LD populations to a greater extent than girls. Lerner (1981) states that in the U.S. learning disabilities appears in boys four to six times more often than in girls. Similarly, replies to a survey questionnaire from 16 countries reported in Tarnopol and Tarnopol (1976) revealed that in countries where special full or part-time programmes existed for children with learning or reading problems the ratio of boys to girls was most frequently stated as three boys to one girl. The NLD sample (N=34) comprised 19 boys and 15 girls. The mean prorated IQ of the LD children was 99.01 (SD=5.68), while the NLD children had a mean prorated IQ of 100.64 (SD=5.23). Table 1 presents the PAT achievement data for the two sample groups.

Table 1

PAT Percentile Rank Data

	LD			NLD		
	N	Median	Range	N	Median	Range
Reading Comprehension	35	8.67	1.0-19.0	34	69.50	53.0-96.0
Reading Vocabulary	35	16.0	1.0-45.0	34	67.0	50.0-85.0
Listening Comprehension	35	30.0	10.0-96.0	34	65.0	33.0-98.0

Instruments

Oral Reading Passages (Phases A and B)

Textual material representing several graduated levels of difficulty and suitable for reading orally was selected for this study. In addition, the material was chosen on the basis that there was a parallel form at each level and included questions for the examination of comprehension at the completion of reading. The following materials were selected and comprised the "Oral Reading Passages (A) and (B)".

The Neale Analysis of Reading Ability (Neale, 1966) provides parallel forms of graded passages for oral reading for children with reading ages to 7 to 13 years. This test has been used by other New Zealand researchers (e.g., Watson & Clay, 1975; Pohl, 1981). Further, the Neale test was not used by participating schools and hence the children had not been exposed to the passages before. In referring to the Neale test, Watson and Clay (1975) in their study of third formers noted that "the material was easy for third formers" (p.45). As the children in the study were to read at their individual "easy" and "difficult" reading levels, it appeared that on the basis of this comment that the better Form 2 readers may not, given only the six Neale passages, read at a level that was difficult for them. In order to avoid a ceiling effect on the most difficult passage (Level 6) a further three passages from the Analytical Reading Inventory (Woods & Moe, 1981) were included at the seventh, eighth and ninth grade levels. These levels are equivalent in New Zealand to Forms 2, 3 and 4 (ages 12 to 13 years to 14 to 15 years).

The "easy" and "difficult" level of each child's reading were determined using both accuracy and comprehension as criteria. Throughout this study accuracy was determined using the following formula

$$\frac{\text{number of words in passage} - \text{uncorrected errors}}{\text{number of words in passage}} \times 100$$

Generally, an accuracy score alone is used (e.g., Ng, 1979; Pohl, 1981). It seemed important however, to include both accuracy and comprehension scores in the criteria to establish level of difficulty as this represented a more inclusive and complete view of reading performance.

Initially, for the easy passage, the criteria of 95% or above in accuracy and 87% or above in comprehension were selected. The specific criteria for determining levels of reading have been debated for several years (Betts, 1954; Powell, 1970; Ekwall, 1976). A score of 95% accuracy reflects oral reading performance at which the students read free from externally observable symptoms of difficulty, such as finger pointing, and are able to use contextual clues, phonics and/or other strategies to read most unknown words (Johns, 1981). Comprehension at the 87% level represents 7 out of 8 questions were answered correctly. However there were only 4 comprehension questions after the first passage with 3 out of 4 comprehension questions answered correctly representing 75%. After the pilot study (see p.141) therefore, the criteria for the comprehension was set at 75% and above.

The "difficult" passage criteria was 90% or below in accuracy and 50% or below in comprehension. Generally at this level students manifest many characteristics indicating they are unable to read the material comfortably. They may exhibit "lack of expression, ... difficulty in pronouncing words, word-by-word reading, and/or finger pointing" (Johns, 1981, p.7). The standards set for the difficult passage are also in line with the traditional criteria set by Betts (1954) and validated by Ekwall (1976).

The accuracy score consisted of the proportion of correctly read words in a passage expressed as a percentage of the total number of words. Errors which had been successfully corrected were not included in the error count. The criteria of 95% or above accuracy for the easy passage is in line with the New Zealand research of Ng (1979) and Pohl (1981). Ng (1979) has also used 90% accuracy for the difficult passage. While Pflaum and Pascarella (1980) have used the criteria of up to 91% in word recognition and up to 74% in comprehension (using the Woods and Moe Inventory) in determining "frustration" level, 50% or below in comprehension of the difficult passage is in line with the decision to drop the criteria for comprehension of the easy passage to a score of 75% or above and with the criteria recommended by Betts (1954) and Ekwall (1976). Thus, the criteria to determine easy and difficult reading levels is supported empirically in other studies.

On the first day of administering the Oral Reading Passages in Phase A it was found that some of the NLD children did not achieve a "difficult" level on both criteria: accuracy and comprehension scores. (This phenomenon had not been evident in the piloting of the instrument). Therefore a further two passages from the Bader Reading and Language Inventory (Bader, 1983) were selected. These were at grade levels 10 and 11-12 with parallel forms. This is equivalent to Forms 5 and 6 and 7 (ages 15 to 16 to 17 to 18) in the New Zealand context. In total the Oral Reading Passages consisted of eleven passages of increasing difficulty from a reading age of seven to adult level.

Any vocabulary or spelling that was American in nature was changed to suit New Zealand children (e.g., "trash" became "rubbish", "color" became "colour"). All the passages were then retyped in similar type-face and spacing and compiled into two booklets, one for each phase. Where pictures accompanied the text in the Neale test these were included on facing pages along-side the text. Where there was an examiner's introduction to the stories in the published material this was omitted. Where alternative phrasing on comprehension questions following the Neale passages was offered, the question that "seemed" most natural or easiest to understand was chosen (e.g., Passages A, "Everest", question 5: "What made them go so very slowly?" was selected over "What made them slacken their pace of climbing to a crawl?"). In the pilot study the alternative phrasing offered by Neale was met with puzzled looks by children in some questions and more current natural language was substituted (e.g., Form A, "Submarine", question 3 the question was reworded to read "What was special about this part of the sea?" in place of Neale's suggested "What made rescue work difficult in this area?" or "What was this part of the sea noted for?") Where there were more than eight comprehension questions in the Bader Inventory materials a selection of eight questions was made. Where there were less than eight questions (only Passages A, "Art") another question was added. All additions and the omission of questions were representative of the story's content and of question type (e.g., main idea, detail, inference questions).

The Oral Reading Passages were used in Phases A and B of the study. In Phase A the children read beginning at the first passage.

In Phase B the children read the passage that reflected their individual "easy" and "difficult" level. The details are outlined in the Procedure section. Table 2 indicates the source of the passages, titles, and number of words in each passage.

Table 2

Oral Reading Passages and Number of Words Per Passage

Passages Phase A		Passages Phase B	
Neale	Number of words	Neale	Number of words
1. Kitten	26	1. Pam's Box	26
2. Tom	49	2. Woodman	49
3. Circus	74	3. Puppet	72
4. Dragon	91	4. Exploring	92
5. Sub marine	118	5. Arabs	118
6. Everest	139	6. Volcano	141
Woods and Moe*		Woods and Moe	
7. Kate	234	7. Johnny	262
8. Zombies	281	8. Witch-hunts	283
9. Hunzakats	321	9. Pollution	339
Bader*		Bader	
10. Chemistry	205	10. Clipper Ships	211
11. Art	210	11. Global Warfare	294

*The titles of the materials from the Woods and Moe and Bader inventories have been created and/or modified by the investigator.

Monitoring Device (Bleep)

Comprehension monitoring has been investigated using numerous techniques, including rereading and regressive eye movements, time taken to read paragraphs which have violated conventional organizational structure, and puzzled looks from readers. To determine whether or not children were aware of errors and corrections made during reading an unobtrusive a measure of monitoring as possible was sought. It was considered important that such a measure should only minimally interfere with the cognitive processing undertaken during reading, be able to record monitoring permanently, and have validity in that it was an acknowledgement of the children's own awareness of monitoring and not an inference of monitoring that the researcher made on the basis of puzzled looks or the like.

Pflaum (nd) has reported the use of an instrument to investigate on-line monitoring of comprehension at the word level without disrupting the flow of reading. This monitoring device, a "Bleep", consists of a button placed at the end of a small cylindrical container (the size of a small AA battery). From the button a wire extends through the container to a tape recorder. The tape recorder receives the sound as the button is pressed. The sound is audible only on the tape. This device met the criteria listed above and was chosen as a measure of awareness. The "bleeps" were made onto the same tape as the oral reading. This allowed for later coding of error behaviour and simultaneously indicated which reading behaviours had been bleeped. The children were asked to press the button or "bleep" when they realized they had made an error or changed what they had first read. Pflaum (nd) has indicated that the Bleep is a valid measure which does not adversely affect oral reading performance. A series of training tasks (see Procedure section) were developed in order to familiarize the children with the Bleep and how it was to be used.

Self Report of Oral Reading Behaviour

At the conclusion of the oral reading, bleeping and oral answering of the comprehension questions, the tape of the oral reading/bleeping was played back and stopped at specific locations. The tape was halted where the child had signaled awareness of making an error or changing what had been read (bleeps), where the child made correction attempts but did not signal awareness (unbleeped correction attempts), and non bleeped repetitions. The miscue types that may have been involved at any one of these points of signaled awareness include both tallied and untallied miscues. Tallied miscues included substitutions, insertions, omissions, reversals, complex reversals, complex substitutions and partial word substitutions. These types of miscues are subsequently referred to as "tallied". Untallied miscues include repetitions, sounding out, substitution intonations and punctuation and are subsequently referred to as "untallied" (See Appendix G). However, children may also have signaled awareness (that is, bleeped), although no miscue was made. These locations were chosen for the following reasons: bleeps indicated that awareness of some kind had occurred and non bleeped correction attempts showed both overt monitoring and the immediate use of fix-up strategies. In addition, non bleeped repetitions may have indicated internal regulation, as the child tried to either grasp what had been read prior to the repetition or tried to process upcoming text. The unbleeped correction attempts were included because, although the pupil did not signal awareness by using the bleep, awareness of an error possibly occurred at a subconscious automatic level while reading.

The children read silently in the text at the location of the bleeps, unbleeped correction attempts and unbleeped repetitions. A series of questions (see Appendix A) was then asked in order to examine the following: knowledge of what happened at that point, knowledge of the cause of the signaled awareness, knowledge of the type of strategy used, knowledge of why that strategy was used, awareness of whether the strategy resulted in a successful correction or not and how it was known, and knowledge of the source of the strategy. The questions reflected an attempt to tap knowledge related to monitoring and fix up strategies which were considered to be indicative of metacognition. The information provided by the pupils was tape recorded on a second machine and transcribed later as the Self Report of Oral Reading Behaviour data.

Reading Strategies

Brown, Armbruster and Baker (in press) have stated that knowledge about reading includes knowing about strategies involved in reading. These authors have defined these strategies as "activities engaged in by the learner to understand and remember information from text" (p.5). Reading strategies are invoked when the focus of the reading task is understanding the author's meaning and when decoding an unknown word during reading. In both these situations a variety, although sometimes the same and/or overlapping strategies, may be implemented by the reader. In order to investigate the differences between LD and NLD children's awareness of reading strategies two scales were developed. The scales were designed to evaluate the understanding the children had about the value of different strategies for gaining meaning from reading and for working out an unknown word. The strategies were regarded as either positive (i.e., useful) or negative (i.e., unhelpful).

Reading Strategies for Meaning Scale. Paris and Myers (1981) have studied children's ratings of positive and negative strategies for remembering stories. Based on this study, 20 strategies that could affect deriving meaning from text were generated. Five judges were asked to categorize the strategies as either positive or negative influences when trying to understand a reading passage. The judges were told to base their categorization on the theoretical position that reading involves the active construction of meaning by the reader (Goodman, 1976). The judges were also asked to indicate whether the strategies were either internal to the reader or external strategies involving materials or other individuals. Therefore, for example, "To help you get meaning from a story how important do you think it is to ask yourself does the story make sense?" was judged an internal-positive strategy, "...to read the story as fast as you can" was judged as internal-negative, "...to ask someone questions about the parts you don't understand" was considered external-positive, and "...to write down all the words in the story" was considered an external-negative strategy. Information from the judges was also used in finalizing the wording of the statements. To these 20 strategy statements five neutral statements containing information irrelevant to getting meaning from text were added. The instrument was made up of questions appearing in randomized order. Each question was followed by a scale of response categories numbered from 1 to 7 indicating the degree to which a factor was rated as important in gaining meaning. A response of 1 reflected a "very important" rating, 4 reflected a "somewhat important" rating, and 7 reflected a "not important" rating (see Appendix B).

Reading Strategies for Decoding Scale. A similar procedure to that described above was undertaken in developing the scale of reading strategies for working out an unknown word. However one of the 20 strategies suggested for consideration was dropped from the Decoding Scale as the judges regarded it as inappropriate. Therefore only four statements appear in the external-positive category, compared with five in the other categories (see Appendix C).

Reading Related Perceptions and Causal Attributions

Two of the variables that seem to be related to performance in reading are children's perceptions of themselves and others as readers and children's beliefs about why they themselves and others succeed and fail in reading. Three different instruments were developed in order to investigate these areas of behaviour.

Causal Attribution Rating Scales. Firstly a scale was developed to tap children's views as to the importance of different reasons for success and failure in reading. Based on the attribution section of the interview in Jacobs (1982), 21 possible causes for success in reading were generated. An independent panel of five judges were asked to group the causal statements according to the given categories. The categories were: academic ability, stable attitude, typical effort during reading, task, strategies, prior knowledge and skills, others (teacher and/or other pupils), family/conditions at home and luck. The judges were also asked to assign the categories to the following dimensions: internal or external, stable or unstable, controllable or uncontrollable. Due to the overlap between the categories of "strategies", and "prior knowledge and skills", the two categories were collapsed and entitled "learning and strategies". Where wide disagreement occurred amongst the judges a sixth judge was used and the disagreements resolved. The rating instrument consisted of a series of statements followed by a scale of response choices numbered from 1 to 7. The children were asked to indicate how true for them a given reason was for their success in reading. A response rated as 1 showed the reason was considered "very true", a rating of 4 indicated the reason was considered "somewhat true", and a rating of 7 indicated the reason was considered "not true". For example, an item on the Causal Attribution Rating Scale for Success "When I do well in reading it's because I am a good reader" was categorized as an ability attribution which could be regarded as an internal, stable, uncontrollable attribution. Appendix D shows the scale as it was presented to the children. Appendix E shows the categories to which the various statements were assigned by the judges and the dimensions on which those categories were located.

In order to develop the Causal Attribution Rating Scale for Failure, the negative position was adopted for each of the statements on the Causal Attribution Rating Scale for Success. For example, "I am a good reader" became "I am not a good reader" in the Causal Attribution Rating Scale for Failure.

<u>Reading Perception and Attribution Questionnaire</u>. This open-ended interview questionnaire tapped perceptions of reading ability and achievement, causal attributions for other children's reading success and failure, and causal attributions for their own successful and unsuccessful reading performances. The children provided free responses. The questionnaire initially focused on children's evaluations of their own reading ability and perceptions of personal reading achievement within their own class (Nicholls, 1979). Secondly, the children were asked to provide reasons why other children in their class may be better and worse readers in comparison to themselves. Further, at a more specific level, children were

requested to describe why they were themselves successful and unsuccessful on a reading task. Appendix F provides the questions that made up the Reading Perception and Attribution Questionnaire.

Task-Linked Perceptions and Causal Attributions. After the children had orally read their easy and difficult passages, the questionnaire designed to examine the contribution of task difficulty on reading related perceptions and causal attributions was administered. The instrument was an open-ended interview questionnaire which required the children to describe how they perceived their understanding and oral reading performance of the just completed task. ("How do you think your understanding/reading was here?") Then the children were asked to indicate the reasons they had for perceiving their understanding and oral reading performance in that particular way ("Why do you think it was [good]/[average]/[poor]?" The prompt question was "What other reasons do you have for thinking your understanding reading was [good]/[average]/[poor]?".

Pilot Study

A pilot study was conducted in order to establish the amount of time taken to administer the different measures, to trial instructions given to the pupils, to determine the appropriateness and clarity of the language of the measures, to determine the suitability of the passages, to evaluate the training sequence for the Monitoring Device (Bleep), to verify the criteria for establishing the children's easy and difficult passages on an individual basis, and to begin to formulate categories from the responses given in the Self Report of Reading Behaviour.

In order to minimize possible experimenter effects arising from changes in speech volume or facial gestures, the author was videotaped administering the various measures to a child not included in the sample. In replaying the video and in discussion with an observer various behaviours could be monitored and discussed. Changes were made accordingly.

At this point eight children at the Form 2 level of a local school (not included in the study) participated in the pilot study. Five of the children were included on the basis of being identified by their teacher as achieving below their class level in reading. The other three children were identified by their teaching as achieving at average or above average class level in reading. In the selection of these children the teacher used her professional judgment of the children's classroom reading performance and the Progressive Achievement tests of Reading Comprehension, Reading Vocabulary and Listening Comprehension.

As a result of the pilot study it was found that a more comprehensive selection of questions was required for use when collecting the Self Report of Reading Behaviour data. Greater flexibility in the use of the questions (e.g., not always presenting the questions in the same order) was also considered necessary. Some very minor word changes were also made to the instructions of the Bleep training segment.

Procedure

The study was conducted in two phases during the later part of 1983. The purpose of Phase A was to establish the children's easy and difficult passage level for oral reading and to collect data on the children's reading-related perceptions and causal attributions. Phase B consisted of administering the individual easy and difficult oral reading passages and the Monitoring Device (Bleep), collecting the Self Report of Oral Reading Behaviour data and administering the reading strategies scales.

Phase A

The measures administered in Phase A were presented to the children in the following order: the Reading Perception and Attribution Questionnaire, the Causal Attribution Rating Scales, Oral Reading Passages (A), and the Task-linked Perceptions and Causal Attributions. Phase A was of 30-40 minutes duration per child.

The children came individually to the room set aside in each of the schools for the duration of the study. The investigator was blind to the children's group designation (LD or NLD). Initial conversation with the child was of a social nature. The child was then asked to sit beside the investigator and the session began with an introduction.

> Hi. I'm working with a large number of intermediate school children. I'm trying to find out about some of the things that Form 2 children do when they read.
>
> I'm going to ask you some questions. There are no right or wrong answers -- just tell me how you feel or how you think.

The Reading Perception and Attribution Questionnaire was administered at that point. If the question seemed unclear or the pupil did not respond, questions were rephrased. For example, Question 1: "Tell me about your reading compared with other children in your class" was restated as "If you had to describe your reading compared with the others in your class what would you say?" Questions 5 and 6: "What are some of the reasons why you do well/badly on a reading task?" were rephrased as "When you do well/badly on a reading task what makes that happen?" During administration further prompts were given if necessary. For example, "Tell me more about it", "Can you explain what you mean?" and "What else?" were used. Responses were noted and the interchange was tape recorded for verification and transcription.

The second measure given was the Causal Attribution Rating Scales. Firstly the rating system was explained to the children.

> Here is a scale. It goes from 1 to 7. The scale goes from "very true" (1), through "somewhat true" to "not true" (7).
>
> Here are some more questions. This time we will use this scale to mark your feelings. There are no right or wrong answers. Just show me how you think by drawing a circle around the number.

The Causal Attribution Rating Scales which measured the importance of causal attributions for success and failure in reading were administered consecutively. The measures were presented both orally and visually. The introductory phrase was read aloud to the child before each causal statement was presented. In addition, as each statement was read the author's finger pointed to the statement in order to focus attention on it. The dual presentation mode was used so that the reading task itself was not a confounding variable. The response rating was circled with a pencil.

The third aspect of Phase A was to establish the easy and difficult levels of reading for each child. Each child began at the first passage of the Oral Reading Passages (A) because the status of each child (LD or NLD) was unknown at this point. The instructions were as follows:

> O.K. We're making good progress. Let's get on with the next.
>
> Here is a short story book. I want you to read the stories aloud. Look at the picture and then read the story to me. If you come to a word you don't know try your best. I can not help you. At the end of the story I will ask you some questions, so try to remember the story as you read it. [Hand book to child, turn to first passage]. You can start now.

The children's reading was tape recorded and the reading behaviours were transcribed on a duplicate copy of the passage. At the conclusion of each passage the comprehension questions were asked and scored. The tape recording was later used for further transcription and verification of oral reading behaviours and comprehension answers. It was also used in the reliability check.

The passages were read following the sequence in the booklet, gradually increasing in difficulty. By monitoring the oral reading behaviours and comprehension scores it was possible in most cases to determine on the spot if the criteria on accuracy and comprehension for the easy and difficult passages had been achieved. If the criteria had been achieved the Task-linked Perceptions and Causal Attributions were administered. If the criteria for the easy passage, for example, was achieved on a subsequent passage as well, the Task-linked

Perceptions and Causal Attributions following easy was administered again. If, following verification of oral reading using the tape recording, there was an indication that the author had incorrectly judged which passage was regarded as easy/difficult and therefore the Task-linked measure had not been administered, it was administered in Phase B following the reading of their true easy/difficult passage. The situation described above occurred relatively infrequently (approximately 10 out of 69 pupils).

Following administration of the comprehension questions and/or the Task-linked Perceptions and Causal Attributions the child was directed to proceed to the next passage with the instruction:

> Now read this one

Reading was terminated when the difficult level had been read or the booklet was completed, whichever was applicable. At the end of the session the child was told:

> That's everything for now. Thank you for spending time with me.

The sequence of events undertaken in Phase A are displayed below.

Introduction to the children
Reading Perception and Attribution Questionnaire
Causal Attribution Rating Scales
Oral Reading Passages (A)
Task-linked Perceptions and Causal Attributions

Between Phases A and B the oral reading tapes were replayed, verified and more fully transcribed where necessary, and coded. Accuracy was determined as reported previously using the formula found on page 132. In order to check the accuracy scores, comprehension scores and easy and difficult level placements an indication of reliability was obtained. The reliability of accuracy scores focused on agreement of the uncorrected errors. Reliability for the comprehension looked at whether or not the total comprehension scores for a passage agreed between the author and a second coder. A second coder examined a random selection of 25% of recordings from children in each of the schools involved in the study. Interrater agreement was calculated by percentage agreement using the following formula:

$$\frac{\text{agreements}}{\text{agreements \& disagreements}} \times 100$$

This procedure has been used in several studies (Biemiller, 1970; Weber, 1970; McNaughton, 1978; Ng, 1979; Pohl, 1981). The formula was subsequently used in all reliability checks used in this study. Interrater agreement on oral reading behaviours consisted of the number of errors not self corrected, the number of self corrections where there was agreement as to the site of the error or self correction, comprehension scores, and easy and difficult level placement. Percentage agreement for each of these variables were 91%, 94%, 93% and 100% respectively. The percentage agreements for the oral reading behaviours compare favourably with reliability in other New Zealand studies (e.g., Clay, 1973; Pohl, 1981; Ng, 1979).

Between Phases A and B the following steps were completed.

Verification, complete transcription and coding of oral reading behaviours

Interrater reliability check

Phase B

Phase B was conducted in the schools within three weeks after Phase A. In Phase B the measures were presented in the following order: reading and monitoring of easy and difficult Oral Reading Passages (B), Self Report of Oral Reading Behaviour and the Reading Strategies Scales.

As in Phase A, children came to the study room individually. Again an attempt was made to set them at ease through brief conversation about recent school activities.

In order to familiarize the children with using the Monitoring Device (Bleep) a short training sequence was developed.

> This machine is a "Bleep". I want you to hold this in your hand. [Give the child the button. Make sure that it fits comfortably into the palm of the hand and can be used by depressing the button with the thumb, commenting "It's kind of like a Space Invaders game".] When I make a mistake or something is different push the button. The button will not make a noise out loud, but it will make a noise on the tape.
>
> I'll read some numbers to you. When I make a mistake push the button.
>
> 1, 2, 3, 4, <u>4</u> 5, 6

Several similar examples involving numbers and then words followed. Instead of the investigator reading the lists, in other subsequent training items the child was required to read the words. Lastly, the training sequence involved the child reading single sentences and paragraphs of up to three short sentences where distortions had been inserted into the text. The instructions were:

> This time as you read aloud push the button when something is not right with the sentence.
>
> The lady picked flowers. Every day she picked flowers flew from her garden. Sometimes she the flowers to a friend. [printed text]

[The button should have been bleeped in the second sentence any time after `flowers' and again in the third sentence following `she'.]

During each trial the author observed whether or not the button was pressed. If an uncertainty existed, the child was questioned whether or not the button had been pressed and if so where in the sentence. If the button had not been pressed the child was asked to consider the trial again and indicate where a bleep should have been made. The child was reminded once more to "push the button whenever something is wrong".

Next the child was directed to read the passage provided. This passage was the child's easy Oral Reading Passage (B). The directions to the children given in the Pflaum (nd) study, that is, "...What we want you to do is to punch hard on the button while you are reading whenever you know for sure that you have made a mistake in your oral reading. Even if you know how to correct the mistake, we want you to push the button" (p.6) were adapted for this study. This was because the last sentence in Pflaum's directions was considered ambiguous, in that the children may understand this direction to mean that they should not necessarily correct their errors but only push the button. It was decided in the directions here to indicate that the child should signify awareness of both errors and corrections. Therefore the instruction focusing on bleeping (i.e., "when you make a mistake or you change what you first read") was stated twice. The directions were as follows:

> I want you to read this passage out loud. Last time [in the trial] you bleeped when there was an error or change. This time as you read aloud bleep when you make a mistake or you change what you first read. If you come to a word that you don't know try your best. I can not help you. At the end of the story I will ask you some questions so try to remember the story. So this time as you read aloud bleep when you make a mistake or you change what you first read.

During the reading of the easy and the difficult Oral Reading Passages (B) the child's reading (and bleeping) was recorded. A transcription of the oral reading behaviours was made on a duplicate copy of the text. At the end of each passage the child was asked the accompanying comprehension questions. While the comprehension responses were recorded they were also transcribed and scored.

Between the easy and the difficult Oral Reading Passage the child was instructed

> Now read this one. Remember bleep whenever you make a mistake or change what you first read.

The second section of Phase B involved the use of an open-ended interview to obtain Self Report of Oral Reading Behaviour data. When bleeps, non bleeped correction attempts or non bleeped repetitions occurred the tape was stopped.

Pupils' knowledge of what had happened, knowledge of the cause of the signaled awareness, knowledge of the type of strategy used, knowledge of why the strategy was used, awareness of whether the strategy resulted in a successful correction or not and if so how it was known, and pupils' knowledge of the source of the strategy were investigated.

As the tape was rewound to the beginning of the easy Oral Reading Passage (B) the following instructions were given:

> I am now going to play back the tape. I will stop it at some places and ask you about that part.

The tape was then played forward and stopped at the designated locations. Then that section of the tape was replayed and the child was directed to read that portion of the text silently while listening to the tape. The author then proceeded with questions designed to tap monitoring and fix up strategy knowledge.

The child's responses were recorded on to a second tape recorder for full transcription later. The same procedure was followed for the difficult Oral Reading Passage (B). Following administration of the questions in the Self Report of Reading Behaviour, the easy Oral Reading Passage (B) and the difficult Oral Reading Passage (B) this comment was made:

> We're progressing well. Let's go on.

In the final part of Phase B, the Reading Strategies for Meaning Scale and Reading Strategies for Decoding Scale were presented. The first scale is a measure of the importance of various strategies for gaining meaning from a story. The second scale focuses on the importance of decoding strategies that may be used when unlocking an unknown word. Again the children were familiarized with the format of the scale. The Reading Strategies for Meaning Scale was administered first as it included two "warm-up" questions which enabled the children to become familiar with the format.

Again, the scales were presented both visually and orally with the introductory phrase being read prior to each statement. Each statement line was pointed to in order to focus attention on it. The responses were circled with a pencil. At the conclusion of the session the child was again told:

> That's all. Thank you very much for spending the time with me.

Phase B took approximately 30 minutes per child.

The sequence of events undertaken in Phase B are displayed below.

Re-introduction to the children

Bleep Training Sequence

Oral Reading Passages (B)

Self Report of Oral Reading Behaviour

Reading Strategies Scales

Summary of the Procedure

The study consisted of two phases. Data collection occurred during the later part of 1983 in the five participating schools. Below is a summary of measures as they were administered.

Phase A.

Reading Perception and Attribution Questionnaire
Causal Attribution Rating Scales
Oral Reading Passages (A)
Task-linked Perceptions and Causal Attributions

Phase B.

Oral Reading Passages (B)
Monitoring Device (Bleep)
Self Report of Reading Behaviour
Reading Strategies Scales

Data Coding

Oral Reading and Signaled Monitoring

One of the most frequently used taxonomies for the analysis of reading behaviours is the Reading Miscue Inventory (RMI) developed by Goodman and Burke (1972). This is a simplification of the more complex taxonomy (Goodman, 1969). The RMI uses the traditional error classification systems involving such concepts as insertions, omissions, substitutions, but also provides information as to whether or not the errors disrupted meaning and indicates which linguistic cueing systems were used by the reader (e.g., graphemic, phonemic, syntactic and semantic). While the taxonomy is extremely comprehensive not all the categories were used in this study. Similarly, some of the levels were collapsed or omitted. This allowed for the simplication of analysis within the categories without losing important differences. Clay (1979) has also developed a system of categories for classifying oral reading behaviours. It is less complex than that of the RMI. Pflaum (1979, 1980) has developed a further group of categories in addition to those based on the linguistic cues described in the RMI and in Clay's (1979) research. In Pflaum's research, miscues are coded as involving no meaning change, non severe meaning change, and severe meaning change. Non severe meaning change refers to an error that did cause a change of meaning, but still resulted in a grammatical sentence.

The taxonomy used in the present study is a synthesis of those used in other studies (Goodman & Burke, 1973; Clay, 1979; Ng, 1979; Pflaum, 1979; Pohl, 1981). In selecting the categories and the levels within the categories an attempt was made to provide a taxonomy that investigated not only errors and self corrections quantitatively, but also qualitatively. A qualitative investigation allows for hypotheses to be derived as to the reading strategies and the linguistic cue variables that might be in operation. Because numerous authors have been critical of oral reading coding procedures (e.g., Hood 1975-1976; Leu, 1982) the taxonomy that was devised needed to provide clear guidelines as to the definition and categorization of miscues as well as justification for the decisions made (see Appendix G). While relatively complex, the coding system reflected critical variables in the reading process. The complexity of the taxonomy nevertheless did not interfere with obtaining good inter-rater reliability later, a fear that has led in other studies to the adoption of a simpler classification system (e.g., Ng, 1979).

The author transcribed the miscues as they occurred during the reading in Phase B. The transcriptions were later verified and more fully transcribed where necessary from the tape recording. The use of the Bleep was also marked on the copy of the reading passages. A sheet known as a General Record and Miscue Analysis Summary was used to record each child's individual miscues. Following this, each miscue was analyzed using the taxonomy with the numerical codings being entered onto the General Record and Miscue Analysis Summary (see Appendix H).

An independent rater, who had been a classroom teacher, was then trained in the use of the scoring and miscue classification system. Initially this rater was familiarized with the notation and categories. Detailed verbal explanations were provided, and any points of confusion were clarified. The second rater was then given a recording from one of the test sessions (not used in the final agreement estimates) together with an unmarked copy of the child's easy and difficult Oral Reading Passages. The tape recording was transcribed onto the duplicate copy and the General Record and Miscue Analysis Summary was completed. Throughout the process, points of confusion were clarified. On two subsequent meetings any other points that were unclear were discussed.

Twenty five percent of the 69 children's recordings were randomly selected for the reliability check. No details about the children were given to the second coder. Comparisons of agreement were made on several variables using the reliability formula mentioned previously (see p.146). The percentage agreement between raters is as follows: when miscues occurred (94%), on agreed miscues occurring/miscues of same type (97%), when bleeps occurred (97%). Interrater agreement was also sought for uncorrected errors (97%) and self corrections (92%). The interrater agreement for the linguistic cues collapsed across levels are: graphic (97%), phonemic (98%), syntactic (93%), and semantic (92%). Separate reliability scores were also calculated at each level of linguistic cue type. These include no graphic, (97%), some graphic (100%), high graphic (93%), no phonemic (94%), some phonemic (98%), high phonemic (96%), no syntactic (97%), some syntactic (89%), high syntactic (96%), no semantic (96%), some semantic (87%), high semantic (90%). Interrater agreement on those categories relating to the meaning change coding system, as described by Pflaum (1979), revealed: no meaning change (91%), non severe meaning change (94%), and severe meaning change (96%). Interrater reliability scores for the signaled monitoring included: no bleep/miscue (99%), bleep/miscue (95%), and bleep/no miscue (100%). Separate reliability scores were also calculated at each level of signaled monitoring/miscue. These included: bleeped before (88%), bleeped during (100%), bleeped immediately after (94%), and bleeped one or more words after (93%). Agreement on the total comprehension score for the easy Oral Reading passage was 88%, while for the difficult Oral Reading passage it was 82%.

Where there was a lack of agreement consensus was used to resolve these. The reliability scores compare favourably with that of other studies (e.g., Clay, 1973; Pohl, 1981; Ng, 1979; Pflaum, 1979).

Self Report of Oral Reading Behaviour

The self report information on oral reading behaviour was transcribed from the tapes. The author then read the transcripts and linked the responses to the appropriate questions. Responses were coded according to the categories developed from the pilot study and from the content of the responses. Appendix I describes the different categories and provides examples for the coding of the self report information.

The Self Report of Oral Reading Behaviour was lost in the tape recording process for one child and therefore this individual was deleted from subsequent analysis of the Self Report. Thus there was a total of 68 scripts for the reliability check.

Again the reliability of coding was established using a second independent coder. A representative sample of 25% of the 68 typed scripts were randomly selected for the reliability check by the second coder. The coder was trained in identifying response categories and points of clarification were made. Percentage agreement using the formula for the different questions was established. Two percentage agreements are provided for Question 5 ("What did you do next?"). This reflects the multiple nature of the responses in that some children provided more than a single strategy in reply to the question. Percentage agreement for the 10 questions, in consecutive order were: 100%, 97%, 91%, 97%, 100% and 89%, 90%, 99%, 96%, 100% and 100%. Where the coders were not in agreement, the responses were examined by a third coder and a consensus was reached.

Reading Perception and Attribution Questionnaire

The open ended interview questionnaire responses were verified from the tapes and a full transcription was made for each child. In Question 1 ("Tell me about your reading compared with other children in your class", see Appendix 6) the first response or description the child used was coded as "good", "average", "bad", or "don't know". For Question 2 a numerical rank from 1 (highest) to 30 (lowest) was assigned according to the child's self ranking of achievement. Questions 3-6 were concerned with causal attributions for other children's reading success and failure and with causal attributions for personal reading success and failure. In order to code these responses an adaption was made to the causal attribution coding system suggested by Cooper and Burger (1980). Criteria key words provided by Cooper and Burger (1980) were used to assist in coding. Appendix J shows the coding system, the dimensions of the attributions and the key words used in this study. Each identifiable and distinctly new response was coded. Therefore, where multiple responses were made in reply to an interview question the individual responses were coded consecutively in separate columns on the coding sheets. A coder familiar with the field of causal attributions was trained in coding the attributions. A reliability check was made on all 69 transcripts. The second coder was unaware of the earlier categorization of the perceptions and attributions by the author. Using the reliability formula, percentage agreement between the two raters on Question 1 regarding perceptions of reading ability was 96%. A check of numerical designation for Question 2 concerning ranking of reading achievement within the class revealed 100% accuracy. Codings of questions concerning the reasons for other children's reading success and failure achieved 94% and 93% reliability respectively. Interrater agreement on responses to questions regarding children's own reading success and failure reached 94% and 95% respectively. These figures compare favourably with other studies (e.g., Cooper & Burger, 1980; Frieze, 1976; Lawes, 1983). Where there was a lack of agreement between coders, the responses were examined by a third coder and a consensus was reached.

Task-linked Perceptions and Causal Attributions

The tapes of the children's responses to the open ended questionnaire relating to perceptions and causal attributions following reading of the easy and difficult passages were transcribed. In Questions 1 and 4, where children were asked to describe their understanding and reading performance of the just completed task, responses were assigned the ranking of "good" "average" "bad" or "don't know". In each instance the first response in reply to the questions 1 and 4 were coded. Some of the causal attribution categories suggested by Cooper and Burger (1980) were again adapted for categorizing the responses in Questions 2, 3, 5 and 6, which related to reasons why they thought their understanding and reading performance had been as described. It should be noted that the attribution categories retained from the Cooper and Burger (1980) classification scheme fit the task specific nature of the questions. A new category was also developed named 'strategies'. This category emerged as a consistent response type and involved both the energizing and directing application of specific strategies. (See Appendix K for categories and dimensions used for coding responses for this measure). Again each clearly distinct response was coded. Multiple responses were made by some pupils in reply to the questions.

During the coding of the attributions it was noted that many of the statements did not specify reasons or causes of why their understanding or reading of the passage had, for example, been "good". In fact, the statements given by the children used the word "because", but described possible indicators of good understanding, such as "because I answered all the questions right". In addition, several of the statements could be considered as either a cause of good reading or an indicator of good reading (e.g., "because I understood it"). The question was therefore raised whether there was a preponderance of indicator statements rather than causal attribution statements in the replies of the children. As the measure was one designed to include an examination of the contribution of task difficulty on causal attributions it was decided, in addition, to recode responses in two questions. Therefore, all the first responses to the Questions 2 and 5 in both the easy and difficult open ended questionnaires were recoded. These questions specifically related to the reasons why the children thought their understanding and reading were as they had earlier described it. The responses were recoded according to the following categories: causal attribution, indicator, ambiguous, don't know and other. In order for a statement to be recoded as a "causal attribution", the statement must have been seen as a response to "why" or "what caused your reading to be `good'". To be recoded as an "indicator", the statement must have been regarded as a response to "how do you know" or "what indications did you have that your reading was `good'". A recoding in the "ambiguous" category reflected that the statement could have been considered as either a causal attribution or an indicator. "Other" recodings were statements that could not be coded as any of the above.

An independent coder was trained in the use of both coding schemes. Any uncertainties were clarified. All of the transcripts (69 each for both the easy and difficult passages) were given to the second coder. The coder was not given any details about the children nor was she aware of the earlier categorizations that had been made. On the easy passage transcripts the agreement between the two raters for Questions 1 and 4 was 100% and 99% respectively. For the coding of causal attributions following the easy passage (namely Questions 2, 3, 5 and 6) agreement between the two raters was from 79% to 95%. For the additional coding (using information from Questions 2 and 5) agreement on the easy passage was 94% and 95% respectively. The percentage agreement on Questions 1 and 4 following the difficult passage was 100% for both. The agreement on coding the causal attributions following the difficult passage ranged from 93% to 96% for Questions 2, 3, 5 and 6. Again these reliability check figures are comparable to those of other studies (Cooper & Burger, 1980; Frieze, 1976; Lawes, 1983). For the additional coding (using information from Questions 2 and 5) the interrater agreement on the responses following the difficult passage was 82% for Question 2, and 87% for Question 5. A third coder examined all the responses where there was a lack of agreement and a consensus position was attained.

Data Analysis

An ex post facto research design was used for this study. This design was chosen in order to determine whether differences between the LD and NLD groups and in gender (the independent variables) resulted in the observed differences on the dependent variables (e.g., types of oral reading behaviours, perceptions, causal attributions).

Oral Reading and Comprehension Monitoring

The children in this study read passages at their individual easy and difficult levels. However the differences in the lengths of the passages allowed disparate opportunity to make miscues. Therefore it was necessary to consider the oral reading behaviours in terms of percentages to allow comparisons to be made between the groups.

In light of the research hypotheses regarding differences between LD and NLD children on the frequency of miscue type, percentage of self correction, differences in errors and corrections in terms of linguistic cues and meaning cues, and differences in monitoring as measured by the Bleep, the following variables were chosen for analysis:

(a) miscue type
(b) correction
(c) linguistic cue system use
(d) meaning cue system use, and
(e) signaled monitoring.

Miscue type. The number of different miscue types was calculated in terms of 100 words of text for the children's easy and difficult passages. Miscue types included both tallied and untallied miscues, those substitutions that were non words, and miscues involving dialect. The number of children who finger-pointed was also calculated.

Correction. Recent debate (Thompson, 1981, 1984) has centred on the method used to calculate individual differences in the incidence of self correction. The method selected for this study has been used in numerous other studies (e.g., Clay, 1973; McNaughton & Glynn, 1981; Pohl, 1981). In this study the incidence of self correction was calculated as a proportion of total errors per 100 words using the following formula:

$$\frac{\text{self corrections}}{\text{uncorrected errors \& self corrections}} \times 100$$

This method was chosen because it took into account that every error made by a child contains the possibility of self correction. Further, it is consistent with the view that self correction reflects an active monitoring of meaning and efficient processing in reading (Clay, 1973; McNaughton & Glynn, 1981).

As well as successful correction, the other levels in the 'correction' category were examined. These include no correction, abandoning the correct form, and unsuccessful attempt at correction. As for successful corrections, percentages were calculated. Further, the relationships between correction and linguistic cue use, meaning cue use and bleep use were examined by use of a series of 2 x 2 (Group x Gender) analyses of variance (ANOVAs). Correction was examined separately on the easy and difficult reading passages (level).

Linguistic cue system use. The interrelated linguistic components of the reading process examined in this study included: graphic, phonemic, syntactic and semantic relationships. These variables were examined because it is believed that fluent reading relies heavily on the application of knowledge of these four linguistic cue systems. It has been suggested in this study that in constructing meaning the reader forms hypotheses about what the text says utilizing linguistic cues. When miscues disrupt the construction of meaning, readers may reexamine the text and consciously apply graphic, phonemic, syntactic, and semantic information, separately or interactively, in order to correct the miscue and allow fluent reading to proceed. The percentages of miscues (both errors and successful corrections) involving the various levels of linguistic cue use were calculated. Some of the levels of each linguistic category were collapsed in order to obtain more robust information and allow for less complicated analysis. The levels were collapsed to form new levels representing "no", "some", or "high" graphic, phonemic, syntactic or semantic cue use. Differences in linguistic cue use for easy and difficult reading passages were examined. A series of ANOVAs on each of the dependent variables was used to test differences statistically.

Meaning cue system use. In Pflaum's (1979, 1980) research miscues were analyzed according to levels of meaning change. The percentages of miscues at different levels: no meaning change, non severe meaning change, and severe meaning change were determined, in addition to the relationship between correction type and meaning cue use. Examination of meaning cue use occurred at both easy and difficult reading passages. A series of 2 x 2 (Group x Gender) ANOVAs was applied to test the hypotheses that there were differences between LD and NLD students, males and females, on the easy and difficult passages in meaning cue use.

Signaled monitoring. Examination of the Bleep data revealed the percentage of bleeps. In addition to the relationships between bleeps and correction, the relationship between bleeps, linguistic cue use and meaning cue use were considered. Analysis of signaled monitoring involved examination of bleeps at the easy and difficult levels. A series of ANOVAs was used to analyze the results.

Self Report of Oral Reading Behaviour. The self report data relating to awareness of comprehension monitoring and strategy use were analysed employing a series of 2 x 2 (Group x Gender) ANOVAs.

Reading Strategies. A series of 2 x 2 (Group x Gender) ANOVAs was performed on both the Reading Strategies for Meaning Scale and the Reading Strategies for Decoding Scale. The data in the five categories (self-positive, self-negative, other-positive, other-negative, and neutral) comprised the dependent variables.

Causal Attribution Rating Scales. To determine whether the attribution categories were distinguished in terms of Group and/or Gender a series of 2 x 2 ANOVAs was conducted. These statistical procedures were used in analyzing the results of both the Causal Attribution Rating Scale for reading success and failure.

Reading Perception and Attribution Questionnaire. The Reading Perception and Attribution Questionnaire provided information on perceptions of achievement rank and causal attributions. The data in Question 2 (perception of reading achievement) were analyzed by means of a 2 x 2 (Group x Gender) ANOVA. Questions 3, 4, 5, and 6 (causal attributions of other's reading performance and their own reading performance) were analyzed using the chi-square statistic.

Task-linked Perceptions and Causal Attributions. Perceptions of understanding and oral reading performance and the causal attributions associated with the perceptions made up the data for this measure. At both difficulty levels, frequency counts for the different categories were obtained and the chi-square statistic was employed. This statistic was used to analyze responses to all the questions, including the recodings undertaken during data coding.

C H A P T E R F O U R

RESULTS

Metacognitive Knowledge

Reading Strategies

Reading Strategies for Meaning Scale. To investigate the awareness of reading strategies involved in deriving meaning from a story, the children were asked to rate strategies designated as internal-positive, internal-negative, external-positive, external-negative and neutral on a continuum from "very important" (1) through "somewhat important" (4) to "not important" (7). Each of the five variables (internal-positive, etc.) comprised five statements with accompanying scales. Therefore possible score ranges for the five variables were from 5 to 35, with the lower the score the more important the rating.

A series of 2 x 2 (Group x Gender) ANOVAs revealed no significant differences between the LD and NLD groups in their ratings of the designated strategies used in obtaining meaning from a story. Table 3 presents the means and standard deviations and Table 4 summarises the ANOVA results. Thus, the hypothesis that in comparison to NLD children, the LD children would indicate less awareness of the importance of positive or helpful strategies and the unimportance of negative or unhelpful strategies used for gaining meaning from a story was not supported.

Figure 1 is a series of bargraphs displaying the ratings of the five different strategy categories. An interesting pattern emerges for these categories. Self-positive strategy ratings are clustered more towards the "very important" pole spreading down the scale no further than the end of the "somewhat important" pole. The other-positive category ratings centre in a bell shaped curve around the midpoint ("somewhat important"), reaching to the left as far as the intersection of "very" and "somewhat important" and to the right as far as the "not important" pole. For the self-negative, other-negative and neutral categories, the children clearly ranked these from around the midpoint of the scale increasingly towards the "not important" pole.

Table 3

Means and Standard Deviations
for the Reading Strategies for Meaning Scale

	LD			NLD		
	N	M	SD	N	M	SD
Self-positive	35	14.29	3.76	34	13.59	4.72
Self-negative	35	28.51	4.59	34	28.15	4.94
Other-positive	35	20.71	5.29	34	19.65	6.66
Other-negative	35	29.43	4.70	34	28.00	5.29
Neutral	35	31.77	3.76	34	30.53	4.41

Table 4

Summary of ANOVA Data for
Reading Strategies for Meaning Scale

	df	MS	F	p
Self-positive				
Group	1	7.590	0.41	0.52
Gender	1	9.253	0.50	0.48
Group by Gender	1	2.692	0.15	0.70
Within cells	65	18.525		
Self-negative				
Group	1	0.077	0.00	0.96
Gender	1	0.014	0.00	0.98
Group by Gender	1	13.729	0.59	0.45
Within cells	65	23.218		
Other-positive				
Group	1	33.085	0.90	0.35
Gender	1	3.016	0.08	0.78
Group by Gender	1	19.028	0.52	0.48
Within cells	65	36.866		
Other-negative				
Group	1	15.558	0.62	0.44
Gender	1	0.042	0.00	0.97
Group by Gender	1	28.257	1.12	0.29
Within cells	65	25.287		
Neutral				
Group	1	19.632	1.14	0.29
Gender	1	1.678	0.10	0.76
Group by Gender	1	0.162	0.01	0.92
Within cells	65	17.245		

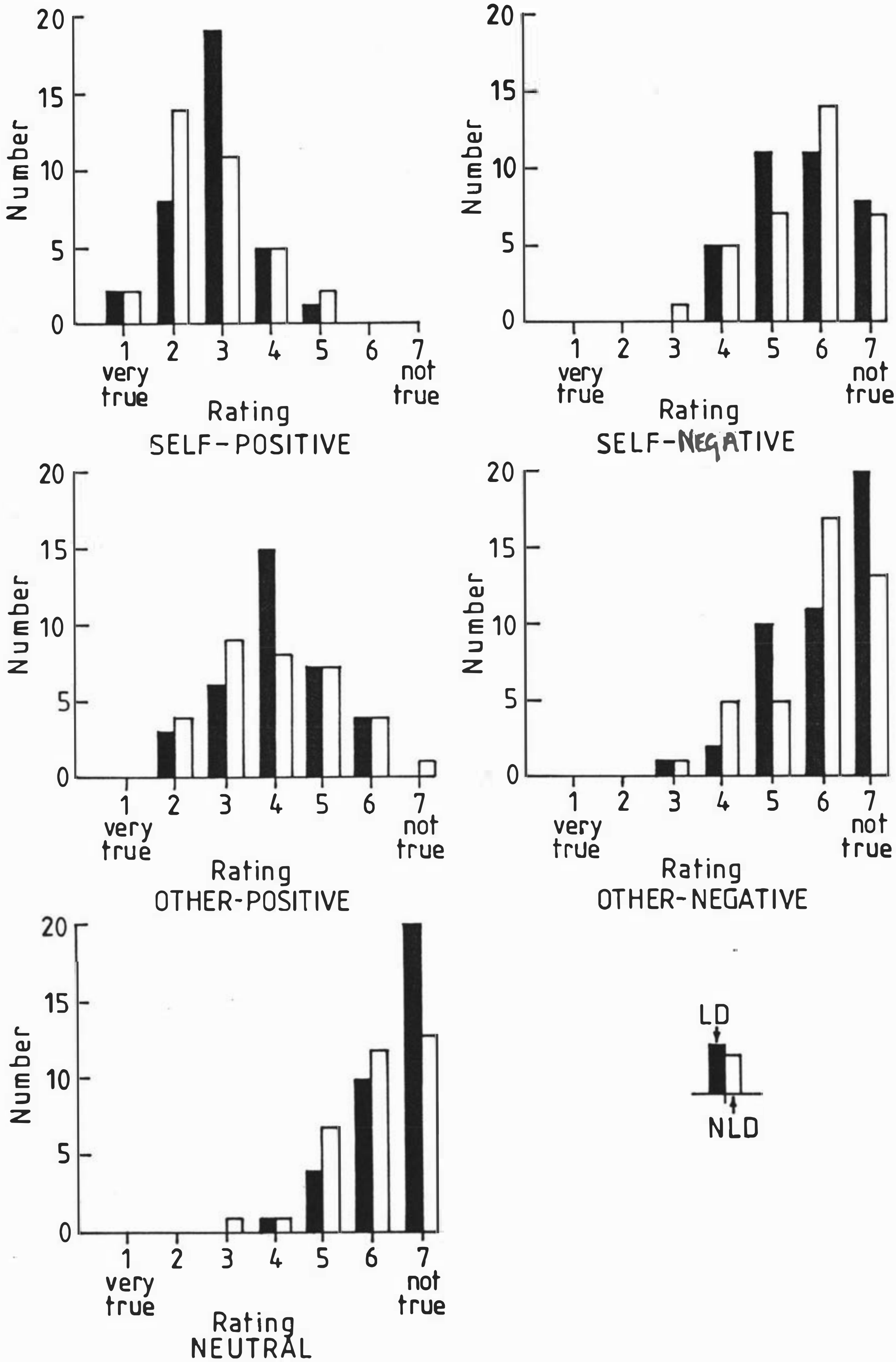

Figure 1. Ratings of Reading Strategies for Meaning Scale

Thus both groups clearly perceived the self-positive and other-positive strategies differently from the self-negative and other-negative strategies. Self-positive and other-positive were ranked as "more" or "somewhat important" in obtaining meaning from a story more than the self-negative and other-negative strategies.

Reading Strategies for Decoding Scale. Differences between the groups on the ratings of importance of strategies, designated as self-positive, self-negative, other-positive, other-negative and neutral, for decoding an unknown word were sought. All categories, except for the other-positive category, comprised five scales. Therefore, possible scores ranged from 5 to 35 for the self-positive, self-negative, other-negative and neutral categories. The possible scores for the other-positive variable ranged from 4 to 28. For all variables the lower the score the more important the strategies.

Table 5 presents the means and standard deviations for the five categories of strategies. The results of the ANOVAs indicated that there were no significant main effects for self-positive, self-negative and other-positive strategies for decoding an unknown word (see Table 6).

A significant difference between the groups was found on the other-negative strategies category ($F(1,65) = 9.16$, $p<.01$), with the LD children considering these unhelpful strategies to be more important than the NLD children. There were no Gender or interaction effects for the other-negative strategies (see Tables 5 and 6).

The results of the ANOVA on the data relating to the neutral category revealed a significant difference between the groups. Here more LD children rated the neutral strategies to be more important than their NLD peers, $F(1,65) = 7.20$, $p<.01$. There were no Gender or interaction effects for the neutral category (see Table 6).

The findings of significant differences in the other-negative and neutral strategies gives some support to the hypothesis that the LD and NLD children would regard the strategies differently. As expected, the LD readers, in comparison to the NLD readers, perceived

Table 5

Means and Standard Deviations for
the Reading Strategies for Decoding Scale

	LD			NLD		
	N	M	SD	N	M	SD
Self-positive	35	15.57	5.78	34	17.29	4.50
Self-negative	35	27.49	5.29	34	29.79	4.29
Other-positive	35	14.43	5.04	34	15.18	4.44
Other-negative	35	28.43	4.94	34	31.56	3.30
Neutral	35	29.57	4.85	34	31.74	3.42

Table 6

Summary of ANOVA Data for
Reading Strategies for Decoding Scale

	df	MS	F	p
Self-positive				
Group	1	22.359	0.82	0.37
Gender	1	1.575	0.06	0.81
Group by Gender	1	31.199	1.15	0.29
Within cells	65	27.231		
Self-negative				
Group	1	78.067	3.29	0.07
Gender	1	10.952	0.46	0.50
Group by Gender	1	3.214	0.14	0.71
Within cells	65	23.732		
Other-positive				
Gender	1	19.174	0.84	0.36
Gender	1	0.162	0.01	0.93
Group by Gender	1	22.153	0.96	0.33
Within cells	65	22.975		
Other-negative				
Group	1	166.118	9.16	0.00 **
Gender	1	10.345	0.57	0.45
Group by Gender	1	0.547	0.03	0.86
Within cells	65	18.130		
Neutral				
Group	1	124.714	7.20	0.01 **
Gender	1	33.839	1.95	0.17
Group by Gender	1	33.681	1.94	0.17
Within cells	65	17.331		

** p<.01

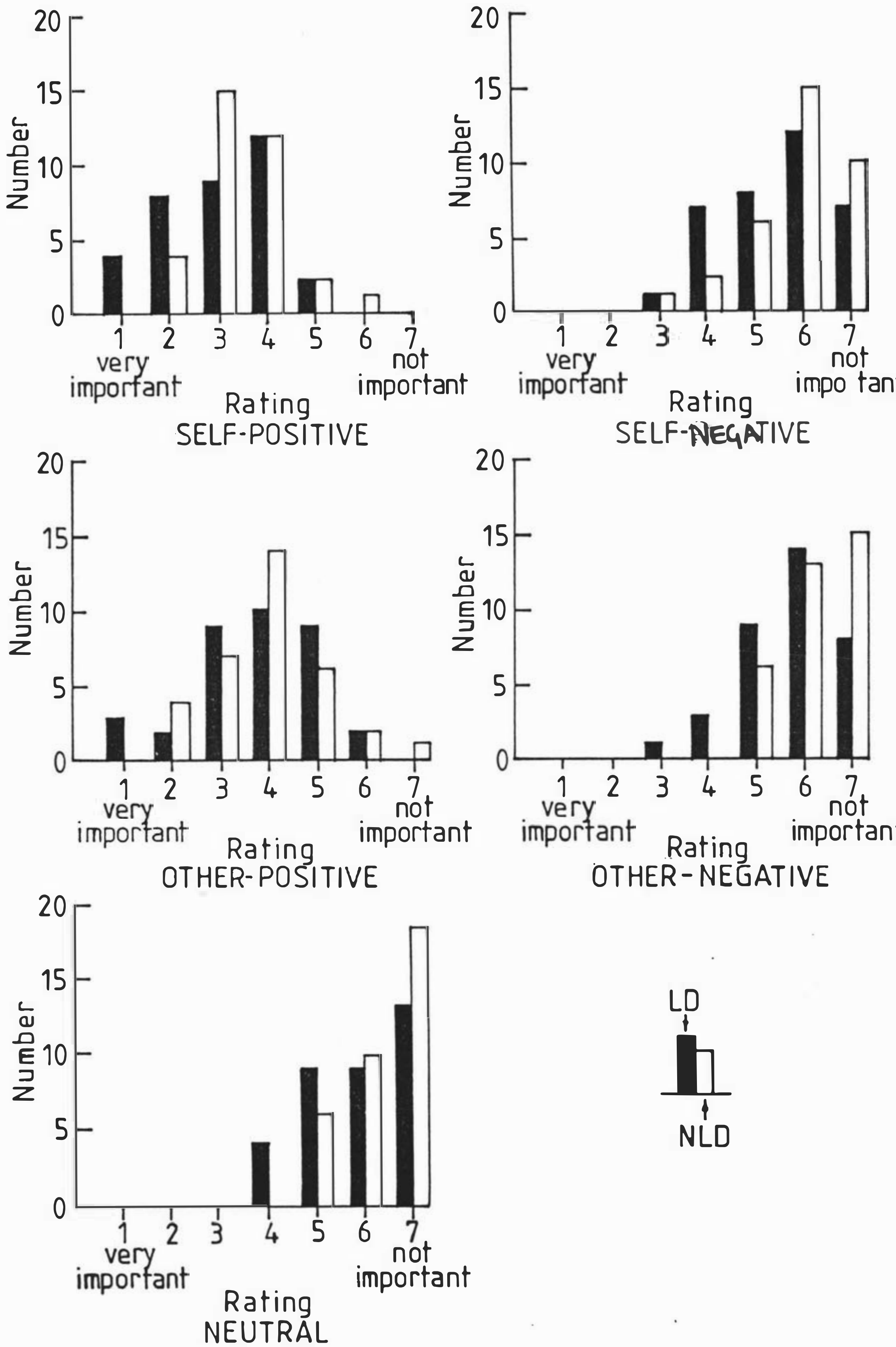

Figure 2. Ratings of Reading Strategies for Decoding Scale

other-negative or unhelpful strategies to be more important in decoding an unknown word. Surprisingly, the neutral statements, containing information irrelevant to the decoding of an unknown word, were also regarded by the LD children as being more important than the NLD children. However the non significant findings relating to the self-positive, self-negative and other-positive strategies means that the hypothesis proposing that the LD children would indicate less awareness of the importance of helpful strategies was not supported.

The bar graphs displayed in Figure 2 reveal that both groups tended to rate the self-positive strategies most often along the continuum from "very important" to "somewhat important". The distribution of the ratings ranged across the whole continuum for the other-positive strategies, but peaked around the "somewhat important" ratings. The self-negative, other-negative and neutral strategies were distributed with increasing frequency from around the "somewhat important" pole towards the "not important" pole.

Thus, the pattern across the five categories shows that the self-positive and other-positive strategies were indeed regarded more important in helping to decode an unknown word than self-negative, other-negative and neutral strategies.

Comprehension Monitoring

Oral Reading and Monitoring Behaviour

One of the major methodological issues in making comparisons between two disparate groups on any behavioural measure is to equate task difficulty. This is also the case when investigating individual differences on a variety of oral reading behaviours. In this study the following procedure was used in an attempt to match the text difficulty level. Firstly, in Phase A, each child read a series of graduated Oral Reading Passages of increasing difficulty. During this Phase the individual "easy" and "difficult" Oral Reading Passage to be used in Phase B was determined. Secondly, in Phase B, the child read the parallel forms of the Phase A passages where the criteria had been met for both difficulty levels. The data for the analyses of Oral Reading Behaviour, Comprehension Monitoring Behaviour ("Bleep") and the Self Report of Oral Reading were collected during this second phase (Phase B).

The criteria used in Phase A for the easy Oral Reading Passage was 95% or above in accuracy and 75% or above in comprehension. For the difficult Oral Reading Passage, the children had to score 90% or below in accuracy and 50% or below in comprehension. The highest levels at which both these criteria were reached in Phase A were the levels at which the children read at Phase B. It was expected that the passage assigned as the "easy level passage" would correspond with the easier passages in the series of graded passages (e.g., passages 1, 2 and 3 of Oral Reading Passages A) for both groups. It was also anticipated that the LD children would read passages lower in the graded sequence (e.g., passages 4, 5, 6 and 7 of Oral Reading Passages A) as their "difficult level passage", while the NLD children read the hardest passages in the graded sequence (e.g., passages 10 and 11) as their "difficult level passage". Table 7 shows the highest level at which the easy and difficult criteria were met following Phase A. Inspection of the table indicates that the level at which the children read was as expected for both the easy and the difficult levels for most of the children in both groups. However four LD children did read at the highest level of difficulty (passage 11), contrary to expectations. These children however were not omitted from the sample as scrutiny of these four children's accuracy and comprehension scores revealed that while at this hardest level of the graduated passages accuracy scores were higher than 90%, their comprehension scores were below 50%. This indicated that although these children may have "called the words" accurately they had not understood what they had read. Therefore, as one of the variables in the criteria was met, and because the children had initially been selected into the LD sample on the basis of poor reading comprehension and reading vocabulary their continued inclusion in the sample for Phase B was justified.

Following Phase B a comparison was made between the accuracy and comprehension scores achieved on the Oral Reading Passages - B and the established criteria of 95% or above accuracy and 75% or above in comprehension for the easy passage, and 90% or below in accuracy and 50% or below in comprehension for the difficult passage. Table 8 shows that on their easy passage, four of the LD children and two of the NLD children were not within the accuracy criteria of 95% or above, although all the accuracy scores except one (92%) were above 94% for both groups. At the difficult level, five of the LD children and 11 of the NLD children had accuracy scores higher than 90%. Table 8 also shows that on the easy passage, 13 of the LD children and 16 of the NLD children did not achieve the criteria of 75% or above in comprehension. When the scores on the difficult passage were studied 5 and 3 LD and NLD children respectively had comprehension scores of more than 50%.

Furthermore, as it was assumed that the children had read at their predetermined easy and difficult level there should be no differences between the groups in terms of both accuracy and comprehension. Before the analyses could be performed the percentage of errors for each individual was calculated in terms of the number of words in the children's individual easy and difficult Oral Reading Passage separately. Results of the ANOVA for the percentage of errors for the easy passage revealed no significant main or interaction effects (see Tables 9 and 10). At the difficult level a significant main effect for Group was found. Here the LD children made more errors per number of words in the passage than the NLD children. There were no Gender or interaction effects (see Tables 9 and 10).

Table 7

Number of Children Reading at Each
Oral Reading Passage : Easy and Difficult

		Easy		Difficult	
		LD	NLD	LD	NLD
Passages Phase A					
Neale					
1.	Kitten	15[a]	10	0	0
2.	Tom	12	6	0	0
3.	Circus	8	9	3	0
4.	Dragon	0	7	8	1
5.	Submarine	0	1	13	2
6.	Everest	0	1	3	3
Woods and Moe					
7.	Kate	0	0	0	0
8.	Zombies	0	0	0	0
9.	Hunzakats	0	0	4	1
Bader					
10.	Chemistry	0	0	0	1
11.	Art	0	0	4	26

[a]Number of children reading at each level of difficulty.

Table 8

Number of Children Achieving Criterial Accuracy and Comprehension Scores: Phase B

	LD[a]	NLD[b]
Easy		
Accuracy[c]		
95%>[d]	31	32
95%<	4	2
Comprehension		
75%>[d]	22	18
75%<	13	16
Difficult		
Accuracy[c]		
90%>	5	11
90%<[d]	30	23
Comprehension		
50%>	5	3
50%<[d]	30	31

[a]N=35
[b]N=34
[c]Percentage of words correctly read.
[d]The criteria required.

In terms of comprehension there were no significant main effects for the easy passage. However, a significant Group by Gender interaction effect (F(1,65) = 10.92, p<.01) was revealed. Here the NLD females had higher mean scores than the NLD males and the LD males had higher mean scores than the LD females (NLD females M = 80.00, NLD males M = 57.24, LD males M = 74.48, LD females M = 54.17. This indicates the NLD females were able to correctly answer more comprehension questions at the easy level than NLD males, LD males or LD females. On the difficult passage there were no significant main or interaction effects for comprehension (see Tables 9 and 10).

Summary. With the use of the parallel passages in Phase B, it was thought that the criteria of accuracy and comprehension met in Phase A for assigning the individual easy and difficult levels would transfer to Phase B. As these results indicate, not all the children in both groups met both the accuracy and the comprehension criteria for the easy and difficult passage. Nevertheless, scrutiny of Table 8 indicates that the majority of the children met at least one of the components of the criteria for each of their Oral Reading Passages.

Prior to further reporting the results an explanation of particular terminology used in this section is given. Throughout the Results Section the term "miscues" subsumes both "errors" and "self corrections". An "error" is an uncorrected response (that is, no attempt at correction was made), a word that matched the expected response but was abandoned for an incorrect response, or a word where an unsuccessful attempt at correction was made. A "self correction" is a successful attempt at correction (see Appendix G). In the categorization of Oral Reading Errors reference is made to both "tallied" and "untallied" miscues. "Tallied" and "untallied" miscues reflect a complete range of oral reading behaviours. The word "tallied" refers to the types of miscue that were tallied (i.e., summed) and used in calculating the accuracy score. "Tallied" miscues are substitutions, insertions, omissions, reversals, complex reversals, complex substitutions and partial word substitutions. "Untallied" miscues are repetitions, sounding out, substitution intonation, and punctuation. The term "bleeps" refers to signaled

Table 9

Summary Data for Accuracy and Comprehension Scores

	LD			NLD		
	N	M	SD	N	M	SD
Accuracy						
Easy	35	3.14[a]	2.60	34	2.30	2.12
Difficult	35	15.38	8.45	34	6.04	3.52
Comprehension						
Easy	35	70.00[b]	30.20	34	67.28	24.23
Difficult	35	32.86	21.02	34	19.49	24.07

[a]Percentage of errors as a function of total words in the passage.
[b]Percentage of correct answers as a function of comprehension questions.

Table 10

Summary of ANOVA Data for Accuracy and Comprehension Scores

	df	MS	F	p
Accuracy				
Easy				
Group	1	16.38	2.89	0.09
Gender	1	9.65	1.70	0.20
Group by Gender	1	0.52	0.09	0.76
Residual	65	5.67		
Difficult				
Group	1	931.152	23.26	0.00 ***
Gender	1	137.927	3.44	0.07
Group by Gender	1	124.430	3.11	0.08
Residual	65	40.026		
Comprehension				
Easy				
Group	1	214.226	0.32	0.57
Gender	1	7.810	0.12	0.91
Group by Gender	1	7225.791	10.92	0.00 **
Residual	65	661.522		
Difficult				
Group	1	1926.128	3.73	0.06
Gender	1	431.301	0.83	0.36
Group by Gender	1	164.270	0.32	0.58
Residual	65	517.023		

** p<.01

*** p<.001

awareness of an error or change through the use of the Monitoring Device (Bleep). "Bleeps" were produced just prior to the miscue occurring, during the miscue, immediately after the miscue, one or more words after the miscue, or when there was no miscue. Miscues were also coded as "unbleeped" (see Appendix G for further clarification and examples).

It is important to note that with respect to the easy passage, 12 of the 69 children (17%) made no "tallied" or "untallied" miscues or "bleeps" at this level. This number comprised 5 LD children and 7 NLD children. When "tallied" miscues only are considered, 13 children (19%) had no easy level "tallied" miscues. This number included the 5 LD children and an additional NLD child (NLD=8). All 69 children made "tallied" and/or "untallied" miscues and/or "bleeps" on the difficult passage.

The number of children who used their finger as a guide underneath the words during reading (that is, finger-pointed) numbered 4 of the 35 LD children, compared with none from a total of 34 NLD children. For the difficult level, 5 LD and 1 NLD children finger-pointed.

Types of miscue

To establish the number of different types of miscues per 100 words, the easy and difficult passages were treated separately. Firstly for each individual, the total of each miscue type was calculated as a percentage of total words in the passage. For example, the number of easy level "substitutions" (a type of "tallied" miscue) was summed, divided by the number of words in the easy level passage, and multiplied by 100.

The procedure was carried out for tallied miscues ("substitutions", "insertions", "omissions", "reversals", "complex reversals", "complex substitutions" and "partial word substitutions"), "untallied" miscues ("repetitions", "sounding out", "substitution intonations", and "punctuation"), "non words" (that is, substitutions that were nonsense words), and "dialect" miscues.

It was hypothesized that both groups would make the same range of miscue types, however LD children would make more of each "miscue type" (except for "repetitions") per 100 words than the NLD children. It was hypothesized that, in comparison to the NLD children, the LD children would make fewer "repetitions" per 100 words.

Table 11 presents the percentages of the different types of miscues. It should be noted that, particularly on the easy passage, the number of children making the different types of miscues may be small. This was because not all the children made miscues of that type.

No further analyses were performed on the following tallied miscue categories at the easy level because the numbers of children making miscues of that type were too small: "insertions" (N=13), "omissions" (N=22), "reversals" (N=1), "complex reversals" (N=0), "complex substitutions" (N=2), and "partial word substitutions" (N=28). On the difficult passage, no further analyses were performed on the following tallied miscue types: "reversals" (N=7), "complex reversals" (N=1), and "complex substitutions" (N=11).

A series of 2 x 2 (Group x Gender) ANOVAs was performed on each of the different miscue types for the easy and difficult passage. Results of the ANOVAs for the "substitutions" on the easy passage revealed no significant main or interaction effects (see Table 12).

On the difficult passage no significant main or interaction effects were found for the "insertion" and "omission" categories (see Table 12). A statistically significant difference was found between the groups on the difficult passage for "substitution" miscues. That is, at the difficult level, LD children made more "substitution" miscues per 100 words than the NLD children. There was no significant Gender or interaction effect on the difficult passage for "substitution" miscues (see Table 12). A significant main effect for Group (see Table 12) was found at the difficult level for "partial word substitutions". That is, the LD children made more "partial word substitutions" per 100 words than the NLD children. There were no significant effects for Gender or Group by Gender.

Turning now to the untallied miscues. The small number of children (N=18) making untallied miscues on the easy passage meant that application of the ANOVAs for the different types of untallied miscues on the easy passage was inappropriate. Owing to the small number of children making "sounding out" (N=0) and "punctuation" (N=12) untallied miscues at the difficult level no further analyses were undertaken. The results of the ANOVAs on the difficult passage for "repetitions" and "substitution intonation" miscues per 100 words revealed no statistically significant main or interaction effects (see Table 12).

The number of children making "non word substitutions" per 100 words was too small (N=14) on the easy passage to warrant further analysis. However, on the difficult passage the results of the ANOVA revealed a significant main effect for Group (see Table 12). That is, the LD children made more "non word substitution" miscues than the NLD children on the difficult passage. There were no significant Gender or Group by Gender effects for "non word substitutions" at the difficult level.

No children made miscues involving "dialect" on the easy passage, and only 5 children made miscues involving "dialect" at the difficult level. Therefore the ANOVAs were not performed for the "dialect" category at the difficult level.

Summary. In terms of tallied miscues per 100 words the complete range of miscue types was made by both groups, although at the easy level very few "insertions", "omissions", "reversals", and "complex substitutions" were made and no "complex reversals" were made. At the difficult level very few "reversals", "complex reversals" and "complex substitutions" were made. Significant differences between the LD and NLD children were found on the difficult passage for "substitutions" and "partial word substitutions".

Both groups of children made "repetitions", "substitution intonation" and "punctuation" untallied miscues, but no "sounding out" untallied miscues at both difficult levels.

Table 11

Percentages[a] of Types of Miscue per 100 words

	LD			NLD		
	N	M	SD	N	M	SD
Tallied miscues						
Substitution						
Easy	35	3.16	2.75	34	2.64	2.41
Difficult	35	12.14	5.73	34	5.23	2.96
Insertion						
Difficult	35	0.46	0.65	34	0.51	0.54
Omission						
Difficult	35	1.97	3.72	34	0.93	0.95
Partial word substitution						
Difficult	35	4.67	4.53	34	1.93	1.11
Untallied miscues						
Repetition						
Difficult	35	0.55	0.93	34	0.29	0.39
Substitution intonation						
Difficult	35	1.25	0.95	34	1.06	0.78
Non word substitutions						
Difficult	35	3.20	1.84	34	1.88	1.05

[a]Each percentage as a function of the number of words in the passage.

Table 12

Summary of ANOVA Data for Types of Miscue per 100 Words

	df	MS	F	p	
Tallied miscues					
Substitution (Easy)					
Group	1	9.004	1.33	0.25	
Gender	1	2.109	0.31	0.58	
Group by Gender	1	5.709	0.84	0.36	
Residual	65	6.795			
Substitution (Difficult)					
Group	1	614.208	28.96	0.00	***
Gender	1	13.318	0.63	0.43	
Group by Gender	1	15.379	0.73	0.40	
Residual	65	21.209			
Insertion (Difficult)					
Group	1	0.002	0.00	0.95	
Gender	1	0.259	0.71	0.40	
Group by Gender	1	0.124	0.34	0.56	
Residual	65	0.367			
Omission (Difficult)					
Group	1	5.601	0.76	0.39	
Gender	1	10.113	1.37	0.25	
Group by Gender	1	12.891	1.75	0.19	
Residual	65	7.370			
Partial word substitution (Difficult)					
Group	1	60.203	5.73	0.20	*
Gender	1	24.481	2.33	0.13	
Group by Gender	1	38.714	3.69	0.06	
Residual	65	10.507			

<u>Untallied miscues</u>					
Repetition (Difficult)					
Group	1	0.569	1.09	0.30	
Gender	1	0.102	0.19	0.66	
Group by Gender	1	0.325	0.63	0.43	
Residual	65	0.520			
Substitution intonation (Difficult)					
Group	1	0.167	0.22	0.64	
Gender	1	0.233	0.30	0.59	
Group by Gender	1	0.620	0.79	0.38	
Residual	65	0.777			
<u>Non word substitutions</u> (Difficult)					
Group	1	35.420	15.70	0.00	***
Gender	1	2.828	1.25	0.27	
Group by Gender	1	3.418	1.52	0.22	
Residual	65	2.256			

* p<.05

*** p<.001

Of the "substitution" miscues that were made, the number that were "non words" occurred at both difficulty levels for both groups. However, very few of these "nonword substitutions" were made at the easy level. At the difficult level a significant difference was found between the groups for "nonword substitutions" per 100 words. With reference to "substitutions", "partial word substitutions" and those substitutions that were "nonsense words", the LD group made more of these types of miscues per 100 words. Thus, the hypothesis that the LD and NLD children would make the same range of tallied and untallied miscue types was supported. The hypothesis that LD children would make more of the different miscue types (except for "repetitions") than the NLD children was supported for "substitutions", "partial word substitutions" and those "substitutions that are non words" at the difficult level. No support was found for the hypothesis that the LD children would make fewer "repetitions" than the NLD children.

Errors, self corrections and linguistic cue use

It was hypothesized that LD children would make more errors and make fewer self corrections than the NLD children. The assistance of the context cues in an easy passage, it was hypothesized, would mean that at this level self correction would occur more frequently than on the difficult passage for both groups. Errors included observed responses where "no attempt at correction" was made, "abandoned correct" words and "unsuccessful attempts at correction". Self corrections were defined as words "immediately successfully corrected". The use of self correction is considered to be a measure of comprehension monitoring. Specifically, it is an indicator of awareness of comprehension failure and the successful use of "fix-up" strategies. The tallied miscues were coded according to the following categories: "substitutions", "insertions", "omissions", "reversals", "complex reversals", "complex substitutions" and "partial word substitutions".

Prior to statistical analyses being applied the percentage of errors and self corrections separately were computed for each child. For example, the percentage of easy passage errors was calculated in terms of the total easy passage errors plus self corrections (total tallied miscues). A similar procedure was adopted for the difficult passage. The procedures were also adopted for the self corrections, with the self corrections as a percentage of respective easy and difficult total tallied miscues. The percentages of errors and self corrections in terms of group and difficulty level are included in Table 13. Not all the children (N=13) made tallied errors and self corrections on the easy passage. At the easy level the ratio of errors to self corrected miscues for the LD group was 53:46, and for NLD children 52:47. On the difficult passage the LD group's ratio of errors to self corrections was 74:25, while for the NLD group the ratio was 66:33. Thus the ratio of errors to corrections at the easy level was similar for both groups, while at the difficult level the ratio was higher for the LD as for the NLD group. The LD children made three times more errors than self corrections, while the NLD children made twice as many errors as self corrections.

The results of the 2 x 2 (Group x Gender) ANOVAs performed separately on the easy and the difficult passage for errors and self corrections revealed no significant main or interaction effects for either the easy or difficult passage (see Table 14). Therefore the hypothesis that the LD children would make more errors than the NLD children was not supported. The hypothesis that the LD children would self correct less than the NLD children was not supported. The hypothesis that both groups would make proportionately more self corrections at the easy level than at the difficult level was, however, supported.

Another aspect of this study was concerned with the linguistic cues used as sources of information by the readers. The linguistic components of the reading miscues analyzed included "graphic", "phonemic", "syntactic" and "semantic" cues. It was hypothesized that differences between the groups would occur in the use of these linguistic cues. Specifically, it was hypothesized that both groups would make use of all four linguistic sources of information when reading. In terms of errors it was predicted, that in comparison to NLD children, LD children would make fewer errors having "high graphic" proximity and "high phonemic" similarity. In comparison to NLD children, LD children would make more errors that were "syntactically" and "semantically unacceptable", and conversely, more errors of the NLD group would have "high syntactic" and "high semantic" acceptability. In terms of self correction, it was

Table 13

Percentages of Errors and Self Corrections in terms of Linguistic Cue Use

	LD						NLD					
	Easy			Difficult			Easy			Difficult		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Errors[a]	30	53.23	35.94	35	74.25	13.80	26	52.70	33.70	34	66.48	16.34
Graphic[b]	30	36.14	34.83	35	61.58	15.74	25	42.78	33.60	34	53.06	17.76
Phonemic	30	36.14	34.83	35	61.68	15.76	26	42.78	33.60	34	53.06	17.76
Syntactic	30	48.31	37.47	35	63.68	17.37	26	48.77	35.12	34	61.10	16.16
Semantic	30	28.33	31.77	35	47.47	15.08	26	38.21	33.87	34	44.17	14.68
Self corrections[a]	30	46.77	35.94	35	25.61	13.83	26	47.30	33.70	34	33.29	15.99
Graphic[b]	30	42.40	32.59	35	24.39	14.18	26	40.04	33.44	34	29.65	14.27
Phonemic	30	41.29	32.30	35	24.39	14.18	26	40.04	33.44	34	29.65	14.27
Syntactic	30	27.60	33.70	35	14.36	9.32	26	21.36	21.96	34	15.00	11.04
Semantic	30	22.12	29.77	35	13.14	9.41	26	16.28	20.87	34	11.58	8.31

[a]Errors and self corrections as a percentage of total tallied miscues.
[b]Errors and self corrections in terms of linguistic cue use as a percentage of total tallied miscues.

Table 14

Summary of ANOVA Data for Errors and Self Corrections

	df	MS	F	p
Errors (Easy)				
Group	1	197.440	0.17	0.69
Gender	1	4211.023	3.55	0.06
Group by Gender	1	2.659	0.00	0.96
Residual	52	1184.951		
Errors (Difficult)				
Group	1	780.900	3.41	0.07
Gender	1	370.923	1.62	0.21
Group by Gender	1	6.338	0.03	0.87
Residual	65	229.330		
Self corrections (Easy)				
Group	1	197.440	0.17	0.69
Gender	1	4211.023	3.55	0.07
Group by Gender	1	2.659	0.00	0.96
Residual	52	1184.951		
Self corrections (Difficult)				
Group	1	626.132	2.79	0.10
Gender	1	353.524	1.58	0.21
Group by Gender	1	15.035	0.07	0.80
Residual	65	224.389		

hypothesized that the LD children would self correct errors having "no graphic proximity", "no phonemic similarity", "no syntactic" and "no semantic" acceptability less often than NLD children. With regard to passage difficulty, it was anticipated that there would be more errors having "high graphic" and "high phonemic" proximity as text difficulty increased. Concomitantly, it was anticipated that "high syntactically" and "high semantically acceptable" errors would decrease as text difficulty increased. Lastly, it was hypothesized that both groups would self correct fewer errors having "high graphic" and "high phonemic" proximity, and "high syntactic" and "high semantic" acceptability as passage difficulty level increased. In addition to these central hypotheses, further analyses were performed on each of the levels of the different types of linguistic cue sources for both errors and self corrections. For example, in addition to the central hypothesis that LD children would make fewer errors having "high graphic" proximity than the NLD children, analyses were also performed on errors having "no graphic" and "some graphic" proximity. Both errors and self corrections, for the easy and difficult passages were examined separately for linguistic cue use. The miscues were coded according to the level of similarity or acceptability to the text word or sentence (see Appendix G). As only tallied miscues were coded according to the linguistic cue system, analyses here were limited to tallied miscues. "Substitutions" and "reversals" (of letters only) were coded according to their "graphic", "phonemic", "syntactic" and "semantic" relationships with the expected response. That is, these miscue types were coded in all four linguistic categories. "Insertions" and "omissions" were only coded according to "syntactic" acceptability. "Partial word substitutions" were only coded according to their "graphic" and "phonemic" relationship with the expected response. "Complex reversals" and "complex substitutions" were not coded according to the linguistic cue system.

Before the analyses could be performed the percentage of miscues within each linguistic category for each individual was obtained. These percentages were obtained in terms of errors and self corrections for the two difficulty levels. The percentage of errors on the easy passage for each linguistic category was calculated in terms of the total easy passage errors and self corrections (total tallied miscues). Similarly, the percentage of self corrections on the easy passage for each linguistic category was calculated in terms of the total easy passage errors and self corrections (total tallied miscues). The same procedures for errors and self corrections respectively were adopted for the difficult passage.

It should be noted that some of the children have no miscues of a linguistic type in relation to total tallied miscues. This tended to occur more on the easy passage. On the other hand, an individual may have all the miscues of one particular linguistic type. As a result large variances in the data occurred. Table 13 also presents the percentages of linguistic cue use in terms of miscue type (errors, self corrections), group (LD, NLD) and Oral Reading Passage (easy, difficult). Scrutiny of Table 13 reveals that in terms of the linguistic relationships between the observed responses and the expected responses, both groups of children increased the percentage of errors from the easy to the difficult level in every linguistic category. The reverse was true for the self corrections. For each of the four linguistic categories the percentage of self corrections decreased in terms of easy and difficult levels, for both groups.

A series of 2 x 2 (Group x Gender) ANOVAs was performed separately for each difficulty level in terms of errors, self corrected miscues, and for each linguistic cue system.

Graphic proximity. In terms of graphic proximity miscues were coded as "no graphic proximity", "some graphic proximity", or "high graphic proximity" (see Appendix G for levels of proximity). The percentages of miscues in terms of graphic proximity are found in Table 15.

The results of the ANOVA for errors having "no graphic proximity" on the easy passage revealed no significant main or interaction effects. For the difficult passage, there was a significant Gender effect ($F(1,65) = 5.07$, $p<.05$). Here the male pupils made more errors that had "no graphic proximity" than the female pupils (Males $\underline{M}$ = 8.18, Females $\underline{M}$ = 4.59). There were no statistically significant Group or interaction effects. Summary of the ANOVA data in terms of levels of graphic proximity are found in Table 16.

The analyses of the easy level self corrected errors having "no graphic similarity" revealed no significant main or interaction effects. However, the analyses on the difficult passage showed a statistically significant main effect for Group (see Table 16). Here the NLD pupils made a higher percentage of self correction of miscues with "no graphic proximity". There were no significant Gender or interaction effects.

When analyses were conducted on the easy passage for errors that had "some graphic proximity" to the text word, there was no significant main effect for Group nor significant interaction effect. However there was a statistically significant Gender effect ($F(1,52) = 4.73$, $p<.05$). The female pupils made more errors with "some graphic proximity" than male pupils (Females $\underline{M} = 22.74$, Males $\underline{M} = 8.59$). On the difficult passage, a significant main effect for Group was found, with the LD pupils making more errors with "some graphic proximity" than the NLD pupils (see Table 16). There were no significant Gender or Group by Gender effects.

No significant main or interaction effects were found at either the easy or difficult level for self corrections of errors with "some graphic proximity" (see Table 16).

When differences between the groups in terms of errors of "high graphic proximity" were considered, no significant main or interaction effects were revealed following the analyses on the easy passage. However, a significant Group effect was found on the difficult passage (see Table 16). Here, in comparison to LD children, the NLD children made more errors with "high graphic proximity".

Analyses of the self corrected miscues having "high graphic proximity" indicated no significant Group, Gender, or Group by Gender effects on the easy passage. On the difficult passage, a significant Gender effect was revealed ($F(1,65) = 8.96$, $p<.01$). Specifically, female pupils made more self corrections for "high graphic proximity" miscues than male pupils (Females $\underline{M} = 8.08$, Males $\underline{M} = 4.43$). There were no significant Group or interaction effects (see Table 16).

Table 15

Summary Data for Percentages of Miscues in terms of Graphic Proximity

	LD			NLD		
	N	M	SD	N	M	SD
No proximity						
Errors						
Easy	30	7.78	17.36	26	15.29	27.12
Difficult	35	7.06	5.53	34	6.81	7.36
Self corrections						
Easy	30	7.59	15.54	26	7.11	13.15
Difficult	35	2.19	3.06	34	5.50	5.98
Some proximity						
Errors						
Easy	30	12.08	21.59	26	15.45	24.39
Difficult	35	32.10	15.20	34	17.08	10.97
Self corrections						
Easy	30	29.59	31.74	26	22.11	29.76
Difficult	35	16.04	11.02	34	18.92	10.11
High proximity						
Errors						
Easy	30	16.28	25.00	26	12.03	21.43
Difficult	35	22.43	11.72	34	29.17	12.52
Self corrections						
Easy	30	5.22	11.99	26	10.82	22.27
Difficult	35	6.15	5.78	34	5.24	5.69

Table 16

Summary of ANOVA Data for Miscues
in terms of Graphic Proximity

	df	MS	F	p
No proximity				
Errors (Easy)				
Group	1	882.840	1.76	0.19
Gender	1	319.810	0.64	0.43
Group by Gender	1	634.517	1.26	0.27
Residual	52	502.375		
Errors (Difficult)				
Group	1	2.967	0.07	0.79
Gender	1	203.377	5.07	0.03 *
Group by Gender	1	16.130	0.40	0.53
Residual	65	40.088		
Self corrections (Easy)				
Group	1	36.918	0.18	0.67
Gender	1	13.953	0.07	0.80
Group by Gender	1	672.516	3.28	0.08
Residual	52	204.791		
Self corrections (Difficult)				
Group	1	190.381	8.31	0.01 *
Gender	1	8.219	0.36	0.55
Group by Gender	1	3.189	0.14	0.71
Residual	65	22.902		
Some proximity				
Errors (Easy)				
Group	1	46.051	0.09	0.76
Gender	1	2338.969	4.73	0.03 *
Group by Gender	1	260.566	0.53	0.47
Residual	52	494.266		

Errors (Difficult)					
Group	1	3470.236	19.53	0.00	***
Gender	1	137.765	0.78	0.38	
Group by Gender	1	137.389	0.77	0.38	
Residual	65	177.712			
Self corrections (Easy)					
Group	1	517.824	0.53	0.47	
Gender	1	591.531	0.61	0.44	
Group by Gender	1	22.047	0.02	0.88	
Residual	52	975.722			
Self corrections (Difficult)					
Group	1	81.638	0.71	0.40	
Gender	1	3.048	0.03	0.87	
Group by Gender	1	33.453	0.29	0.59	
Residual	65	59.180			
High proximity					
Errors (Easy)					
Group	1	343.950	0.62	0.43	
Gender	1	269.733	0.49	0.49	
Group by Gender	1	637.948	1.16	0.29	
Residual	52	551.238			
Errors (Difficult)					
Group	1	626.827	4.31	0.04	*
Gender	1	159.082	1.09	0.30	
Group by Gender	1	220.390	1.51	0.22	
Residual	65	145.548			
Self corrections (Easy)					
Group	1	419.042	1.43	0.24	
Gender	1	923.906	3.15	0.08	
Group by Gender	1	350.847	1.20	0.28	
Residual	52	293.086			

Self corrections (Difficult)					
Group	1	76.918	2.62	0.11	
Gender	1	263.159	8.96	0.00	**
Group by Gender	1	56.434	1.92	0.17	
Residual	65	29.360			

* p<.05

** p<.01

*** p<.001

In summary, with regard to significant differences between the groups, these were found only on the difficult passage. Here the LD children made proportionately more errors with "some graphic proximity" and fewer errors with "high graphic proximity" in comparison to NLD children. Thus, while the results indicate that on the difficult passage LD readers did use graphic information, the more proficient readers (NLD) were more likely to make errors that were more graphically similar to the words in the text. Reliance on "high graphic proximity" could be seen then as an indicator of these NLD readers. In terms of self corrected miscues a difference between the groups was found on the easy passage for the self correction of miscues with "no graphic proximity". That is, when miscues which had no resemblance in terms of physical features to the text word were made, the NLD children self corrected proportionately more of these on the easy passage than the LD children.

Phonemic similarity. Where appropriate each tallied miscue was also coded in terms of having "no phonemic similarity", "some phonemic similarity" and "high phonemic similarity" to the text word (see Appendix G). Summary of the percentages in terms of levels of phonemic similarity are found in Table 17.

Analyses of variance were performed in a manner similar to miscues in terms of graphic proximity at each level of difficulty, separately. No significant differences between the groups were found in terms of errors with "no phonemic similarity" on the easy passage. That is, the analyses revealed no main or interaction effects. On the difficult passage a significant main effect for Gender ($F(1,65) = 4.60$, $p<.05$) was found. The male pupils made proportionately more errors with "no phonemic similarity" on the difficult passage than did the female pupils (Males $M = 6.50$, Females $M = 3.22$) (see Table 18).

In terms of self corrected errors having "no phonemic similarity", no significant main effects were found on the easy level, but there was a significant interaction effect ($F(1,52) = 4.62$, $p<.05$). Here the LD males made more self corrections of that type than the LD females (LD females $M = 0.00$, LD males $M = 10.23$), whereas NLD females made more self corrections of that type than NLD males

(NLD females $\underline{M}$ = 9.33, NLD males $\underline{M}$ = 2.78) (see Table 18). A significant main effect for Group was found following analysis of self correction of miscues with "no phonemic similarity" (see Table 18), with the NLD group making more self corrections of that type than the LD group at the difficult level.

Differences between the LD and NLD children, male or female pupils or any interaction of group by gender were not found on the easy passage with relation to errors having "some phonemic similarity". A significant Group effect was however revealed on the difficult passage (see Table 18). This was due to the LD group making more errors with "some phonemic similarity" to the expected response than the NLD children. There were no significant Gender or Group by Gender effects (see Table 18).

No significant effects were found on either the easy or difficult passage for the self correction of miscues with "some phonemic similarity" (see Table 18).

No statistically significant effects were found on both easy and difficult passages for errors or self corrections with "high phonemic similarity" (see Table 18).

In summary, in terms of the phonemic relationship between the observed response and the expected response, significant differences between the groups were limited again to the difficult passage. LD children made more errors which bore "some phonemic similarity" to the text word, than the NLD children. Because words with "some graphic proximity" generally tend also to imply "some phonemic similarity", the finding that the LD children made both more errors with "some graphic proximity" and more errors with "some phonemic similarity" than the NLD children is not surprising. Further, the findings in terms of self correction of miscues with "no phonemic similarity" indicated that on the difficult passage the NLD children were superior.

Table 17

Summary Data for Percentages of Miscues in terms of Phonemic Similarity

	LD			NLD		
	N	M	SD	N	M	SD
No similarity						
Errors						
Easy	30	4.26	12.94	26	5.72	20.06
Difficult	35	5.34	5.77	34	5.37	6.80
Self corrections						
Easy	30	7.50	15.22	26	5.80	12.52
Difficult	35	2.88	3.93	34	5.76	5.94
Some similarity						
Errors						
Easy	30	19.88	28.94	26	23.50	29.63
Difficult	35	43.65	14.53	34	34.39	17.10
Self corrections						
Easy	30	32.49	32.48	26	26.65	31.71
Difficult	35	18.18	11.93	34	21.62	10.32
High similarity						
Errors						
Easy	30	12.00	20.91	26	13.56	22.18
Difficult	35	12.69	7.89	34	13.30	9.22
Self corrections						
Easy	30	1.30	4.99	26	7.58	20.22
Difficult	35	3.33	3.78	34	2.27	3.26

Table 18

Summary of ANOVA Data for Miscues
in terms of Phonemic Similarity

	df	MS	F	p
No similarity				
Errors (Easy)				
Group	1	3.971	0.01	0.91
Gender	1	275.740	0.98	0.33
Group by Gender	1	0.196	0.00	0.98
Residual	52	281.442		
Errors (Difficult)				
Group	1	7.117	0.19	0.67
Gender	1	174.921	4.60	0.04 *
Group by Gender	1	11.698	0.31	0.58
Residual	65	38.011		
Self corrections (Easy)				
Group	1	10.821	0.06	0.81
Gender	1	41.633	0.22	0.64
Group by Gender	1	865.261	4.62	0.04 *
Residual	52	187.326		
Self corrections (Difficult)				
Group	1	158.880	6.18	0.02 *
Gender	1	2.302	0.09	0.77
Group by Gender	1	16.536	0.64	0.43
Residual	65	25.719		
Some similarity				
Errors (Easy)				
Group	1	8.727	0.01	0.92
Gender	1	1053.526	1.22	0.76
Group by Gender	1	159.427	0.18	0.67
Residual	52	866.742		

Errors (Difficult)				
Group	1	1496.465	5.81	0.02 *
Gender	1	24.513	0.10	0.76
Group by Gender	1	72.528	0.28	0.60
Residual	65	257.423		
Self corrections (Easy)				
Group	1	253.971	0.24	0.62
Gender	1	1291.830	1.24	0.27
Group by Gender	1	82.432	0.08	0.78
Residual	52	1044.749		
Self corrections (Difficult)				
Group	1	47.765	0.39	0.54
Gender	1	246.571	2.00	0.16
Group by Gender	1	133.374	1.08	0.30
Residual	65	123.313		
High similarity				
Errors (Easy)				
Group	1	169.156	0.36	0.55
Gender	1	0.576	0.00	0.97
Group by Gender	1	798.496	1.72	0.20
Residual	52	464.955		
Errors (Difficult)				
Group	1	12.400	0.17	0.69
Gender	1	28.427	0.38	0.54
Group by Gender	1	3.229	0.04	0.84
Residual	65	75.233		
Self corrections (Easy)				
Group	1	364.606	1.84	0.18
Gender	1	179.597	0.91	0.35
Group by Gender	1	419.690	2.12	0.15
Residual	52	198.296		
Self corrections (Difficult)				
Group	1	29.735	2.36	0.13
Gender	1	0.839	0.07	0.80
Group by Gender	1	16.226	1.29	0.26
Residual	65	12.615		

* $p<.05$

Syntactic acceptability. Analyses of the miscues in relation to syntactic cue utilization involved errors and self corrections with "no syntactic acceptability", "syntactic acceptability with the prior portion of the sentence", and "high syntactic acceptability" (see Appendix G). As only three children made miscues "syntactically acceptable with the following portion of the sentence", the errors and self corrections of that type were not analyzed. The percentage of miscues in terms of syntactic acceptability are found summarized in Table 19. Again the ANOVAs were conducted separately for both difficulty levels.

Results of the ANOVAs for errors having "no syntactic acceptability" at both levels indicated no significant main or interaction effects (see Table 20). In terms of "syntactically unacceptable errors" that were successfully corrected on the easy passage, a significant main effect for Group was found (see Table 20). The NLD children had a higher percentage of self corrections of that type than the LD children. There were no Gender or Group by Gender effects on the easy passage. On the difficult passage a significant Gender effect was found for the self correction of errors that were "syntactically unacceptable" ($F\ (1,65) = 5.35,\ p<.05$). The female pupils made more of these self corrections than the male pupils (Females $\underline{M} = 9.64$, Males $\underline{M} = 5.85$) (see Table 20).

The analyses revealed no significant difference for Group, Gender or Group by Gender interactions for either errors or self corrections involving "syntactic acceptability of the prior portion of the sentence". This held for both the easy and difficult passages (see Table 20).

Similarly, for the easy and difficult passage errors and self corrections having a "high degree of syntactic acceptability", none of the effects was statistically significant (see Table 20).

Thus, the only group difference found in the analyses relating to syntactic acceptability was evident on the easy passage with the NLD group successfully correcting more errors with "no syntactic acceptability" than the LD children. This finding suggests that at the easy level the NLD readers were able to reestablish meaning following a breakdown in the grammatic structure of the text to a higher degree than the LD readers.

Table 19

Summary Data for Percentages of Miscues
in terms of Syntactic Acceptability

	LD			NLD		
	N	M	SD	N	M	SD
No acceptability						
Errors						
Easy	30	12.74	18.32	26	17.99	26.18
Difficult	35	36.26	13.23	34	32.83	11.83
Self corrections						
Easy	30	4.01	10.47	26	11.73	15.40
Difficult	35	7.64	6.55	34	6.69	8.32
Acceptable with prior portion of the sentence						
Errors						
Easy	30	5.56	13.90	26	9.97	21.94
Difficult	35	13.04	7.22	34	10.40	6.40
Self corrections						
Easy	30	12.00	23.09	26	3.24	7.73
Difficult	35	4.76	4.99	34	4.73	5.08
High acceptability						
Errors						
Easy	30	30.02	32.59	26	20.81	26.52
Difficult	35	14.19	7.60	34	17.77	9.27
Self corrections						
Easy	30	11.59	27.05	26	12.79	22.30
Difficult	35	1.96	2.85	34	3.42	5.11

Table 20

Summary of ANOVA Data for Miscues
in terms of Syntactic Acceptability

	df	MS	F	p
No acceptability				
Errors (Easy)				
Group	1	133.317	0.27	0.61
Gender	1	629.032	1.25	0.27
Group by Gender	1	53.823	0.11	0.75
Residual	52	503.761		
Errors (Difficult)				
Group	1	127.914	0.81	0.37
Gender	1	187.619	1.19	0.28
Group by Gender	1	104.441	0.66	0.42
Residual	65	158.100		
Self corrections (Easy)				
Group	1	953.559	5.66	0.02 *
Gender	1	338.051	2.01	0.16
Group by Gender	1	0.610	0.00	0.95
Residual	52	168.636		
Self corrections (Difficult)				
Group	1	81.618	1.55	0.22
Gender	1	281.913	5.35	0.02 *
Group by Gender	1	56.899	1.08	0.30
Residual	65	52.744		
Acceptable with prior portion of the sentence				
Errors (Easy)				
Group	1	64.746	0.20	0.66
Gender	1	423.197	1.29	0.26
Group by Gender	1	159.747	0.49	0.49
Residual	52	328.483		

Errors (Difficult)				
Group	1	107.857	2.25	0.14
Gender	1	3.302	0.07	0.79
Group by Gender	1	0.569	0.01	0.91
Residual	65	47.990		
Self corrections (Easy)				
Group	1	978.331	3.02	0.08
Gender	1	71.479	0.22	0.64
Group by Gender	1	16.571	0.05	0.82
Residual	52	324.234		
Self corrections (Difficult)				
Group	1	0.055	0.00	0.96
Gender	1	13.217	0.51	0.48
Group by Gender	1	3.486	0.14	0.72
Residual	65	25.843		
<u>High acceptability</u>				
Errors (Easy)				
Group	1	991.832	1.08	0.30
Gender	1	220.522	0.24	0.63
Group by Gender	1	185.235	0.20	0.66
Residual	52	922.105		
Errors (Difficult)				
Group	1	163.783	2.30	0.13
Gender	1	87.401	1.23	0.27
Group by Gender	1	89.359	1.26	0.26
Residual	65	71.112		
Self corrections (Easy)				
Group	1	119.006	0.20	0.66
Gender	1	1850.643	3.03	0.09
Group by Gender	1	38.158	0.06	0.80
Residual	52	610.102		
Self corrections (Difficult)				
Group	1	47.679	2.75	0.10
Gender	1	0.893	0.05	0.82
Group by Gender	1	12.688	0.73	0.40
Residual	65	17.339		

* $p<.05$

Semantic acceptability. Analyses of semantic cue use involved the examination of miscues at the following levels: "no semantic acceptability", "semantic acceptability with the prior portion of the sentence", and "high semantic acceptability". Where miscues had been coded in terms of "retention of the base word" and "semantically acceptable with the following portion of the sentence", analyses were not undertaken. This was due to the relatively small number of children making such miscues. The percentages of miscues in terms of semantic acceptability are presented in Table 21.

A significant main effect for Gender ($F(1,52) = 6.04$, $p<.05$) was found as a result of the analysis of errors with "no semantic acceptability" at the easy level, with females making proportionately more errors of that type than males (Females $\underline{M} = 19.94$; Males $\underline{M} = 6.25$). There were no significant Group or interaction effects. At the difficult level, there were no significant effects (see Table 22).

In terms of self correction of miscues where there was "no semantic acceptability" with the text word, a significant main effect for Group (see Table 22) was found on the easy passage. This effect was due to the NLD children making more self corrections of that type than the LD children. There were no significant Gender or interaction effects. Similarly, on the difficult passage a significant main effect for Group was found for self corrected miscues with "no semantic acceptability" (see Table 22). The LD children here made more self corrections of that type than the NLD children. This result however, was effected by a significant interaction effect ($F(1,65) = 4.79$, $p<.05$). The LD females made significantly more self corrections of errors that were "semantically unacceptable" than the NLD females, and the males in both groups (LD females $\underline{M} = 10.85$, NLD females $\underline{M} = 4.30$, LD males $\underline{M} = 4.74$, NLD males $\underline{M} = 4.78$) (see Table 22).

In terms of both errors and self corrections which were "semantically acceptable only with the prior portion of the sentence" the analyses revealed no significant effects on both passages (see Table 22).

Indeed, the same was true for errors and self corrections which were "semantically highly acceptable". The analyses revealed no significant main or interaction effects on both passages (see Table 22).

Table 21

Summary Data for Percentages of Miscues
in terms of Semantic Acceptability

	LD			NLD		
	N	M	SD	N	M	SD
No acceptability						
Errors						
Easy	30	8.46	16.42	26	14.22	22.35
Difficult	35	26.19	11.98	34	26.90	12.29
Self corrections						
Easy	30	2.90	8.91	26	9.64	15.77
Difficulty	35	6.31	6.25	34	4.57	5.82
Acceptable with prior portion of the sentence						
Errors						
Easy	30	5.56	13.90	26	9.12	21.88
Difficult	35	11.48	7.13	34	8.54	6.26
Self corrections						
Easy	30	11.63	22.82	26	3.24	7.73
Difficult	35	4.30	4.75	34	3.94	4.44
High acceptability						
Errors						
Easy	30	17.20	28.26	26	14.06	28.87
Difficult	35	11.17	6.34	34	11.04	7.19
Self corrections						
Easy	30	7.59	21.71	26	9.55	21.83
Difficult	35	1.58	2.57	34	2.76	5.18

Table 22

Summary of ANOVA Data for Miscues
in terms of Semantic Acceptability

	df	MS	F	p
No acceptability				
Errors (Easy)				
Group	1	88.157	0.25	0.62
Gender	1	2111.944	6.04	0.02 *
Group by Gender	1	47.872	0.14	0.71
Residual	52	349.554		
Errors (Difficult)				
Group	1	0.288	0.00	0.96
Gender	1	4.647	0.03	0.86
Group by Gender	1	213.319	1.51	0.22
Residual	65	140.961		
Self corrections (Easy)				
Group	1	677.118	4.31	0.04 *
Gender	1	322.418	2.05	0.16
Group by Gender	1	16.829	0.11	0.75
Residual	52	157.154		
Self corrections (Difficult)				
Group	1	157.279	4.65	0.04 *
Gender	1	117.958	3.49	0.07
Group by Gender	1	161.876	4.79	0.03 *
Residual	65	33.792		
Acceptable with prior portion of the sentence				
Errors (Easy)				
Group	1	27.701	0.09	0.77
Gender	1	545.462	1.67	0.20
Group by Gender	1	97.135	0.30	0.59
Residual	52	325.939		

Errors (Difficult)				
Group	1	139.483	3.02	0.09
Gender	1	0.918	0.02	0.89
Group by Gender	1	12.098	0.26	0.61
Residual	65	46.242		
Self corrections (Easy)				
Group	1	831.908	2.62	0.11
Gender	1	36.229	0.11	0.74
Group by Gender	1	42.330	0.13	0.72
Residual	52	317.586		
Self corrections (Difficult)				
Group	1	0.249	0.01	0.92
Gender	1	1.957	0.09	0.76
Group by Gender	1	14.064	0.65	0.42
Residual	65	21.555		
High acceptability				
Errors (Easy)				
Group	1	0.054	0.00	0.99
Gender	1	674.240	0.97	0.33
Group by Gender	1	518.256	0.74	0.39
Residual	52	697.489		
Errors (Difficult)				
Group	1	0.790	0.02	0.90
Gender	1	3.109	0.07	0.80
Group by Gender	1	6.526	0.14	0.71
Residual	65	47.108		
Self corrections (Easy)				
Group	1	143.777	0.31	0.58
Gender	1	1457.698	3.16	0.08
Group by Gender	1	72.445	0.16	0.69
Residual	52	461.899		
Self corrections (Difficult)				
Group	1	30.085	1.80	0.19
Gender	1	2.604	0.16	0.70
Group by Gender	1	17.460	1.04	0.31
Residual	65	16.758		

* $p<.05$

Finally then, group differences were found to be significant on both the easy and difficult passage where errors that had "no semantic acceptability" were successfully corrected. At the easy level, NLD children made more self corrections than the LD children. Surprisingly, at the difficult level the reverse was the case, with LD children making more self corrections than the NLD children. However, as noted the fact that LD females made proportionately more of this type of self correction than the other groups, influenced the difficult level finding (see Table 26).

Summary. The results of analyses for errors and self corrections on both difficulty levels revealed no significant differences between the groups. This was contrary to expectations where it had been predicted that the LD children would make more errors and fewer self corrections than the NLD children. However as predicted the percentage of self-corrections decreased as text difficulty level increased.

The results of analyses for errors and self corrections and the use of the linguistic cue system indicate that both LD and NLD children used "graphic", "phonemic", "syntactic" and "semantic" sources of information when reading orally. While group differences only occurred at the difficult level, as far as the relationship between linguistic cue use and errors was concerned, the LD children tended to make more errors that had both "some graphic proximity" and "some phonemic proximity" to the text words than the NLD children. On the other hand, NLD children appeared to make more errors having "high graphic proximity" to the text word. Thus, they made more errors that were closest in visual appearance to the expected response. The hypothesis that LD children would make less "high graphic" errors than the NLD children was supported. The hypothesis was not supported however, for "high phonemic similarity" where no differences between the groups was found. As no differences between the groups existed at either level for errors and syntactic and semantic linguistic cue use, the hypotheses that LD children would make more errors that were "syntactically" and "semantically unacceptable", and conversely that the NLD group would make more "syntactically" and "semantically acceptable" errors were not supported.

When the relationship of self corrections and linguistic cue use is examined at the easy level, in comparison to LD children, the NLD children were more able to correct errors that had "no syntactic" or "semantic acceptability". That is, the hypothesis that in comparison to the NLD children, the LD group would correct fewer errors that had "no syntactic" and "no semantic acceptability" was supported for the easy passage. No support was found for the hypotheses that the LD group would correct fewer errors having "no graphic" or "no phonemic similarity" than the NLD group on the easy passage.

At the difficult level, the LD group was inferior in their correction of errors that had "no graphic proximity" and "no phonemic similarity", therefore the hypotheses were supported. In terms of correction of "syntactically unacceptable" errors at the difficult level, no group differences were found and the hypothesis was not supported. Surprisingly, at the difficult level the LD children corrected more "semantically unacceptable" errors, and the hypothesis was not supported.

Therefore, while there were no significant differences between the groups in terms of self correction ability on either the easy or difficult passage (as reported earlier), when this is broken down in terms of linguistic cue use, a clear link between the underlying graphic, phonemic, syntactic and semantic cues and self correction is evident. The results indicate that LD children did make use of the same linguistic sources of information as the NLD children, however utilization of this information was not as effective.

With respect to the influence of text difficulty, the patterns of oral reading errors indicate that for both LD and NLD children the number of errors of "high graphic proximity" increased and the number of errors of "high phonemic similarity" remained virtually the same. Thus the hypothesis was supported for errors of "high graphic proximity".

"Syntactic" and "semantically highly acceptable" errors decreased for both groups as text difficulty increased, indicating support for the hypotheses regarding the nature of text difficulty on error behaviour and contextual linguistic cues.

In terms of the influence on self corrections and uses of linguistic cue sources as the task difficulty level increased, the LD children slightly increased their correction of errors having "high graphic proximity" and "high phonemic similarity", while the NLD children self corrected fewer of these error types when the task became more demanding. Both groups showed a decrease in their self correction of "syntactically" and "semantically highly acceptable" errors as text difficulty level increased.

Errors, self corrections and meaning change

Pflaum (1979, 1980) has used a taxonomy for categorizing miscues which varies from that of Goodman and Burke (1973), Pohl (1981) and Clay (1979). Pflaum uses the categories of "no meaning change", "non severe meaning change" (Pflaum uses the term "meaning change") and "severe meaning change" to code the miscues made during oral reading. This categorization scheme was used here by determining within these three categories whether the miscues were "uncorrected" (that is, no attempt at correction), "successfully corrected" and "unsuccessful attempts at correction" (see Appendix G).

It was hypothesized here that as a percentage of total tallied miscues, the LD children would make more "severe meaning change" miscues than the NLD children. When viewed in terms of correction, it was anticipated that the LD group would make more "uncorrected", "unsuccessfully corrected", and both "uncorrected" and "unsuccessfully corrected" "severe meaning change" errors than the NLD group. In addition, it was predicted that the "severe meaning change" errors as a percentage of total miscues would be self corrected less by the LD children. Further, it was hypothesized that both groups would make more "severe meaning change" miscues at the difficult level in comparison to the easy level. Analyses relating to errors and self corrections at each level of meaning change were performed in addition to those relating to the central hypotheses above.

The proportion of "no meaning change" miscues to total tallied miscues were expressed as a percentage for the easy and difficult passage. That is, the number of easy passage "no meaning change" miscues were summed and divided by the total of the easy errors and self corrections (total tallied miscues), and multiplied by 100. The same procedure was adopted for the difficult passage. Thereafter the same method was used for the number of easy passage "no meaning change" uncorrected errors, the easy passage "no meaning change" successfully corrected errors, the easy passage "no meaning change" unsuccessful attempts at correction, and the easy passage "no meaning change" uncorrected and unsuccessful attempts at correction combined. Each of the percentages derived for the "no meaning change" miscues were similarly derived for the "non severe meaning change" and "severe meaning change miscues". The percentages are presented in Table 23 in terms of group and level.

At a general level, it can be seen that most of the miscues made in relation to the total number of tallied miscues at both the easy and the difficult level were "severe meaning change" miscues. Based on mean percentage scores alone, at the difficult level, "severe meaning change" miscues were approximately nine times more frequent than either "no meaning" or "non severe meaning" change miscues for the LD group, and approximately six times more frequent than "no meaning change" and seven times more frequent than "non severe meaning change" miscues for the NLD group.

A series of 2 x 2 (Group x Gender) ANOVAs was applied to the data. At the easy and difficult level no significant main nor interaction effects were found for the total of "no meaning change" miscues and the total of "non severe meaning change" miscues (see Table 24). No significant main and interaction effects were found on the easy passage for the total of "severe meaning change" miscues, however a significant main effect for Group was found at the difficult level (see Table 24). Here the LD children made significantly more "severe meaning change" miscues than did the NLD children. There were no significant Gender or Group by Gender effects on the difficult passage in terms of "severe meaning change" miscues (see Table 24).

As a result of the ANOVAs at both the easy and difficult level there were no significant main effects for Group or Gender or interaction effects for uncorrected "no meaning change" errors (see Table 24). Analyses were not performed for successfully corrected "no meaning change errors" nor unsuccessful attempts at correction of "no meaning change" errors because of the small numbers of children making these types of miscues. No significant main or interaction effects, at both difficulty levels were found for "no meaning change" errors where uncorrected and unsuccessfully corrected errors were combined (see Table 24).

Due to the small numbers of children making "non severe meaning change" errors that had been successfully corrected and also those where unsuccessful attempts at correction had been made, these variables were not subjected to further analyses. The findings of the ANOVAs for "non severe meaning change" errors where no attempt at correction had been made, and where both uncorrected and unsuccessful attempts at correction were made revealed no significant differences (see Table 24).

The only significant differences with regard to the "severe meaning change" miscues related to unsuccessful attempts at correction and both uncorrected and unsuccessful correction attempts at the difficult level (see Table 24). Specifically, at the difficult level, a significant main effect for Group was found on the unsuccessful attempts at correction for "severe meaning change" errors (see Table 24). That is, the LD children unsuccessfully attempted to correct their "severe meaning change" errors more frequently than the NLD children at the difficult level. There were no significant Gender or Group by Gender interaction effects.

When results of the ANOVA for the "severe meaning change" errors both where no attempt at correction and the unsuccessful correction attempts were considered at the difficult level, a significant main effect for Group was revealed (see Table 24). Here again the LD children made more "severe meaning change" errors which they either did not attempt to correct or were unsuccessful at correcting than the NLD group. This finding is likely to have been influenced by the significant finding at the difficult level for unsuccessful correction attempts of "severe meaning change" errors. There were no significant Gender or Group by Gender effects for the "severe meaning change" errors which had not been corrected or were unsuccessfully corrected (see Table 24).

Summary. The results of the ANOVAs with respect to the meaning cue use for the easy and difficult Oral Reading Passage show that significant differences between the groups were found only at the difficult level. These differences pertained to the LD group, which in comparison to the NLD group, made more "severe meaning change" miscues in total as a function of total tallied miscues. Thus, the hypothesis that the LD children would make more "severe meaning change" miscues was supported at the difficult level. The hypotheses suggesting that the LD children would make more uncorrected "severe meaning change" errors than the NLD children was not supported. However the results indicated that the LD children made more unsuccessfully corrected and both uncorrected and unsuccessfully corrected "severe meaning change" errors combined on the difficult passage than the NLD children. This provides support for the hypotheses at least at the difficult level. The hypothesis suggesting the LD children would be inferior in the successful correction of "severe meaning change" errors was not supported. In terms of percentages, the number of "severe meaning change" miscues did increase as task difficulty increased, supporting the hypothesis proposed.

Table 23

Summary Data for Percentages[a] of Meaning Cue Use Types

	LD			NLD		
	N	M	SD	N	M	SD
Total meaning cue use						
No meaning change						
Easy	30	24.59	32.98	26	20.76	29.96
Difficult	35	9.21	5.69	34	12.29	8.47
Non severe meaning change						
Easy	30	22.02	28.57	26	16.49	18.39
Difficult	35	9.41	7.56	34	10.34	9.79
Severe meaning change						
Easy	30	52.56	35.27	26	66.60	33.02
Difficult	35	80.98	9.52	34	76.03	12.54
No meaning change						
Uncorrected						
Easy	30	22.00	33.07	26	13.21	22.81
Difficult	35	8.01	5.82	34	10.68	7.11
Uncorrected and unsucc. corrected						
Easy	30	22.00	33.07	26	14.49	24.83
Difficult	35	8.49	5.84	34	10.68	7.11
Non severe meaning change						
Uncorrected						
Easy	30	10.15	17.65	26	6.23	13.06
Difficult	35	7.01	6.83	34	7.55	7.96

Uncorrected and unsucc. corrected						
Easy	30	10.52	17.79	26	7.43	10.61
Difficult	35	7.59	6.83	34	7.62	7.94
<u>Severe meaning change</u>						
Uncorrected						
Easy	30	17.92	24.65	26	29.39	32.29
Difficult	35	44.71	14.66	34	41.77	12.30
Successfully corrected						
Easy	30	32.68	30.47	26	31.30	31.20
Difficult	35	22.86	13.49	34	28.31	17.07
Unsuccessfully corrected						
Easy	30	1.96	6.76	26	5.91	13.03
Difficult	35	13.41	11.51	34	5.95	6.51
Uncorrected and unsucc. corrected						
Easy	30	19.88	24.39	26	35.30	33.35
Difficult	35	58.12	13.07	34	47.72	14.03

[a]Types of meaning cue use as a percentage of total tallied miscues.

Table 24

Summary of ANOVA Data for
Meaning Cue Use Types

	df	MS	F	p
Total meaning cue use				
No meaning change (Easy)				
Group	1	73.906	0.07	0.79
Gender	1	145.832	0.14	0.71
Group by Gender	1	85.066	0.08	0.76
Residual	52	1034.041		
No meaning change (Difficult)				
Group	1	107.835	2.10	0.15
Gender	1	122.999	2.40	0.13
Group by Gender	1	3.131	0.06	0.81
Residual	65	51.293		
Non severe meaning change (Easy)				
Group	1	182.619	0.30	0.59
Gender	1	35.566	0.06	0.81
Group by Gender	1	299.498	0.49	0.49
Residual	52	611.387		
Non severe meaning change (Difficult)				
Group	1	69.171	0.91	0.34
Gender	1	64.603	0.85	0.36
Group by Gender	1	118.379	1.56	0.22
Residual	65	75.952		
Severe meaning change (Easy)				
Group	1	1341.639	1.13	0.29
Gender	1	56.359	0.05	0.83
Group by Gender	1	1684.857	1.42	0.24
Residual	52	1185.386		

Severe meaning change (Difficult)				
Group	1	547.138	4.462	0.04 *
Gender	1	13.089	0.107	0.75
Group by Gender	1	272.222	2.220	0.14
Residual	65	122.610		

<u>No meaning change</u>

Uncorrected (Easy)				
Group	1	698.017	0.82	0.37
Gender	1	6.040	0.01	0.93
Group by Gender	1	324.010	0.38	0.54
Residual	52	853.599		
Uncorrected (Difficult)				
Group	1	63.370	1.54	0.22
Gender	1	145.878	3.55	0.06
Group by Gender	1	0.173	0.00	0.95
Residual	65	41.113		
Uncorrected and unsucc. corrected (Easy)				
Group	1	464.363	0.52	0.48
Gender	1	53.707	0.06	0.81
Group by Gender	1	523.092	0.58	0.45
Residual	52	894.961		
Uncorrected and unsucc. corrected (Difficult)				
Group	1	45.021	1.08	0.30
Gender	1	117.229	2.81	0.10
Group by Gender	1	0.697	0.02	0.90
Residual	65	41.658		

<u>Non severe meaning change</u>

Uncorrected (Easy)				
Group	1	201.146	0.79	0.38
Gender	1	33.211	0.13	0.72
Group by Gender	1	32.702	0.13	0.72
Residual	52	254.341		

Uncorrected (Difficult)				
Group	1	33.406	0.61	0.44
Gender	1	40.726	0.74	0.39
Group by Gender	1	69.464	1.26	0.27
Residual	65	55.047		
Uncorrected and unsucc. corrected (Easy)				
Group	1	181.893	0.70	0.41
Gender	1	41.715	0.16	0.69
Group by Gender	1	127.359	0.49	0.49
Residual	52	260.554		
Uncorrected and unsucc. corrected (Difficult)				
Group	1	14.027	0.26	0.62
Gender	1	43.586	0.79	0.38
Group by Gender	1	65.829	1.20	0.28
Residual	65	54.944		

Severe meaning change

Uncorrected (Easy)				
Group	1	704.970	0.88	0.35
Gender	1	1365.611	1.70	0.20
Group by Gender	1	566.568	0.70	0.41
Residual	52	804.648		
Uncorrected (Difficult)				
Group	1	174.366	0.94	0.34
Gender	1	104.138	0.56	0.46
Group by Gender	1	155.420	0.84	0.36
Residual	65	184.700		
Successfully corrected (Easy)				
Group	1	0.071	0.00	0.99
Gender	1	1988.365	2.11	0.15
Group by Gender	1	230.496	0.25	0.62
Residual	52	771.977		

Successfully corrected (Difficult)					
Group	1	221.677	0.94	0.34	
Gender	1	452.986	1.92	0.17	
Group by Gender	1	54.841	0.23	0.63	
Residual	65	235.735			
Unsuccessfully corrected (Easy)					
Group	1	106.974	1.04	0.31	
Gender	1	229.345	2.23	0.14	
Group by Gender	1	4.253	0.04	0.84	
Residual	52	102.687			
Unsuccessfully corrected (Difficult)					
Group	1	628.758	7.19	0.01	**
Gender	1	215.990	2.47	0.12	
Group by Gender	1	11.377	0.13	0.72	
Residual	65	87.431			
Uncorrected and unsucc. corrected (Easy)					
Group	1	1361.173	1.69	0.20	
Gender	1	2714.234	3.38	0.07	
Group by Gender	1	668.994	0.83	0.37	
Residual	52	803.656			
Uncorrected and unsucc. corrected (Difficult)					
Group	1	1465.344	8.25	0.01	**
Gender	1	620.080	3.49	0.07	
Group by Gender	1	82.696	0.47	0.50	
Residual	65	177.535			

* p<.05

** p<.01

Signaled Monitoring

Types of signaled monitoring

The Monitoring Device (Bleep) was used to signal awareness that an error had been made or that a change had been made (that is, an attempt at correction had been made) during oral reading. To establish the number of different types of signaled monitoring per 100 words, the easy and difficult passages were treated separately. For each individual the total of each bleep type was calculated as a percentage of total words in the passage. That is, for example, the number of easy level "unbleeped" miscues was summed, divided by the number of words in the easy level passage and multiplied by 100. The procedure was carried out for all types of signaled monitoring ("unbleeped", "bleeped prior to miscue", "bleeped during miscue", "bleeped immediately after miscue", "bleeped one or more words after miscue" and "bleeped when there was no miscue").

It was hypothesized that both groups would make the same range of bleep types. However, LD children would make more "unbleeped miscues" and "bleeps when there was no miscue", and fewer "bleeps before", "during", "immediately after" and "one or more words after" the miscues per 100 words than the NLD children.

Table 25 presents the percentages of the different types of signed monitoring behaviour. Particularly on the easy passage the number of children making the different types of bleeps may be small. This was due to the fact that not all the children made bleeps of that type.

When consideration was given to signaled monitoring, "bleeping" behaviour was considered for both tallied and untallied miscues combined. That is, any time a bleep was made irrespective of what type of miscue it was associated with, it was considered.

The number of children who signaled monitoring by using the Bleep on the easy passage "prior to the miscue (N=3), "during the miscue" (N=4), "immediately after the miscue" (N=26), "one or more words after the miscue" (N=21), and when there was "no miscue" (N=7) were too small to warrant further analysis. Results of the ANOVA on the easy passage revealed a statistically significant difference between the groups on the easy passage in terms of "unbleeped" miscues (see Table 26). Specifically, the LD children made more "unbleeped" responses per 100 words than the NLD children. There were no Gender or Group by Gender interactions for "unbleeped" miscues on the easy passage.

Analyses were not performed at the difficult level for signaled monitoring "prior to the miscue" (N=15)", and "when there was no miscue" (N=15) because of the small number of children making these responses. No main or interaction effects were revealed as a result of the ANOVAs performed on the difficult passage for signaled monitoring "during the miscue" and "immediately after the miscue". A significant main effect for Group was found on the difficult passage for the "unbleeped" category (see Table 26). Here the LD children made more "unbleeped" responses per 100 words than the NLD children. There were no significant Gender or Group by Gender effects for the "unbleeped" category on the difficult passage. No significant main effects were found for miscues that had been "bleeped one or more words after the miscue", however a significant interaction effect was found (see Table 26). This effect was due to more "bleeps being made one or more words after the miscue" per 100 words by the LD males than the LD females (LD males $\underline{M}$ = 0.95, LD females $\underline{M}$ = 0.41), whereas the NLD females bleeped more words per 100 "one or more words after the miscue" than the NLD males (NLD females $\underline{M}$ = 0.92, NLD males $\underline{M}$ = 0.45).

Summary. The results indicated that the hypothesis that both groups would make the complete range of bleep types was supported. Furthermore, support was given to the prediction that LD children would make more "unbleeped" responses per 100 words than the NLD children. This was the case for both the easy and the difficult levels. However, the hypotheses that LD children would make more "bleeps where there was no miscue" and less bleeps "prior to" the miscue could not be tested because of the small number of children making bleeps of these types. The hypotheses that LD children would signal monitoring less "during", "immediately after" and "one or more words after the miscue" than NLD children were not supported.

Table 25

Summary Data for Percentages[a] of Types of Signaled Monitoring per 100 Words

	LD			NLD		
	N	M	SD	N	M	SD
Unbleeped						
Easy	35	4.92	3.75	34	2.36	2.21
Difficult	35	15.30	7.94	34	6.53	2.87
Bleeped during						
Difficult	35	2.23	3.70	34	0.71	1.01
Bleeped immediately after						
Difficult	35	3.42	3.44	34	2.30	1.86
Bleeped one or more words after						
Difficult	35	0.81	0.94	34	0.66	0.82

[a]Each percentage as a function of the number of words in the passage.

Table 26

Summary of ANOVA Data for Types of Signaled Monitoring per 100 Words

	df	MS	F	p
Unbleeped (Easy)				
Group	1	97.133	10.101	0.00 **
Gender	1	5.953	0.619	0.43
Group by Gender	1	1.921	0.200	0.66
Residual	65	9.616		
Unbleeped (Difficult)				
Group	1	917.571	25.91	0.00 ***
Gender	1	85.688	2.42	0.13
Group by Gender	1	37.373	1.06	0.31
Residual	65	35.412		
Bleeped during (Difficult)				
Group	1	18.347	2.49	0.12
Gender	1	2.833	0.38	0.54
Group by Gender	1	17.092	2.32	0.13
Residual	65	7.380		
Bleeped immediately after (Difficult)				
Group	1	10.807	1.38	0.24
Gender	1	2.437	0.31	0.58
Group by Gender	1	6.245	0.80	0.38
Residual	65	7.817		
Bleeped one or more words after (Difficult)				
Group	1	0.00	0.00	0.95
Gender	1	0.01	0.02	0.87
Group by Gender	1	3.85	5.13	0.03 *
Residual	65	0.75		

* p<.05

** p<.01

*** p<.001

Signaled monitoring and linguistic cue use

It was hypothesized that LD children would be less aware that comprehension had failed than the NLD children. One measure of comprehension monitoring was through use of the Monitoring Device (Bleep). The children indicated that they had made an error or changed what they first read by signaling their awareness. It was expected that LD children would be less able to detect that they had made an error, that is they would bleep errors less. Errors refer to uncorrected errors (that is no attempt at correction was made), abandoned correct words, and unsuccessful attempts at correction.

The analyses were applied to the tallied miscues: "substitutions", "insertions", "omissions", "reversals", "complex substitutions", "complex reversals" and "partial word substitutions". In order to derive the percentage of bleeped errors for each individual the following procedure was adopted. Bleeped errors were treated separately for the easy and difficult Oral Reading Passage. The total of the easy passage errors that were bleeped was divided by the total of all easy passage errors and corrections (total tallied miscues), and multiplied by 100. The same procedure was adopted for the difficult passage.

It should be noted that not all children made bleeped errors in relation to the total number of errors and corrections. This is particularly so on the easy passage where fewer errors were made. Table 27 presents a summary of the percentages of bleeped errors in terms of group (LD, NLD) and passage (easy, difficult).

Two-way ANOVAs (Group x Gender) were performed separately for the easy and difficult passage in terms of bleeped errors. The results of the ANOVAs showed no significant main or interaction effects on the easy or the difficult passage (see Table 28). The hypothesis that the LD children were less able to detect that they had made an error, as measured by the Monitoring Device was not supported.

By combining the two indices of comprehension monitoring (that is, awareness of comprehension monitoring through use of the Bleep and the use of self correction), investigation of the awareness of self correction during oral reading could be undertaken.

The percentage of bleeped self corrections were derived for each individual for both levels of difficulty. Bleeped successful corrections were summed for the easy passage, divided by the total of easy errors plus corrections (total tallied miscues), and multiplied by 100. The same procedure involving difficult bleeped successful corrections was used for the difficult passage.

Table 27 includes the percentage of bleeped self corrections in terms of group and level of difficulty. Not all the children made bleeped self corrections, particularly at the easy level. This is a manifestation of the fact that not all the children made errors at this level. Scrutiny of Table 27 reveals that both groups bleeped fewer self corrections at the difficult level than at the easy level.

The 2 x 2 ANOVA of the bleeped self corrections on the easy passage revealed no statistically significant main or interaction effects (see Table 28). For the difficult passage there was a significant Group effect, with the LD children bleeping fewer self corrections than the NLD children (see Table 28). There were no significant effects for Gender or Group by Gender. The hypothesis, that LD children would be less aware that they had self corrected during oral reading was accepted for the difficult passage.

Awareness of monitoring, in terms of detection of comprehension failure and the application of corrective actions, and its relationship to linguistic cue use was also investigated. Of interest specifically, was the relationship between monitoring as measured by the "Bleep" and "graphic", "phonemic", "syntactic" and "semantic" errors and corrections.

Following on from the hypothesis that the LD children would be less able to detect their errors as measured by the signaled monitoring, it was further hypothesized that the LD children, in comparison to NLD children, would not signal their monitoring of errors with "no graphic proximity" and no "phonemic similarity" as frequently as NLD children. Nor would the LD group bleep errors that were "syntactically unacceptable" and "semantically unacceptable" more than the NLD group. Following on also from the hypotheses that LD children would be less aware of their self corrections, it was hypothesized that in comparison to NLD children, the LD children would bleep fewer of their self corrections of errors bearing "no graphic proximity", "no phonemic similarity", "no syntactic" and "no semantic acceptability". In addition to these central hypotheses, further analyses were performed for signaled monitoring at each of the levels of the different linguistic cue sources for both errors and self corrections.

The procedures adopted for the analyses of the miscues in terms of the linguistic cues (refer previous section) were also used here except that the bleep variable was added to the numerator. That is the percentages of bleeped miscues within each linguistic category for both errors and self corrections on the two levels of difficulty were established for each individual. For example, the total of bleeped errors on the easy passage for each linguistic category was divided by the total number of easy errors and corrections (total tallied miscues), and multiplied by 100. In addition, this procedure was followed at the difficult level. Thereafter the procedures were also used for the bleeped self corrections, with the respective total of easy or difficult tallied miscues for the denominator. Bleeps were defined as "bleeps occuring before", "during". "immediately after" or "one or more words after the miscue". Bleeps made "where there was no miscue" were not included. Particularly on the easy passage, it could have happened for any one individual that none of the miscues of a particular linguistic type were bleeped, or that all of the miscues of a particular linguistic type were bleeped. This has resulted in large variances. Table 27 summarizes the percentages of linguistic cue use in terms of bleeped errors and bleeped self corrections, LD and NLD children and easy and difficult Oral Reading Passage.

A glance at Table 27 indicates that for LD children the ratio of bleeped errors to bleeped corrections, at the easy level, shows more bleeped self corrections (10:24). At the easy level, the ratio of bleeped errors to self corrections for the NLD group is 19:30, also

Table 27

Percentages of Signaled Monitoring of Errors and Self Corrections in terms of Linguistic Cue Use

	LD						NLD					
	Easy			Difficult			Easy			Difficult		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Bleeped errors[a]	30	9.85	26.47	35	21.54	16.20	26	18.51	23.89	34	15.26	15.28
Graphic[b]	30	8.18	25.41	35	15.19	11.47	26	14.93	23.88	34	14.31	14.97
Phonemic	30	8.18	25.41	35	15.19	11.47	26	14.93	23.88	34	4.31	14.97
Syntactic	30	6.04	20.28	35	16.01	15.34	26	14.96	22.73	34	11.54	13.05
Semantic	30	4.37	18.52	35	9.66	8.21	26	11.38	22.35	34	10.59	12.81
Bleeped self corrections[a]	30	23.78	29.68	35	10.22	11.05	26	29.88	30.36	34	19.77	13.29
Graphic[b]	30	21.63	28.36	35	9.71	10.46	26	24.97	29.31	34	17.27	11.57
Phonemic	30	21.63	28.36	35	9.71	10.46	26	24.97	29.31	34	17.27	11.57
Syntactic	30	17.57	28.73	35	7.31	8.65	26	17.82	23.13	34	10.26	8.75
Semantic	30	15.43	28.40	35	6.80	8.10	26	12.91	22.52	34	7.99	7.23

[a]Bleeped errors and bleeped self corrections as a percentage of total tallied miscues.
[b]Bleeped errors and bleeped self corrections in terms of linguistic cue use as a percentage of total tallied miscues.

Table 28

Summary of ANOVA Data for Signaled
Monitoring of Errors and Self Corrections

	df	MS	F	p
Bleeped errors				
Easy				
Group	1	1206.326	1.89	0.18
Gender	1	371.889	0.58	0.45
Group by Gender	1	890.563	1.39	0.24
Residual	52	639.789		
Difficult				
Group	1	238.772	0.97	0.33
Gender	1	105.986	0.43	0.52
Group by Gender	1	518.194	2.10	0.15
Residual	65	246.888		
Bleeped self corrections				
Easy				
Group	1	545.831	0.59	0.45
Gender	1	53.638	0.59	0.81
Group by Gender	1	154.710	0.17	0.69
Residual	52	930.184		
Difficult				
Group	1	1433.178	9.61	0.00 **
Gender	1	138.014	0.93	0.34
Group by Gender	1	111.782	0.75	0.39
Residual	65	149.177		

** p<.01

with more bleeped self corrections. Turning now to the difficult level, the ratio of bleeped errors to bleeped self corrections is 22:10 and 15:20 for LD and NLD children respectively.

When consideration is given to the linguistic relationships between what was read and the text word the LD children increased the percentage of bleeped errors from the easy to the difficult level, while for the NLD children the percentages remained relatively stable. For the bleeped self corrections the percentage decreased from the easy to the difficult Oral Reading passage for both groups.

The data were analyzed by a series of 2 x 2 (Group x Gender) ANOVAs. The analyses were undertaken in terms of errors, self corrections and for each linguistic cue system.

Graphic proximity. The degree of graphic proximity between the observed and expected responses were coded as "no graphic proximity", "some graphic proximity" or "high graphic proximity" (see Appendix G). Summary of the percentage of miscues where monitoring was signaled in terms of graphic proximity is found in Table 29).

Only a few children made bleeped errors and bleeped self corrections having "no graphic proximity" and therefore analyses were not undertaken for these variables.

No significant main or interaction effects were found for bleeped errors having "some graphic proximity" at the easy level. A significant main effect for Group was revealed at the difficult level (see Table 30). This table indicates that LD children made more bleeped errors with "some graphic proximity" than the NLD children. There was no Gender effect or interaction effect (see Table 30).

In terms of bleeped self corrections with "some graphic proximity" there were no significant main or interaction effects on the easy passage. However, on the difficult passage, a main effect for Group showed that the NLD group were more likely to bleep self corrected errors that had "some graphic proximity". There were no other significant effects (see Table 30). Too few children bleeped errors or self corrections with "high graphic proximity" to warrant further analyses.

Summarizing the findings in terms of bleeped miscues and graphic proximity, the group differences occurred only at the difficult level. The LD children made proportionately more bleeped errors with "some graphic proximity", while NLD children were more likely to make bleeped self corrections bearing "some graphic proximity" to the text word. Thus, the LD group differed from the NLD group in their awareness of errors with "some graphic proximity". Awareness of comprehension failure and subsequent "fix-up" strategies, as measured by the signaled monitoring of self corrections, also indicated that the two groups differed in terms of the observed responses having "some graphic proximity".

Phonemic similarity. Phonemic similarity between the miscues and the text words was indicated by coding the miscues as having "no phonemic similarity", "some phonemic similarity" or "high phonemic similarity" (see Appendix G). Table 29 presents the percentage of miscues where monitoring was signaled in terms of phonemic similarity.

Errors and self corrections with "no phonemic similarity" that had been bleeped were not analyzed using ANOVAs as there were too few children making such miscues. No significant effects were found for bleeped errors involving "some phonemic similarity" at either difficulty level (see Table 30).

At the easy level there were no significant main or interaction effects for self correction of errors where there was "some phonemic similarity" and where the children had signaled monitoring. However at the difficult level a significant main effect for Group was found (see Table 30). Here the NLD children bleeped more self corrections with "some phonemic similarity" than the LD children.

In terms of both errors and self corrections with "high phonemic similarity" which were bleeped, no analyses were performed due to the small number of children signaling monitoring of miscues of this type.

In sum, the only significant difference between groups in terms of phonemic cue use was found at the difficult level for errors of "some phonemic similarity" that had been self corrected and bleeped.

Table 29

Summary Data for Percentages for Signaled Monitoring of Miscues in terms of Graphic Proximity and Phonemic Similarity[a]

	LD			NLD		
	N	M	SD	N	M	SD
Graphic proximity						
Some proximity						
Errors						
Easy	30	4.18	18.39	26	7.20	15.96
Difficult	35	10.54	9.33	34	6.21	7.09
Self corrections						
Easy	30	15.59	27.61	26	13.30	11.22
Difficult	35	5.16	6.48	34	22.73	8.48
Phonemic similarity						
Some similarity						
Errors						
Easy	30	5.85	20.17	26	8.06	15.13
Difficult	35	12.85	9.77	34	11.71	12.70
Self corrections						
Easy	30	15.80	28.07	26	17.31	27.59
Difficult	35	5.79	7.59	34	13.00	9.57

[a]Percentages of bleeped errors and self corrections and linguistic cue use as a function of total tallied miscues.

Table 30

Summary of ANOVA Data for Signaled Monitoring of Miscues in terms of Graphic Proximity and Phonemic Similarity

	df	MS	F	p
Graphic proximity				
Some Proximity				
Errors (Easy)				
Group	1	235.614	0.81	0.37
Gender	1	214.736	0.74	0.39
Group by Gender	1	784.083	2.69	0.11
Residual	52	291.023		
Errors (Difficult)				
Group	1	279.898	4.00	0.05 *
Gender	1	22.282	0.32	0.58
Group by Gender	1	45.529	0.65	0.42
Residual	65	69.983		
Self corrections (Easy)				
Group	1	100.880	0.15	0.70
Gender	1	25.212	0.04	0.85
Group by Gender	1	14.203	0.02	0.89
Residual	52	672.665		
Self corrections (Difficult)				
Group	1	622.812	10.71	0.00 **
Gender	1	0.184	0.00	0.96
Group by Gender	1	19.857	0.34	0.56
Residual	65	58.147		

Phonemic similarity

Some similarity					
Errors (Easy)					
Group	1	188.521	0.58	0.45	
Gender	1	6.040	0.02	0.89	
Group by Gender	1	565.289	1.73	0.19	
Residual	52	325.947			
Errors (Difficult)					
Group	1	26.254	0.20	0.66	
Gender	1	5.878	0.05	0.83	
Group by Gender	1	11.474	0.09	0.77	
Residual	65				
Self corrections (Easy)					
Group	1	2.215	0.00	0.96	
Gender	1	2.536	0.00	0.96	
Group by Gender	1	165.515	0.21	0.65	
Residual	52	802.211			
Self corrections (Difficult)					
Group	1	754.299	9.96	0.00	**
Gender	1	46.984	0.62	0.43	
Group by Gender	1	8.991	0.12	0.73	
Residual	65	75.724			

* p<.05

** p<.01

The NLD group made proportionately more of such bleeped self corrections than the LD group. Thus, awareness of self correction of errors with phonemic similarity was found to be significantly different only for errors of "some phonemic similarity".

Syntactic acceptability. The relationship between the observed and expected response in terms of syntax was coded as being "not syntactically acceptable", "syntactically acceptable only with the prior portion of the sentence", "syntactically acceptable only with following portion of the sentence", and "highly syntactically acceptable". However due to the small numbers of children who signaled their awareness of both the errors and self corrections of these types, no analyses were performed.

Semantic acceptability. Semantic acceptability was coded following comparison of the child's miscue and the expected response in terms of "no semantic acceptability", "retention of the base word", "semantic acceptability with the prior portion of the sentence", "semantic acceptability with the following portion of the sentence", and "high semantic acceptability". However, data relating to each of these categories were not analyzed as too few children bleeped these types of miscues at both difficulty levels.

Summary. Too few children bleeped errors with "no graphic" and "no phonemic similarity" for analyses to be performed and therefore the hypotheses that LD children would less frequently signal monitoring of words most unlike the expected response in terms of graphic and phonemic similarity than the NLD children could not be tested. However, while no significant differences were found between the groups in terms of the detection or awareness that errors had been made, as measured by the Bleep (reported earlier), one difference was found between the groups when the results of the bleeping of errors of different linguistic cue types were analyzed. Specifically, at the difficult level, the LD children bleeped more errors of "some graphic proximity" to the text word than the NLD children. The hypotheses that in comparison to the NLD children, the LD children would less likely indicate monitoring of "syntactically" and "semantically unacceptable" errors also could not be tested because of the small number of children bleeping these error types.

The findings reported earlier relating to the awareness of self corrections indicated that no differences were found between the groups on the easy passage, although a significant Group effect was found for the difficult passage. That finding suggested that the NLD children were more aware than the LD children that they had self corrected. Turning now to the study of bleeped self corrections in relation to linguistic cue use. The hypotheses suggested that LD children would bleep fewer self corrections having "no graphic proximity" and "no phonemic similarity" than the NLD children. However the small numbers of children bleeping these self corrected miscue types prevented the hypotheses being tested. Similarly, too few children bleeped self corrections having "no syntactic" and "no semantic acceptability", and therefore the hypotheses suggesting that LD children would bleep fewer self corrections having "no syntactic" and "no semantic acceptability" could not be tested. However, significant group differences were found at the difficult level indicating that the LD children had less awareness of self correcting errors bearing "some graphic proximity" and "some phonemic proximity" to the text word, as measured by the Bleep. Thus, in general the LD children were less aware of their self corrections when related to "some graphic" and "some phonemic" cue use than the NLD group at the difficult level.

Signaled monitoring and meaning change

Pflaum (nd), using the "Bleep" as a monitoring device, investigated the differences between groups in terms of the proportion of bleeped miscue types ("no meaning change", "non severe meaning change" and "severe meaning change") to the total number of bleeps.

Similarly, here the number of bleeped miscues of different types in the relation to the total number of bleeps was examined. Interest was focused on the relationship between signaled monitoring of different types of meaning cue use as a function of all signaled monitoring as indicated by the use of the Bleep. However unlike the Pflaum study, the children were not assigned to a bleep/no bleep condition, but rather all children were directed to use the Monitoring Device as a signal that they had made an error or changed what they first read. In addition, this study was interested in the effect of task difficulty (easy, difficult) on the miscues where awareness was signaled.

Specifically as a proportion of the total number of occasions that monitoring was signaled, it was hypothesized that all three types of meaning cue use would be bleeped: that is, "no meaning change", "non severe meaning change" and "severe meaning change" miscues. As it was anticipated in an earlier hypothesis that the LD children would signal monitoring of both errors and self corrections less frequently than the NLD children, it was in turn hypothesized here, that of the monitoring that was signaled, the "severe meaning change" errors and self corrections would also be bleeped less frequently by the LD group. However, it was also anticipated that the LD children would indicate their awareness of uncorrected and unsuccessfully corrected "severe meaning change" errors and the uncorrected and successfully corrected "severe meaning change" errors together, less frequently than the NLD children. In terms of difficulty level, it was anticipated that both groups would bleep the "total severe meaning change" miscues more at the easy than at the difficult level. Additional analyses were performed for signaled monitoring at each level of meaning change for errors and self corrections.

In order to derive the percentage of bleeped miscues of each type for each individual as a function of the total number of bleeps, the number of bleeped miscues of the different type of meaning cue were summed for the easy passage, divided by the total number of easy bleeped tallied miscues, and multiplied by 100. Bleeps included bleeping "prior", "during", "immediately after", and "one or more words after" the miscue (see Appendix G). The bleeps children made "when there was no miscue" were not included. The same procedure was used for the difficult passage. The percentage of total "no meaning change" miscues, total "non severe meaning change" miscues and total "total severe meaning change" miscues on the easy and difficult level were also calculated. Within the three categories (that is, "bleeped no meaning", "bleeped non severe meaning" and "bleeped severe meaning change"), the percentages for uncorrected errors, successful corrections, unsuccessful correction attempts, and uncorrected and unsuccessfully corrected errors combined, each in relation to the total of bleeped tallied miscues were determined. However, it should be noted that not all of the children made bleeped miscues, particularly on the easy passage where fewer miscues were made. In fact the numbers of children making bleeped miscues in the following categories were too small to warrant further analyses and were therefore omitted: total "bleeped no meaning change" miscues (N=22) and total "bleeped non severe meaning change" miscues (N=39) over both difficulty levels. As a consequence, no analyses were performed within these categories at the level of uncorrected, successfully corrected, unsuccessfully corrected, and both uncorrected and unsuccessfully corrected miscues. Table 31 shows the percentages of "severe meaning change" miscues that were bleeped. The fact that so very few children signaled monitoring of "no meaning change" and "non severe meaning change" miscues would tend to indicate that the children are more aware of the most extreme violations of meaning as indicated by their signaled monitoring. For both groups "severe meaning change" miscues were bleeped more frequently as task difficulty increased.

A significant main effect for Group was found following the ANOVA on the easy passage for bleeped uncorrected "severe meaning change" errors. Here, the NLD children made more bleeped uncorrected "severe meaning change" errors in relation to the number of bleeped tallied miscues than the LD children (see Table 32). There were no Gender or Group by Gender effects on the easy passage. On the difficult passage in terms of bleeped uncorrected "severe meaning change" errors there were no statistically significant differences (see Table 32).

The percentages of bleeped successfully corrected "severe meaning change" errors for LD and NLD children on the easy passage were not statistically significantly different (see Table 32). However the 2 x 2 ANOVA performed on the difficult passage revealed a significant main effect for Group (see Table 32). Here, on the difficult passage, the NLD children also made more bleeped successfully corrected "severe meaning change errors" than the LD children. There were no significant Gender or Group by Gender interaction effects.

In terms of bleeped unsuccessfully corrected "severe meaning change" errors on the easy passage there were no significant main or interaction effects (see Table 32). However, the results of the ANOVA on the difficult passage did reveal a significant difference. Here a significant main effect for Group was evident, with the LD children making more bleeped unsuccessful corrections of "severe meaning change" errors than the NLD children (see Table 32). There were no significant Gender or interaction effects.

Finally, with respect to bleeped "severe meaning change" errors that had been either uncorrected or unsuccessfully corrected, a significant main effect for Group was found on the easy passage and also on the difficult passage (see Table 32). The NLD children made more bleeped "severe meaning change" uncorrected and unsuccessfully corrected errors on the easy passage, the reverse was true at the difficult level. In neither case (easy or difficult passage) were there any Gender or interaction effects. However, these significant differences were undoubtedly influenced by the significant differences found between the groups when bleeped uncorrected "severe meaning change" errors and bleeped unsuccessfully corrected "severe meaning change" errors were treated separately.

Table 31

Summary Data for Percentages[a] of Signaled Monitoring and Types of Meaning Cue Use to Signaled Monitoring

	LD			NLD		
	N	M	SD	N	M	SD
Total signaled monitoring and meaning cue use						
Bleeped severe meaning change						
Easy	19	61.40	42.69	20	73.45	34.09
Difficult	33	87.41	18.40	32	86.18	21.27
Signaled monitoring and severe meaning change						
Bleeped uncorrected						
Easy	19	2.63	11.47	20	22.86	36.33
Difficult	33	35.57	32.01	32	27.65	25.42
Bleeped successfully corrected						
Easy	19	52.19	44.60	20	43.21	33.89
Difficult	33	27.94	27.55	32	48.39	32.09
Bleeped unsuccessfully corrected						
Easy	19	6.58	23.34	20	7.38	16.58
Difficult	33	23.90	27.81	32	10.14	13.23
Bleeped uncorrected and bleeped unsuccessfully corrected						
Easy	19	9.21	25.29	20	30.24	37.41
Difficult	33	59.47	29.14	32	37.79	27.29

[a]Types of bleeped meaning cue use as a percentage of bleeped tallied miscues (i.e., total bleeps).

Table 32

Summary of ANOVA Data for Signaled Monitoring and Types of Meaning Cue Use

	df	MS	F	p
Total signaled monitoring and meaning cue use				
Bleeped severe meaning change (Easy)				
Group	1	1019.290	0.65	0.42
Gender	1	38.282	0.03	0.88
Group by Gender	1	286.011	0.18	0.67
Residual	35	1559.460		
Bleeped severe meaning change (Difficult)				
Group	1	0.014	0.00	1.00
Gender	1	440.810	1.10	0.30
Group by Gender	1	2.891	0.01	0.93
Residual	61	400.274		
Signaled monitoring and severe meaning change				
Bleeped uncorrected (Easy)				
Group	1	3951.716	5.05	0.03 *
Gender	1	18.878	0.02	0.88
Group by Gender	1	51.908	0.06	0.80
Residual	35	782.163		
Bleeped uncorrected (Difficult)				
Group	1	254.245	0.30	0.58
Gender	1	772.794	0.92	0.34
Group by Gender	1	1111.744	1.33	0.25
Residual	61	837.983		

Bleeped successfully corrected (Easy)					
Group	1	1245.733	0.79	0.38	
Gender	1	4.197	0.00	0.96	
Group by Gender	1	2235.824	1.41	0.24	
Residual	35	1581.438			
Bleeped successfully corrected (Difficult)					
Group	1	4930.313	5.40	0.02	*
Gender	1	118.004	0.13	0.72	
Group by Gender	1	399.903	0.44	0.51	
Residual	61	913.425			
Bleeped unsuccessfully corrected (Easy)					
Group	1	18.997	0.05	0.83	
Gender	1	158.276	0.39	0.54	
Group by Gender	1	536.751	1.32	0.26	
Residual	35	407.675			
Bleeped unsuccessfully corrected (Difficult)					
Group	1	2958.021	6.01	0.02	*
Gender	1	16.478	0.03	0.86	
Group by Gender	1	135.606	0.28	0.60	
Residual	61	491.993			
Bleeped uncorrected and bleeped unsuccessfully corrected (Easy)					
Group	1	4518.698	4.27	0.05	*
Gender	1	67.831	0.06	0.80	
Group by Gender	1	922.496	0.87	0.36	
Residual	35	1058.628			
Bleeped uncorrected and bleeped unsuccessfully corrected (Difficult)					
Group	1	4946.696	6.17	0.02	*
Gender	1	1014.960	1.27	0.27	
Group by Gender	1	470.796	0.59	0.45	
Residual	61	801.824			

* $p<.05$

In addition to investigating the percentage of meaning cue types and signaled monitoring as a function of all signaled monitoring (that is, bleeped miscue types per total bleeped miscues), each meaning cue type where monitoring had been signaled was calculated as a percentage of that particular type of meaning cue. For example, for each individual the percentage of easy passage "severe meaning change" miscues that were bleeped were summed, divided by the total number of easy "severe meaning change" miscues, and multiplied by 100. A similar procedure was adopted for the difficult passage. The procedures were carried out for total "no meaning change", total "non severe meaning change" and total "severe meaning change" miscues. Within each of these types of meaning cue use the procedure was used for the "uncorrected", "successfully corrected", "unsuccessfully corrected" and both "uncorrected" and "unsuccessfully corrected" categories. Thus, attention here focused on the differences between the groups in terms of signaled monitoring of each different type of meaning change relative to the total of each different meaning change type. The hypotheses stated that less of the "severe meaning change" uncorrected, successfully corrected and both uncorrected and unsuccessfully corrected miscues would be bleeped by the LD children in comparison to the NLD children. Furthermore it was anticipated that the total of "severe meaning change" miscues would be bleeped more frequently at the easy level for both groups. Additional analyses were performed at each level of meaning change for all error and correction types.

Due to the small numbers of children indicating monitoring of "no meaning change" miscues (N=22), and "non severe meaning change" miscues (N=39) over both levels of difficulty, no further analyses were undertaken for the total of bleeped "no meaning change" miscues or for the total of bleeped "non severe meaning change" miscues. Nor were analyses performed for the levels within these categories, namely, uncorrected, successfully corrected, unsuccessfully corrected, and both uncorrected and unsuccessfully corrected "no meaning change" and "non severe meaning change" miscues. In addition, analyses were not performed for bleeped unsuccessfully corrected "severe meaning change" errors, due to the small number of children making this error type. Further, it should be noted that some children had no bleeped miscues of one particular meaning cue type in relation to the total of that meaning cue type, whereas some children may have had all the responses of one particular bleeped meaning cue type. As a result large variances in the data occurred. Table 33 presents the percentages of types of meaning cue use where monitoring was signaled in terms of group and difficulty level.

The ANOVAs for the total of bleeped "severe meaning change" miscues revealed a significant main effect for Group at the easy level (see Table 34), with the NLD group indicating monitoring of "severe meaning change" miscues to a greater extent than the LD group. There were no Gender or interaction effects. A significant Group by Gender interaction effect for the total of bleeped "severe meaning change" miscues was revealed at the difficult level (see Table 34). Here the NLD females bleeped more "severe meaning change" miscues than the other groups (NLD females $\underline{M}$ = 45.39, $\underline{SD}$ = 21.00; LD males $\underline{M}$ = 37.48, $\underline{SD}$ 20.70; NLD males $\underline{M}$ = 34.65, $\underline{SD}$ = 19.36; LD females $\underline{M}$ = 27.69, $\underline{SD}$ = 18.52). There were no significant main effects.

When differences between the groups were investigated for the uncorrected "severe meaning change" errors that had been bleeped as a proportion of uncorrected "severe meaning change" errors, the ANOVAs revealed a statistically significant main effect for Group at the easy level. Here the NLD children were much more likely to indicate monitoring of their uncorrected errors where meaning was severely distorted (see Table 34). There were no significant Gender or interaction effects. At the difficult level, there were no significant main or interaction effects for bleeped uncorrected "severe meaning change" errors.

A significant main effect for Gender was revealed at the easy level for successfully corrected "severe meaning change" errors that had been bleeped (see Table 34). Here, the female pupils bleeped more successfully corrected "severe meaning change" errors than their male peers (females $\underline{M}$ = 15.64, males $\underline{M}$ = 3.85). There was no significant

Table 33

Summary Data for Percentages[a] of Signaled Monitoring of Types of Meaning Cue Use to Types of Meaning Cue Use

	LD			NLD		
	N	M	SD	N	M	SD
Total signaled monitoring of meaning cue use						
Bleeped severe meaning change						
Easy	23	31.93	34.41	23	53.78	35.94
Difficult	35	34.96	20.36	34	39.38	20.51
Signaled monitoring of severe meaning change						
Bleeped uncorrected						
Easy	14	7.14	26.73	16	33.33	39.44
Difficult	35	24.11	23.10	34	21.70	21.63
Bleeped successfully corrected						
Easy	14	47.02	42.63	17	72.94	40.43
Difficult	33	34.82	32.04	31	58.35	32.60
Bleeped uncorrected and bleeped unsuccessfully corrected						
Easy	16	15.63	35.21	17	39.41	41.26
Difficult	35	32.33	21.40	34	26.93	22.80

[a]Types of bleeped meaning cue use as a percentage of types of meaning cue use.

Table 34

Summary of ANOVA Data for Signaled Monitoring of Types of Meaning Cue Use

	df	MS	F	p
Total signaled monitoring of meaning cue use				
Bleeped severe meaning change (Easy)				
Group	1	6073.035	5.17	0.03 *
Gender	1	2166.899	1.85	0.18
Group by Gender	1	2608.629	2.22	0.14
Residual	42	1173.999		
Bleeped severe meaning change (Difficult)				
Group	1	822.941	2.03	0.16
Gender	1	3.367	0.01	0.93
Group by Gender	1	1568.466	3.87	0.05 *
Residual	65	405.765		
Signaled monitoring of severe meaning change				
Bleeped uncorrected (Easy)				
Group	1	5500.550	4.45	0.05 *
Gender	1	415.979	0.34	0.57
Group by Gender	1	85.946	0.07	0.79
Residual	26	1236.645		
Bleeped uncorrected (Difficult)				
Group	1	85.426	0.17	0.68
Gender	1	9.342	0.02	0.89
Group by Gender	1	1526.816	3.10	0.08
Residual	65	492.970		

Bleeped successfully corrected (Easy)					
Group	1	4371.078	2.92	0.10	
Gender	1	10839.163	7.25	0.01	**
Group by Gender	1	118.378	0.08	0.78	
Residual	32	1494.915			
Bleeped successfully corrected (Difficult)					
Group	1	10076.933	9.55	0.00	*
Gender	1	0.031	0.00	1.00	
Group by Gender	1	1413.207	1.34	0.25	
Residual	60	1055.417			
Bleeped uncorrected and bleeped unsuccess-fully corrected (Easy)					
Group	1	4509.463	2.912	0.10	
Gender	1	306.134	0.198	0.66	
Group by Gender	1	590.435	0.381	0.54	
Residual	29	1548.781			
Bleeped uncorrected and bleeped unsuccessfully corrected (Difficult)					
Group	1	467.420	0.96	0.33	
Gender	1	3.522	0.01	0.93	
Group by Gender	1	998.233	2.05	0.16	
Residual	65	488.175			

* $p \leq .05$

** $p < .01$

main effect for Group nor was there a significant interaction effect. At the difficult level, a significant main effect for Group was found for bleeped successfully corrected "severe meaning change" errors (see Table 34). Here, the NLD children, in comparison with the LD children, indicated monitoring successfully corrected "severe meaning change" errors to a greater extent. There were no Gender or interaction effects (see Table 34).

Where bleeped uncorrected and bleeped unsuccessfully corrected "severe meaning change" errors had been combined, there were no significant main or interaction effects for either the easy or difficult Oral Reading Passage (see Table 34).

Summary When monitoring was signaled, it was signaled for all three types of meaning cue use. However, across the two levels of difficulty, the numbers of children who bleeped "no meaning change" and "non severe meaning change" miscues were small. The findings of the statistical analyses in terms of signaled monitoring (bleeps) and meaning cue use in relation to total bleeped tallied miscues were limited only to the "severe meaning change" miscues.

No significant differences were found between the groups for bleeped "severe meaning change" miscues, therefore the hypothesis that LD children would bleep the "severe meaning change" miscues less than the NLD children was not supported. As a function of total number of bleeped tallied miscues, the NLD group bleeped more "severe meaning change" errors that were uncorrected at the easy level than the LD children. Thus the hypothesis was supported for the easy passage. NLD children also bleeped more "severe meaning change" errors that were successfully corrected at the difficult level than the LD children. The hypothesis that the LD children would bleep their self corrections of "severe meaning change" errors less frequently than the NLD children was therefore supported for the difficult level. However, on the difficult passage, as a function of the total number of bleeps, LD children signaled monitoring of "severe meaning change" errors where correction attempts were unsuccessful, more often than NLD children. The hypothesis that the LD children would bleep their unsuccessfully corrected "severe meaning change" errors less frequently was therefore not supported at the difficult level. In addition, in relation to the total number of occasions where signaled monitoring occurred at the easy level, "severe meaning change" errors that had been uncorrected plus unsuccessfully corrected and bleeped were more frequently made by the NLD children. On the difficult level, as a proportion of the total number of occasions when monitoring was signaled, the LD children bleeped the uncorrected plus unsuccessfully corrected "severe meaning change" errors more often than the NLD children. The hypothesis that the LD children would indicate the monitoring of both uncorrected and unsuccessfully corrected "severe meaning change" errors less than the NLD children was supported for the easy passage, but not for the difficult passage. Finally, the percentage of indicated monitoring of "severe meaning change" miscues increased as task difficulty increased for both groups, thus the hypothesis that children would indicate awareness of "severe meaning change" miscues at the easy level more than at the difficult level was not supported.

When seen as a proportion of particular types of meaning cue use, significant differences between the groups for signaled monitoring were limited to the "severe meaning change" miscues. At the easy level, NLD children indicated monitoring the total of "severe meaning change" miscues and uncorrected "severe meaning change" errors more frequently than the LD children. At the difficult level, the NLD group was found to indicate awareness of the successful correction of "severe meaning change" errors more than the LD children. Thus, the hypothesis suggesting that the LD children would be inferior in terms of indicating their monitoring of uncorrected "severe meaning change" errors was supported for the easy passage. Support was also found for the hypothesis relating to the successful correction of "severe meaning change" errors that were bleeped for the difficult level. The hypothesis relating to bleeped unsuccessfully corrected "severe meaning change" errors could not be tested as too few children bleeped this type of error. In terms of bleeped uncorrected plus bleeped unsuccessfully corrected errors, no differences between the groups were found at either difficulty level and therefore the hypothesis was not supported. While there was a lower percentage of signaled monitoring of "severe meaning change" miscues at the easy level in comparison with the difficult level for the LD group, the reverse was the case for the NLD group. As a result, the hypothesis suggesting that the total of "severe meaning change" miscues at the easy level would be bleeped more than at the difficult level for both groups was not supported. The hypothesis only held for the NLD group.

Metacognitive Knowledge

Self Report of Oral Reading Behaviour

The data comprising the Self Report of Oral Reading Behaviour were collected at points where the children signified awareness of making an error or changing what they had first read (bleeps), where children made correction attempts but did not signify awareness (unbleeped correction attempts), and at unbleeped repetitions. These points were considered to be indicative of monitoring at either a conscious or subconscious level. Specifically, the Self Report of Oral Reading data were collected at both "tallied" and "untallied" miscues. Tallied miscues include "substitutions", "insertions", "omissions", "reversals", "complex reversals", "complex substitutions" and "partial word substitutions". These types of miscues are subsequently referred to as "tallied" miscues. Untallied miscues include "repetitions", "sounding out", "substitution intonations" and "punctuation" and are subsequently referred to as "untallied" (see Appendix G). In addition, the Self Report of Oral Reading data also included information gathered in response to questions relating to signified awareness (bleeps) but where no error or correction occurred. Thus, data relating to bleeped tallied errors and correction attempts, unbleeped tallied correction attempts, bleeped untallied errors and correction attempts, unbleeped untallied corrections, unbleeped repetitions and bleeps where there were neither errors nor correction attempts were obtained. Repetitions that were bleeped were included in the "bleeped untallied errors" category. However, "unbleeped repetitions" were also designated as data collection points. This is because unbleeped repetitions were considered to be indicative of monitoring. With unbleeped repetitions awareness was not signaled (by the bleep), however the very nature of a repetition suggests that the reader was either trying to grasp what had been read prior to the repetition or was processing the next word or words.

Twenty pupils did not have data on the easy passage. These pupils included 2 children whose easy passage information was lost in the tape recording process, 13 children who made no tallied miscues on their easy passage, and 5 children where the criteria for collection of the Self Report data (described above) were not met for their easy passage. At the difficult level, information was lost for one child in the recording process. Therefore, 48 and 68 children took part in the Self Report of Oral Reading Behaviour for the easy and difficult levels respectively.

Further, not all the questions (see Appendix A) were asked at every possible data collection point. While this resulted in some data loss, this was done to avoid children falling into a response set and to prevent frustration, particularly for those children who on their difficult passage made numerous errors and correction attempts. Scrutiny of the data revealed that the intensity of the questioning was spread randomly across data collection points on both easy and difficult passages and across both LD and NLD children. In other words, irrespective of whether questioning occurred on the easy or the difficult passage, or concerned LD or NLD children the pattern of questioning was the same.

Before performing the statistical analyses the number of easy and difficult passage responses were scrutinized for each category in reply to each question. In a number of cases the number of responses in certain categories was so small (<12) that no analyses were undertaken. Where the number of responses was less than thirty a chi square analysis was applied. On all other occasions analyses of variance were performed. However, it is insufficient to look only at the number of responses. The number of responses should also be seen in terms of the number of individuals making those responses. Therefore, throughout the reporting of the results of the Self Report of Oral Reading Behaviour, reference is made both to the number of responses and the number of respondents.

In collecting the Self Report Data the tape of the child's Oral Reading was played back to the child at the data collection points. After listening to the tape the child was asked "what happened there?" At this point initial "don't know" responses were coded and analyzed separately. Table 35 includes the number of responses and the number of respondents for each group at the easy and the difficult level for the initial "don't know" responses. The chi square analysis revealed no significant difference (X^2 (1) = 0.05, p>.05) between the groups in terms of initial "don't know" responses on the difficult passage.

Where the children had responded that they did not know what had happened at a particular monitoring point the tape was replayed yet again. These children therefore had the opportunity to respond again and their replies were coded according to whether the type of reply they made involved a "global description" of what had happened (e.g., "made an error"), a "specific description" (e.g., "missed out a word"), or still showed no recognition of what had occurred (repeated "don't know") (see Appendix I). These subsequent explanations were coded and included in the response categories made by children who immediately were able to make global or specific descriptive statements at the data collection points.

Table 35 also includes the number of responses and the number of respondents for the following categories: "global description", "specific description", and "repeated don't know". As can be seen from this table very few children made "global descriptions" of what had happened or "repeated don't know" responses. When comparing the categories, the number of responses indicating a "specific description" of what had occurred was far greater for both groups at both levels of passage difficulty than either the "global description" or "repeated don't know" categories (see Table 35). This indicates that both LD and NLD children at both difficulty levels provided responses reflecting knowledge of what had happened in precise terms (e.g., "I missed out a word", "I repeated a word") more frequently than providing global descriptions (e.g., "I made a mistake") or still indicating no knowledge of what had occurred ("I don't know").

The chi square analysis of the easy passage specific descriptions revealed no significant difference (X^2(1) = 0.60, p>.05). Before the 2 x 2 (Group x Gender) ANOVA could be applied to the "specific description" responses on the difficult level, the percentage of difficult level "specific description" responses was derived for each individual using the following procedure. The number of difficult level "specific description" responses was summed, divided by the total number of difficult level monitoring points (bleeps, unbleeped correction attempts and unbleeped repetitions), and multiplied by 100. Results of the ANOVA revealed no significant main or interaction effects for "specific descriptions" on the difficult level. Therefore, at this level the LD children were as able to provide specific descriptions of what had occurred at a point of monitoring as the NLD children. Table 36 includes a summary of the means and standard deviations for "specific descriptions" at the difficult level. Table 37 includes a summary of the ANOVA data pertaining to "specific descriptions" at the difficult level.

Thus, the hypothesis that LD children would be less able to provide descriptions (that is, they would make more "don't know" responses) in comparison to NLD children was not supported. In addition, the hypothesis that in comparison to the NLD group, the LD group would make more "global", rather than "specific descriptions" of what happened at points of monitoring was not supported.

In order to determine whether the LD children would differ from the NLD children in terms of the correspondence between their reported description of what had happened and actual reading behaviour, the specific descriptive statements were initially dichotomously coded as being either "corresponding" or "not corresponding". Table 35 indicates the "correspondence/no correspondence" of the reported miscue type and actual miscue type. Due to the dichotomous nature of the coding only analyses related to the "correspondence" are reported here. The chi square analysis revealed no statistically significant differences ($X^2(1) = 0.78$, $p>.05$). To obtain the mean percentage of "correspondence" of reported miscue type and actual miscue type on the difficult passage, the number of corresponding difficult Oral Reading Passage responses was divided by the total number of difficult level specific descriptive statements and multiplied by 100. The mean percentages of responses indicating "correspondence" between the specific descriptive statements and actual reading behaviour in terms of group (LD, NLD) on the difficult passage are presented in Table 36.

The ANOVAs (Group x Gender) of "correspondence" on the difficult Oral Reading Passage revealed no statistically significant main or interaction effects (see Table 37). In sum, the hypothesis that LD

Table 35

Descriptions of Comprehension Monitoring and Correspondence with Oral Reading Behaviour

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Initial Response								
Don't know	20	63 (57)[a]	11	27 (56)[b]	15	47 (43)[a]	11	21 (44)[b]
Descriptions								
Global	2	7 (78)	2	6 (75)	5	2 (29)	3	2 (40)
Specific	59	444 (54)	26	35 (51)	58	375 (46)	22	33 (49)
Repeated Don't know	2	12 (57)	2	9 (56)	1	9 (63)	1	7 (44)
Total	63	463 (55)			64	386 (45)		
Correspondence with behaviour								
Correspondence	53	379 (55)	25	24 (51)	48	316 (45)	19	33 (49)
No correspondence	6	65 (52)	6	23 (48)	10	59 (48)	7	25 (52)
Total	59	444 (54)			58	375 (46)		

[a]Percentage of responses.
[b]Percentage of respondents.

Table 36

Percentages of Specific Descriptions and Correspondence With Oral Reading Behaviour

	LD			NLD		
	N	M	SD	N	M	SD
Specific description[a]	35	96.19	6.95	33	97.72	4.42
Correspondence[b]	35	85.69	14.47	33	84.15	11.46

[a]Difficult level "specific description" responses as a percentage of bleeps, unbleeped correction attempts, and unbleeped repetitions at the difficult level.
[b]Difficult level correspondence as a percentage of difficult levels "specific descriptions".

Table 37

Summary of ANOVA Data for Specific Descriptions and Correspondence with Oral Reading Behaviour

	df	MS	F	p
Specific Description (Difficult)				
Group	1	50.846	1.48	0.23
Gender	1	18.746	0.55	0.46
Group by Gender	1	38.991	1.13	0.29
Residual	64	34.420		
Correspondence (Difficult)				
Group	1	73.919	0.43	0.52
Gender	1	50.495	0.29	0.59
Group by Gender	1	149.298	0.86	0.36
Residual	64	173.509		

children's specific descriptions of what occurred at points of monitoring would correspond less with actual reading behaviour than those made by NLD children was not supported.

The reasons the children gave for their conscious and subconscious monitoring were sought by asking "why did you do that?" Of interest was whether there were different types of reasons for monitoring given by the two groups. It was hypothesized that in comparison to NLD children, LD children would provide more reasons for comprehension monitoring which mirror their conception of reading as a decoding process, rather than a meaning-getting activity. Initially, it was necessary to establish whether or not differences existed between the LD and NLD children in the number of responses relating to a specific category. For example, as a proportion of total reasons for monitoring were there differences between LD and NLD children in the number of times they gave "expectation of another word" as a reason for their monitoring? The reasons why were categorized as "expectation of another word", "reading on", "phonemic cues", "lack of concentration and other", "understanding", "previous error", "graphic cues", and "don't know" (see Appendix I).

The number of responses and the number of respondents in each category on the easy and difficult Oral Reading Passages are reported in Table 38. As can be seen from Table 38 the small number of responses deemed further analysis inappropriate for "reading on", "lack of concentration and other", "understanding", "previous error" and "don't know" at both levels of difficulty. However, analyses at the difficult level were undertaken for "expectation of another word", "phonemic cues" and "graphic cues".

Results of the chi square analysis on the difficult passage for the "expectation of another word" category revealed no statistically significant difference ($X^2(1) = 1.18, p>.05$). The chi square analysis for the "phonemic cues" category revealed a significant difference on the difficult passage ($X^2(1) = 10.12, p<.01$), with the NLD children suggesting more often than LD children that "phonemic cues" (e.g., "didn't say the right word", "stumbled, I said care and less") were the cause of their conscious and subconscious monitoring. No significant difference was found between the groups following the chi square analysis on the "graphic cues" category at the difficult level ($X^2(1) = 0.21, p>.05$).

Table 38

Reasons for Conscious and Subconscious Monitoring

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Expectation of another word	9	37 (41)[a]	7	19 (46)[b]	5	54 (59)[a]	5	22 (54)[b]
Reading on	1	10 (42)	1	10 (48)	5	14 (58)	4	11 (52)
Phonemic cues	2	32 (34)	2	20 (50)	7	63 (66)	5	20 (50)
Lack of concentration and other	3	15 (42)	3	6 (35)	6	21 (58)	6	11 (65)
Understanding	5	19 (70)	5	8 (53)	4	8 (30)	3	7 (47)
Previous error	1	4 (50)	1	2 (50)	1	4 (50)	1	2 (50)
Graphic cues	3	21 (72)	3	13 (68)	3	8 (28)	2	6 (32)
Don't know	7	14 (48)	7	10 (53)	4	15 (22)	3	9 (47)
Total	31	152 (41)			35	185 (49)		

[a]Percentage of responses.
[b]Percentage of respondents.

Thus, when consideration was given to the reasons why the children were monitoring via bleeps, unbleeped correction attempts and unbleeped repetitions the NLD children gave more reasons relating the cause of their monitoring to "phonemic cues", such as poor pronounciation, than the LD children.

Skilled reading proceeds as an automatic and smooth reaction to syntactic and semantic cues (Downing & Leong, 1982). When an error is made, the reader switches to a more flexible and conscious control of activities. Goodman, Goodman and Burke (1978) suggest that disconfirmation of a reader's predictions about the grammatical patterns that lead to meaning "brings regressing, reprocessing and correction" (p.13). It was hypothesized that LD and NLD children would differ in their reported use of the types of strategies (activities) brought into play when attempting a correction. Specifically it was suggested that LD children would more often report the use of strategies that focus on word solving strategies that do not involve the use of context. Categories of strategy type included: "reread", "read ahead", "inner image", "syllabification", "comparison" and "don't know" (see Appendix I). The strategies of "slow down" and "kept on" were appropriate in response to the question "what did you do next?", but were inappropriate when considering strategy use for attempted corrections and therefore were not included here.

Table 39 indicates the number of responses and respondents for each strategy type in terms of group and passage level. Scrutiny of these frequencies indicated that further analyses would not be appropriate at the easy and difficult levels for any of the categories except for "rereading" at both levels of difficulty, and for the "inner image" and "syllabification" strategy categories at the difficult level.

At the easy level, a chi square analysis of the number of responses for "rereading", which was used as a strategy when attempting a correction, revealed no significant difference ($X^2(1) = 0.53$, $p>.05$). In order to obtain the percentage of responses relating to the "rereading" strategy for the difficult passage the number of difficult passage "rereading" responses was summed, divided by the total number of difficult tallied and untallied successful and unsuccessful correction attempts, and multiplied by 100. A 2 x 2

(Group x Gender) ANOVA revealed a significant main effect for Group on the difficult passage "rereading" responses (see Table 40). Here, NLD children indicated that they used this strategy more than the LD children when attempting to correct an error (NLD $\underline{M}$ = 45.26, $\underline{SD}$ = 28.84; LD $\underline{M}$ = 63.08, $\underline{SD}$ = 21.80).

A chi square analysis of the difference in the number of responses between groups on the difficult passage relating to the strategy of "inner image" (e.g., "I think how it sounds", "I say the word in my mind") revealed no statistically significant difference ($X^2(1) = 1.33$, $p>.05$).

A non significant difference on the number of responses relating to "syllabification" as a correction strategy was found on the difficult passage ($X^2(1) = 3.41$, $p>.05$).

Thus, when attempting to make corrections no differences were found between groups in the use of "rereading" at the easy level, and "inner image" and "syllabification" on the difficult passage. The NLD children however reported using "rereading" as an aid to correction on the difficult passage more than the LD children.

Some children also made reference to a second strategy type which they used in conjunction with the first strategy. However so few responses were made that further analyses were not attempted. Table 41 includes a summary of the number of responses for the second types of strategy.

The reasons why the children used particular types of strategy when attempting to correct were examined. It was anticipated that the LD children's reasons why particular types of corrective strategy were used would reflect their conception of reading as a decoding activity. Two of the categories originally coded were omitted. These were the categories of "expectation" and "miscellaneous". The types of explanations given by the children that could be coded as "expectation" were appropriate for repetitions. However just as references to strategies used during repetitions were omitted from the previous chi square analyses and ANOVAs, so also reasons for strategies relating to repetitions were omitted here. In addition, the types of reasons that were categorized as "miscellaneous" generally were also appropriate for repetitions or

Table 39

Strategies Used When Making A Correction Attempt

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Reread	30	127 (46)[a]	18	31 (49)[b]	37	148 (54)[a]	16	32 (51)[b]
Read ahead	2	8 (73)	2	7 (70)	0	3 (27)	0	3 (30)
Inner image	3	33 (67)	3	16 (59)	2	16 (33)	2	11 (41)
Syllabification	3	108 (64)	2	29 (57)	1	61 (36)	1	22 (43)
Comparison	1	1 (20)	1	1 (25)	1	4 (80)	1	3 (75)
Don't know	0	3 (50)	0	3 (50)	1	3 (50)	1	3 (50)

[a]Percentage of responses.
[b]Percentage of respondents.

Table 40

Summary of ANOVA Data for Rereading
Strategy Type

	df	MS	F	p
Reread (Difficult)				
Group	1	3160.020	4.91	0.03 *
Gender	1	2240.782	3.48	0.07
Group by Gender	1	159.255	0.25	0.62
Residual	64	643.429		

* p<.05

Table 41

Second Strategies Used When Making A Correction Attempt

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Reread	2	6	2	5	0	3	0	3
Read ahead	3	0	3	0	0	1	0	1
Inner image	0	6	0	6	1	3	1	3
Syllabification	0	13	0	9	0	7	0	5
Comparison	0	2	0	2	0	3	0	3
Don't know	0	0	0	0	0	0	0	0
Total	5	27			1	17		

appropriate in reply to the question "why did you do that?". However they were not appropriate when the central concern was reasons why specific strategies were used for attempted corrections. Therefore, categories pertaining to why certain strategies were employed during correction attempts include: "check it", "make it look right" (global response), "help with pronounciation", "help with understanding", "habit", and "don't know".

Due to the small number of children providing reasons why they selected a specific strategy only chi square analyses were applied where appropriate, on the difficult passage (see Table 42).

On the difficult Oral Reading Passage, the chi square analysis for the "make it right" category revealed no significant difference between the groups ($X^2(1) = 0.20$, $p > .05$).

The chi square analysis performed on the "help with understanding" category at the difficult level revealed no statistically significant difference ($X^2(1) = 0.04$, $p > .05$).

Where children made reference to a second type of strategy, questions were also directed at discovering why this second strategy, in conjunction with the first, was used. However only a small number of responses indicating reasons why the second strategy was employed, were given (see Table 43). Further analyses of the data were considered unwarranted.

Attempting to make a correction may be the first step in reestablishing meaning. However the reader must also determine or "know" that the corrective strategy employed was either successful or unsuccessful. To determine whether LD children had less awareness of whether or not their application of a strategy had been successful it was necessary firstly to establish whether differences between the groups occurred for each of the different categories: knowledge of success ("successful"), knowledge of lack of success ("unsuccessful"), and no knowledge ("don't know").

Table 44 provides a summary of the number of responses relating to "knowledge of success", "knowledge of lack of success", and "no knowledge". The small number of responses for the "knowledge of lack

Table 42

Reasons Why Reported Strategies Were Used

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Check it	3	11 (61)[a]	3	7 (58)[b]	0	7 (39)[a]	0	5 (42)[b]
Make it right	15	39 (49)	11	19 (46)	16	41 (51)	10	22 (54)
Help with pronounciation	0	6 (46)	0	6 (50)	1	7 (54)	1	6 (50)
Help with understanding	9	21 (58)	7	15 (60)	1	15 (42)	1	10 (40)
Habit	1	5 (38)	1	4 (40)	2	8 (62)	2	6 (60)
Don't know	2	15 (45)	2	10 (53)	4	18 (55)	4	9 (47)
Total	30	97 (50)			24	96 (50)		

[a]Percentage of responses.

[b]Percentage of respondents.

Table 43

Reasons Why Reported Second Strategies Used

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Check it	2	2	2	2	1	2	1	2
Make it right	1	0	1	0	1	3	1	3
Help with pronounciation	0	1	0	1	0	1	0	1
Help with understanding	3	2	3	2	0	4	0	4
Habit	1	0	1	0	1	0	1	0
Don't know	1	1	1	1	0	0	0	0
Total	8	6			3	10		

of success" on the easy passage, and for "no knowledge" on both the easy and the difficult passage meant no further analyses were performed.

The chi square analysis for the number of "knowledge of success" responses where children indicated their belief that they had been successful in their correction on the easy passage revealed no significant difference ($X^2(1) = 1.50$, $p>.05$). In order to perform the 2 x 2 (Group x Gender) ANOVA on the difficult passage for the "knowledge of success" category, the mean percentage of difficult level responses indicating success with strategy application was obtained. The number of difficult level "knowledge of success" responses was summed, divided by the number of difficult tallied and untallied successful and unsuccessful correction attempts, and multiplied by 100. Table 45 presents the means and standard deviations for the "knowledge of success" category at the difficult level. The results of the ANOVA for "knowledge of success" responses on the difficult passage indicated a significant main effect for Group (see Table 46). Here the LD group made fewer "knowledge of success" responses on the difficult passage than the NLD group. In addition, a significant main effect for Gender was found (see Table 46). Here, the female pupils made more "knowledge of success" responses than their male peers (Females $\underline{M} = 55.03$, Males $\underline{M} = 33.48$).

The chi square analysis applied to the responses on the difficult passage for the "knowledge of lack of success" responses revealed no statistically significant difference ($X^2(1) = 3.38$, $p>.05$).

Thus, in terms of awareness of the successful and unsuccessful application of corrective strategies, group differences existed on the difficult passage with regard to knowledge that strategies applied in order to correct errors were successful. This finding should be interpreted along-side the successful correction rates. Scrutiny of the monitoring points that involved successful correction on the difficult passage revealed a similar number of monitoring points involved successful correction for both groups (LD = 50.52%, NLD = 49.48%). The results therefore indicate that in spite of the similarity in the number of successful correction attempts on the difficult passage, the NLD children revealed that they knew more confidently that their corrective strategies had been successful.

Verification of children's reported success or otherwise of the corrective strategies was also investigated. It was hypothesized that in comparison to the NLD children, the LD children's "reported knowledge" of successful and unsuccessful strategy application would correspond less with actual reading behaviour. In determining the correspondence between the reported "knowing" that the strategy had been successful and unsuccessful and actual reading behaviour, the statements of "success" and "lack of success" were dichotomously coded as being either "corresponding" or "not corresponding". Reading behaviour related to the successful correction and unsuccessful attempts at error correction.

Table 44 presents the number of responses indicating the "correspondence" and "no correspondence" of reported "success" and "lack of success" and actual reading behaviour. Due to the dichotomous nature of the coding only the "correspondence" is reported here. The chi square analysis revealed no statistically significant difference at the easy level between the groups ($X^2(1) = 1.08$, $p>.05$). On the difficult passage, the mean percentage of correspondence between the reported "success" and "lack of success" and actual reading behaviour was derived by summing the difficult level "correspondence", dividing by the number of difficult level knowledge of "success" and knowledge of "lack of success" statements, and multiplying by 100. Table 45 presents the means and standard deviation for the correspondence between the knowledge of "success" and "lack of success" statements and actual reading behaviour for the difficult passage. A 2 x 2 (Group x Gender) ANOVA revealed no significant effects on the difficult passage (see Table 46).

Thus, the hypothesis that the LD group's knowledge that corrective strategies had been successful and unsuccessful would correspond less with actual reading behaviour than that of the NLD group was not supported.

Table 44

Knowledge of Success and Knowledge of Lack of Success and Correspondence with Oral Reading Behaviour

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Reported knowing								
Knowledge of success	28	95 (46)[a]	18	29 (48)[b]	30	110 (54)[a]	14	31 (52)[b]
Knowledge of lack of success	3	53 (73)	3	23 (62)	2	20 (27)	2	14 (38)
Lack of knowledge	0	18 (56)	0	12 (55)	0	14 (44)	0	10 (45)
Total	31	166 (54)			32	144 (46)		
Correspondence with behaviour								
Correspondence	30	131 (55)	19	30 (48)	27	108 (45)	13	32 (52)
No Correspondence	1	17 (44)	1	12 (40)	5	22 (56)	4	18 (60)
Total	31	148 (53)			32	130 (47)		

[a]Percentage of responses.
[b]Percentage of respondents.

Table 45

Percentages of Knowledge of Success and Correspondence of Knowledge of Success and Knowledge of Lack of Success with Oral Reading Behaviour

	LD			NLD		
	Difficult			Difficult		
	N	M	SD	N	M	SD
Knowledge of success[a]	35	31.86	27.94	33	50.21	25.79
Correspondence[b]	30	87.91	17.58	32	84.10	17.77

[a]Difficult level "knowledge of success" responses as a percentage of tallied and untallied successful and unsuccessful correction attempts at the difficult level.

[b]Difficult level correspondence as a percentage of total difficult level reported "knowledge of success" and "knowledge of lack of success" statements.

Table 46

Summary of ANOVA Data for Knowledge of Successful and Unsuccessful Strategy Use and Correspondence with Oral Reading Behaviour

	df	MS	F	p
Knowledge of success (Difficult)				
Group	1	3248.854	4.88	0.03 *
Gender	1	5165.546	7.75	0.01 **
Group by Gender	1	13.343	0.02	0.89
Residual	64	666.347		
Correspondence (Difficult)				
Group	1	221.820	0.69	0.41
Gender	1	2.158	0.01	0.94
Group by Gender	1	16.153	0.05	0.82
Residual	58	322.910		

* p<.05

** p<.01

Finally, in probing into the area of fix-up strategies, data were collected regarding how the children knew that their attempts at correction had been successful and unsuccessful. It was hypothesized that in comparison to NLD children, LD children's reasons for knowing would more often reflect as reliance on internal-word features, rather than sentence or story features. The types of knowing have been categorized as: "meaning", "inner knowledge", "graphic cues", "phonemic cues", and "don't know".

The number of responses relating to ways of knowing that correction had been successful and unsuccessful is presented in Table 47. The small number of responses for each of the five categories at the easy level and for the "meaning", "graphic cues", and "don't know" categories at the difficult level did not allow for further analyses. The chi square analysis of the "inner knowledge" responses on the difficult passage revealed no significant difference ($X^2(1) = 0.02$, $p>.05$). Similarly, no significant difference was found for "phonemic cues" on the difficult passage ($X^2(1) = 0.64$, $p>.05$).

The LD group did not therefore indicate that they were less able to tell whether or not they had been successful or unsuccessful by means of "inner knowledge" or through the use of "phonemic cues" than the NLD children.

Where applicable questions about how the children knew that the second strategy had been successful and unsuccessful were also put to the children. However, again the response frequencies were so small no further analyses were performed (see Table 48).

To discover from which source knowledge of types of fix-up strategies came, children were also asked "how do you know to use that strategy?" The purpose of the question was to investigate whether children were able to acknowledge that they had learned to use a particular strategy via instruction of a parent or teacher or if it was a strategy that they considered to be inherent. It was expected that the LD children would consider teachers and parents (i.e., external agents) to be greater influences as the sources of knowledge about corrective strategies, whereas the NLD children would consider the strategies to be an integral part of their knowledge about reading. The categories relating to the source of their knowledge were: "inner knowledge", "outside knowledge", and "don't know".

Table 49 presents the frequencies of responses and respondents for source of strategy knowledge. The number of responses was too small to warrant further analyses, except for "outside knowledge" responses at the difficult level.

The chi square analysis of the "outside knowledge" responses for the difficult passage revealed no statistically significant difference between the groups ($X^2(1) = 0.04$, $p>.05$).

Thus, the LD children did not differ from the NLD children in suggesting that teachers and parents were the source of knowledge about corrective strategies.

Summary. The results of the Self Report of Oral Reading Behaviour revealed that both LD and NLD children were similar in terms of initially not recognizing what had occurred at points of conscious and subconscious monitoring on the difficult passage.

The descriptions of the points of monitoring were precise rather than global explanations for both the LD and NLD groups. On the difficult passage, LD children were as able as NLD children to provide "specific descriptions" of what had occurred at the monitoring points. In addition, the level of correspondence between the reported specific descriptive statements and the actual reading behaviour on both the easy and the difficult level was similar for both groups.

The reasons that the children gave for conscious and subconscious monitoring were investigated. On the difficult passage, no difference between the groups was found for the reasons of "expectation of another word" or "graphic cues". However, the NLD children suggested

Table 47

Ways of Knowing

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Meaning	7	16 (57)[a]	6	11 (50)[b]	6	12 (43)[a]	5	11 (50)[b]
Inner knowledge	10	22 (52)	9	16 (52)	7	20 (48)	5	15 (48)
Graphic cues	1	10 (56)	2	8 (50)	3	8 (44)	3	8 (50)
Phonemic cues	1	36 (51)	1	17 (46)	5	35 (49)	4	20 (54)
Don't know	0	4 (44)	0	4 (45)	2	5 (56)	2	5 (55)
Total	20	88 (52)			23	80 (48)		

[a]Percentage of responses.
[b]Percentage of respondents.

Table 48

Ways of Knowing for the Second Strategy

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Meaning	0	3	0	3	0	1	0	1
Inner knowledge	0	1	0	1	1	2	1	2
Graphic cues	2	2	2	2	2	5	2	5
Phonemic cues	0	1	0	1	1	7	1	7
Don't know	0	2	0	2	2	1	2	1
Total	2	9			6	16		

Table 49

Source of Knowledge of Strategies

	LD				NLD			
	Responses		Respondents		Responses		Respondents	
	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult
Inner knowledge	0	2	0	2	2	1	2	1
Outside knowledge	2	23 (56)[a]	2	17 (57)[b]	4	18 (44)[a]	3	13 (43)[b]
Don't know	1	2	1	2	1	3	1	2
Total	3	27 (55)			7	22 (45)		

[a]Percentage of responses.
[b]Percentage of respondents.

that "phonemic cues" caused them to monitor consciously or subconsciously more than the LD children.

Investigation of strategies used during correction revealed that "rereading" was used as frequently by the LD pupils as by the NLD pupils on the easy level. Similarly, on the difficult level, the reported use of "inner image" and "syllabification" during correction was the same for both groups. However, the NLD children indicated that on the difficult passage they attempted to correct errors more often by "rereading" than did the LD children. Investigation of the reasons why the children reported utilizing the corrective strategies revealed that at the difficult level both groups were similar in responding that corrective strategies were applied in order to "make it right" and "to help with understanding".

Both groups reported knowing that their attempts at correction had been "successful" to the same extent at the easy level. However, at the difficult level, as a proportion of all tallied successful and unsuccessful correction attempts, in comparison to the NLD children, the LD children made fewer "knowledge of success" statements. This result, pertaining to knowledge of successful correction, is important particularly when the fact that there was an equal number of monitoring points involving successful correction for each group is taken into account. Therefore, NLD children indicated a more confident "knowledge of success" than the LD children. Both groups were similar in terms of the knowledge of "lack of success" of a corrective strategy on the difficult passage.

In addition, both groups were similar in terms of the correspondence between their reported statements of successful and unsuccessful application of strategies when correcting and actual reading behaviour at both difficulty levels. When asked to provide reasons how they knew that their attempts at correction had been successful and unsuccessful, the LD and the NLD children were similar in terms of suggesting they knew because of "inner knowledge" and "phonemic cues" at the difficult level.

Finally, both groups showed similar indications at the difficult level that the source of knowledge for the use of corrective strategies was the teacher or parents (i.e., "outside knowledge").

Perceptions and Causal Attributions

Causal Attribution Rating Scales

Two Causal Attribution Rating Scales were presented to the children. The scales were designed to measure the importance of different reasons for success and failure in reading respectively. The reasons included: "ability", "stable attitude", "typical effort", "learning and strategies", "task", "teacher", "family", and "luck". The reasons were treated as positive or negative (I am a good reader/ I am not a good reader) for the Causal Attribution Rating Scale for Success and for Failure respectively. On both of the Scales the variable "luck" comprised one scale, while "ability", "typical effort", "task", "teacher", and "family" comprised two scales each. "Stable attitude" comprised three separate scales and "learning and strategies" was made up of six scales. The children responded to a series of statements reflecting the reasons for success (and failure) by marking how true each given reason was for them. The scales were ranked as "very true" (1) through "somewhat true" (4) to "not true" (7). Therefore possible score ranges for the different variables were from 1 to 7 for "luck", 2 to 14 for "ability", "typical effort", "task", "teacher", and "family", 3 to 21 for "stable attitude", and 6 to 42 for "learning and strategies". The lower the score the more important the rating.

Causal Attribution Rating Scale for Success. The data for the Causal Attribution Rating Scale for Success were analyzed by a series of 2 x 2 (Group x Gender) ANOVAs separately for each attribution category. The results of the ANOVAs on the "typical effort", "task", "learning and strategies", "teacher", and "family" variables showed there were no significant main or interaction effects. Table 50 shows the means and standard deviations and Table 51 is a summary of the ANOVA data for each of the categories.

There were however significant Group effects for "ability", "stable attitude", and "luck". Specifically, a significant Group effect for "ability" ($F(1,65) = 9.64$, $p<.01$) was found with NLD children making a stronger attribution to "ability". There were no Gender or interaction effects for "ability" (see Tables 50 and 51).

Table 50

Means and Standard Deviations for
Causal Attribution Rating Scale for Success

	LD			NLD		
	N	M	SD	N	M	SD
Ability	35	7.46	2.36	34	5.47	2.18
Stable attitude	35	10.14	4.05	34	7.62	3.00
Typical effort	35	5.80	2.29	34	5.09	1.94
Learning & strategies	35	24.34	5.08	34	22.12	5.31
Task	35	6.77	1.86	34	6.44	2.16
Teacher	35	10.49	2.06	34	11.53	2.02
Family	35	6.89	3.22	34	6.24	2.54
Luck	35	5.57	1.20	34	6.15	0.93

Table 51

Summary of ANOVA Data for Causal Attribution Rating Scale for Success

	df	MS	F	p
Ability				
Group	1	50.684	9.64	0.00 **
Gender	1	0.000	0.00	1.00
Group by Gender	1	3.258	0.62	0.43
Within cells	65	5.259		
Stable attitude				
Group	1	54.526	4.36	0.04 *
Gender	1	16.552	1.32	0.25
Group by Gender	1	28.377	2.27	0.14
Within cells	65	12.519		
Typical effort				
Group	1	14.349	3.17	0.08
Gender	1	1.432	0.32	0.58
Group by Gender	1	7.432	1.64	0.21
Within cells	65	4.525		
Learning & strategies				
Group	1	42.367	1.58	0.21
Gender	1	1.507	0.06	0.81
Group by Gender	1	58.114	2.16	0.15
Within cells	65	26.875		
Task				
Group	1	0.837	0.21	0.65
Gender	1	2.744	0.68	0.41
Group by Gender	1	4.842	1.19	0.28
Within cells	65	4.062		

Teacher				
Group	1	12.349	2.94	0.09
Gender	1	6.245	1.49	0.23
Group by Gender	1	0.029	0.01	0.93
Within cells	65	4.199		
Family				
Group	1	7.405	0.86	0.36
Gender	1	0.081	0.01	0.92
Group by Gender	1	0.772	0.09	0.77
Within cells	65	8.658		
Luck				
Group	1	8.616	7.69	0.01 *
Gender	1	2.344	2.09	0.15
Group by Gender	1	2.062	1.84	0.18
Within cells	65	1.121		

* p<.05

** p<.01

Similarly, NLD children made stronger attributions to "stable attitude" than the LD children ($F(1,65) = 4.36$, $p<.05$). There were no Gender or interaction effects (see Tables 50 and 51). A statistically significant Group effect ($F(1,65) = 7.68$, $p<.05$) was found for "luck", with the LD children attributing success in reading more to "luck" than the NLD children. There were no Gender or interaction effects for "luck" (see Tables 50 and 51).

In considering the dimensions of various attributions NLD children differed from LD children on causes that were internal and stable. The NLD children attributed their success in reading to "ability" and "stable attitude", internal, stable attributions, more so than LD children. Where the LD children attributed reading success more to "luck" than the NLD children, this was an external, unstable, uncontrollable attribution. The hypothesis then was supported for the attributions of "ability", "stable attitude" and "luck". As predicted the NLD children made more attributions for success to internal,stable causes.

Causal Attribution Rating Scale for Failure. The data of the Causal Attribution Rating Scale for Failure were analyzed by a series of 2 x 2 (Group x Gender) ANOVAs separately for each attribution category. No significant main or interaction effects were found on the "stable attitude", "task", "teacher", "family", and "luck" variables (see Tables 52 and 53).

There was however a significant group effect for "lack of typical effort" ($F(1,65) = 7.81$, $p<.01$), with LD children making stronger attributions to "lack of typical effort" than the NLD children. That is, the LD children believed that "lack of typical effort" played a greater role in reading failure than did the NLD children (see Tables 52 and 53). There was no main effect for Gender or significant interaction effect for "lack of typical effort". In addition, a main effect for Group was found for "lack of ability" ($F(1,65) = 3.84$, $p<.01$). Here, the LD children considered "lack of ability" a more important reason for reading failure than the NLD children (see Tables 52 and 53). There were no Gender or interaction effects.

Table 52

Means and Standard Deviations for
Causal Attribution Rating Scale for Failure

	LD			NLD		
	N	M	SD	N	M	SD
Ability	35	8.34	3.15	34	9.97	2.48
Stable attitude	35	14.54	4.39	34	16.56	3.91
Typical effort	35	8.80	3.19	34	10.94	2.86
Learning & strategies	35	29.97	5.44	34	31.56	6.43
Task	35	9.06	2.93	34	9.32	3.10
Teacher	35	11.34	2.45	34	11.76	2.02
Family	35	11.17	2.41	34	11.94	2.16
Luck	35	5.74	1.48	34	6.03	1.40

Table 53

Summary of ANOVA Data for Causal Attribution Rating Scale for Failure

	df	MS	F	p
Ability				
Group	1	30.318	3.84	0.05 *
Gender	1	26.474	3.35	0.07
Group by Gender	1	0.336	0.04	0.84
Within cells	65	7.893		
Stable attitude				
Group	1	48.770	2.835	0.10
Gender	1	40.594	2.360	0.13
Group by Gender	1	2.198	0.128	0.72
Within cells	65	37.628	2.187	
Typical effort				
Group	1	70.716	7.810	0.01 **
Gender	1	15.549	1.717	0.20
Group by Gender	1	8.438	0.932	0.34
Within cells	65	9.055		
Learning & strategies				
Group	1	10.175	0.320	0.57
Gender	1	287.992	9.044	0.01 **
Group by Gender	1	9.588	0.301	0.59
Within cells	65	113.679	3.570	
Task				
Group	1	1.743	0.188	0.67
Gender	1	2.979	0.322	0.57
Group by Gender	1	4.092	0.442	0.51
Within cells	65	9.252		

Teacher				
Group	1	1.560	0.307	0.58
Gender	1	5.919	1.163	0.29
Group by Gender	1	1.393	0.274	0.60
Within cells	65	5.088		
Family				
Group	1	7.406	1.468	0.23
Gender	1	4.616	0.915	0.34
Group by Gender	1	18.269	3.621	0.06
Within cells	65	5.046		
Luck				
Group	1	1.755	0.832	0.37
Gender	1	0.724	0.343	0.56
Group by Gender	1	1.554	0.737	0.39
Within cells	65	2.109		

* p=.05

** p<.01

In addition, while there were no significant Group or interaction effects for "lack of learning and strategies", a significant main effect for Gender was revealed ($F(1,65) = 9.04$, $p<.01$). Here, the males regarded a "lack of learning and strategies" to have more important causal influences in reading failure than the female pupils (males $\underline{M} = 29.18$, females $\underline{M} = 33.71$).

Thus, the hypothesis that LD children would attribute failure in reading more to internal stable causes was accepted for the attributions of "lack of ability" and "lack of typical effort".

Summary of Findings of Causal Attribution Rating Scales. NLD children more than LD children indicated that the attributions of "ability" and "stable attitude" were important in reading success. In turn, LD children indicated that the attribution of "luck" was more important in reading success than the NLD children.

LD children regarded "lack of typical effort" and "lack of ability" as important in reading failure more than NLD children. The NLD children did not indicate any attributions which they considered being more important in reading failure than the LD children.

An interesting comparison emerges here. That is, NLD children regarded "ability" as a reason for their success more than their peers, while LD children considered "lack of ability" more as a reason for failure.

Reading Perception and Attribution Questionnaire

Children's perceptions of their class reading achievement was determined using a measure involving a vertical line of 30 "smiley faces", which symbolically represented the ranking of classmates in terms of reading achievement (Nicholls, 1979). On this ranking scale, where the first "face" represented the child who does best in reading and the thirtieth "face" the child whose reading achievement was the worst in class, the children were asked to indicate their perceived level of achievement by writing their name beside a "face" reflecting their status. It was hypothesized that the perceptions of the LD group would differ significantly from the NLD group, with the LD children having lower perceptions of reading achievement. Results of a 2 x 2 (Group x Gender) ANOVA revealed a significant main effect for Group (see Table 54). The LD children indicated significantly lower perceptions of their level of reading achievement than the NLD children (LD M = 17.83, SD = 6.32; NLD M = 10.82, SD = 5.21). There were no significant Gender or interaction effects. The hypothesis was therefore supported.

The reasons why other children succeed in reading were investigated by asking "what are some of the reasons why some of the children in your class are better readers than you are?" The hypothesis to be tested suggested that, in comparison to NLD children, the LD children would make different types of attributions for the reading success of others. Namely, LD children would more often attribute their peers' reading success to internal causes.

In the data collection phase, the first question the children were asked was "what are some of the reasons why some of the children in your class are better readers than you are?" If one response was given, a prompt question ("What other reasons do you have for thinking that some of the children in your class are better readers than you are?") was used to elicit further responses.

Prior to the analyses being performed the number of responses before and after the prompt and the total number of responses were summed (see Table 55). The number of responses before the prompt was virtually the same (LD=55, NLD=56). The chi square analysis for responses after the prompt revealed no significant difference, $X^2(1) = 0.31$, $p>.05$. The total number of responses was almost the same for both groups (LD=71, NLD=69).

Frequency counts of the responses in each causal attribution category that had been generated were made (see Table 56). Chi square analyses for the different causal attributions revealed no statistically significant differences between the groups. Table 56 shows that the reading success of others was most often attributed to "ability" ("they are cleverer than me") by both groups. The second and third most frequent types of attributions for the success of others in reading were "previous experience" and "stable attitude" respectively. Both groups made these types of attributions.

Table 54

Summary of ANOVA Results for Perception of In-Class Reading Achievement Level

	df	MS	F	p
Group	1	588.83	17.58	0.00 ***
Gender	1	69.58	2.08	0.15
Group by Gender	1	16.30	0.49	.49
Within cells	65	33.49		

*** p<.001

It was hypothesized that in comparison to the NLD children, the LD children would more often attribute the failure of others in reading to external causes. To establish whether the LD children would make different types of attributions than the NLD children for the failure of others in reading, the number of responses before and after the prompt question and the total number of responses were summed and chi square analyses performed.

Table 55 shows the number of responses for each group. The chi square analyses revealed no significant differences between the groups in terms of responses before the prompt or for the total number of responses. That is, before the prompt, $X^2(1) = 1.25$, $p>.05$, and for the total number of responses, $X^2(1) = 0.80$, $p>.05$. The number of responses after the prompt was almost the same (LD=9, NLD=7).

Table 56 presents the frequency counts of responses in each generated causal attribution category. A chi square analysis indicated a significant difference between LD and NLD children in terms of "stable attitude" before the prompt ($X^2(1) = 7.76$, $p<.05$), with NLD children making more attributions to "stable attitude" (e.g.,"I don't like reading") than the LD children. However chi square analyses of the total responses for each of the categories revealed no significant differences. Although there were no significant differences, Table 56 also indicates that LD children most frequently attributed their classmates failure in reading to a "lack of ability" and the NLD children most frequently made attributions indicating that those who failed did not enjoy reading ("stable attitude").

In terms of the hypotheses, that in comparison to the NLD children, the LD children would make attributions for others' success in reading to internal causes and make attributions for others' failure in reading to external causes, no support was found.

Table 55

Number of Open-Ended Attribution Responses for Success and Failure of Others in Reading

	LD		NLD	
	Success	Failure	Success	Failure
Before the prompt	55	61	56	74
After the prompt	16	9	13	7
Total	71	70	69	81

Table 56

Total Number of Responses per Causal Attribution Category for Success and Failure of Others in Reading

	LD		NLD	
	Success	Failure	Success	Failure
Liking and interest	3	3	2	0
Immediate effort	0	0	2	0
Attention	1	10	2	11
Stable attitude	8	9	9	25
Typical effort	1	15	1	8
Ability	26	16	25	18
Previous experience	22	9	19	12
Family	3	1	3	5
Task interest	0	0	0	1
Teacher	3	5	2	0
Miscellaneous	1	0	2	1
Don't know	2	2	2	0

The reasons the children gave for their success in reading were investigated by asking "what are some of the reasons why you do well on a reading task?" It was hypothesized that in comparison to NLD children, the LD children would make different types of attributions for their reading success. Specifically, it was hypothesized that the LD children would more often attribute personal reading success to external factors.

During the data collection phase a prompt question ("What are some of the other reasons why you do well on a reading task?") was used to elicit further responses. A comparison of the number of responses before and after the prompt and the total number of responses for each of the groups was made (see Table 57). Chi square analyses revealed no statistically significant differences. That is, before the prompt, $X^2(1) = 0.66$, $p>.05$, after the prompt, $X^2(1) = 0.8$, $p>.05$, and for the total number of responses, $X^2(1) = 0.17$, $p>.05$.

Chi square analyses were performed on the total number of responses for each of the generated attribution categories. No significant differences were found. Scrutiny of Table 58 reveals that the most frequently cited attribution for success in reading for both groups was "immediate effort" (e.g.,"I think it out before I answer the questions").

The reasons why one may be successful on a reading task, however, may be quite different from the reasons why one might fail. The hypothesis relating to personal reading success had suggested that in comparison to the NLD children, the LD children would make more attributions to external factors. Here however, in relation to reasons why an individual might do poorly in reading, it was hypothesized that the LD children, in comparison to the NLD children, would attribute their failure in reading more to internal factors.

Table 57 presents the number of responses before and after the prompt and in total for each group to the question "what are some of the reasons why you do badly on a reading task?" The chi square analyses revealed no significant differences between the groups in terms of the numbers of responses before the prompt, $X^2(1) = 0.92$,

Table 57

Number of Open-Ended Attribution Responses for Success and Failure in Reading

	LD		NLD	
	Success	Failure	Success	Failure
Before the prompt	57	59	66	70
After the prompt	12	14	8	13
Total	69	73	74	83

Table 58

Total Number of Responses per Causal Attribution Category for Success and Failure in Reading

	LD		NLD	
	Success	Failure	Success	Failure
Liking and interest	6	12	13	18
Immediate effort	29	13	25	15
Attention	8	15	6	10
Mood	2	0	2	4
Stable attitude	1	1	2	0
Typical effort	1	3	2	2
Ability	5	9	10	14
Previous experience	6	5	1	1
Family	0	7	1	12
Task ease/difficulty	5	4	3	5
Task interest	3	2	3	0
Teacher	2	2	2	1
Don't know	1	0	2	1

p>.05, and for the total number of responses, $X^2(1) = 0.64$, p>.05. The number of responses after the prompt was virtually the same (LD=14, NLD=13).

Chi square analyses also showed no significant differences for any of the attribution categories that had been generated. Table 58 indicates that the most frequently cited attribution for failure in reading for the LD children was "lack of attention" and "lack of liking and interest" in reading for the NLD children.

Therefore, the hypothesis that in comparison to the NLD children, the LD children would more often attribute their own reading success to external causes was not supported. Nor was there any support found for the hypothesis suggesting that the LD children, in comparison to the NLD children, would more often attribute their reading failure to internal causes.

Task-linked Perceptions and Causal Attributions

The contribution of task difficulty on reading-related perceptions and causal attributions was investigated by an open-ended questionnaire administered immediately after the children had read their easy and difficult Oral Reading Passage.

The perceptions of children's understanding and oral reading performance at both difficulty levels are discussed first (see Table 59). As indicated in Table 59, at the easy level, the majority of the LD and NLD children described their understanding as "good" or "average". Interestingly, 1 LD child and 3 NLD children indicated that they thought their understanding was "poor". The chi square analysis for perceptions of understanding at the easy level was not significant, $X^2(3) = 4.98$, p>.05.

Turning now to the difficult Oral Reading Passage, as expected most of the children from both groups thought they had understood their difficult passage "poorly" (see Table 59), although, 4 LD children and 1 NLD child described their understanding as "good". The chi square analysis for perceptions of understanding on the difficult passage was not significant, $X^2(3) = 1.86$, p>.05.

Table 59 also indicates that both groups described their oral reading performance largely as "good" or "average" at the easy level. However, 8 of the LD children and 2 of the NLD children perceived their oral reading performance as "poor" (see Table 59). The percentages relating to the perceptions of "poor" reading performance are higher than those for perceptions of "poor" understanding by the LD children at the easy level. This result may be a reflection of the fact that oral reading is less common than silent reading for intermediate school pupils and as such, when the LD children were asked to read orally and then describe their "performance", the children were more aware of the overt and vulnerable nature of the task. Their perceptions, even at the easy level, may be an expression of this awareness. The chi square analysis revealed no significant difference, $X^2(3) = 5.29$, $p>.05$, for perceptions of oral reading performance at the easy level.

The oral reading performance at the difficult level was generally thought of as "poor" by both groups (see Table 59). One LD child and 5 NLD children however, perceived their oral reading performance at the difficult level as "good". The chi square analysis revealed no significant difference between the groups in terms of perceptions of oral reading performance at the difficult level, $X^2(3) = 4.49, p>.05$. Thus, results relating to the perceptions of understanding and oral reading performance on the easy and the difficult passage supported the hypotheses that both groups would have "high" perceptions on the easy passage and "low" perceptions on the difficult passage.

In addition to task-linked perceptions, data on task-linked causal attributions were also obtained. The causal attributions that the children made in response to the questions "what reasons do you have for thinking that your understanding/oral reading was [good]/[average]/[poor]/?" at both difficulty levels were collected. It was hypothesized that the LD children would make different attributions for their understanding/oral reading performance than the NLD children. Specifically, in comparison to the NLD children, the LD children would make more external attributions for their understanding and oral reading performance at the easy passage level. In addition,

Table 59

Self Perceptions of Understanding and Oral Reading Performance for the Easy and Difficult Oral Reading Passages

	Good		Average		Poor		Don't know	
	LD	NLD	LD	NLD	LD	NLD	LD	NLD
Easy								
Understanding	28.6[a]	38.2	68.6	47.1	2.9	9.8	0.0	5.9
Reading performance	22.9	32.4	51.4	61.8	22.9	5.9	2.9	0.0
Difficult								
Understanding	11.4	2.9	11.4	11.8	74.3	82.4	2.9	2.9
Reading performance	2.9	14.7	25.7	32.4	62.9	50.0	8.6	2.9

[a]Percentage of responses (number of responses divided by total for each group, multiplied by 100).

it was hypothesized that in comparison to the NLD children, the LD children would make more internal attributions for their understanding and their oral reading performance at the difficult passage level.

Firstly, to establish whether or not there was a significant difference in the number of responses given by the two groups, the number of responses before and after the prompt question ("What other reasons do you have for thinking that your understanding/oral reading was [good]/[average]/[poor]?" and the total number of responses were summed. Table 60 shows the number of responses before and after the prompt for understanding and oral reading performance at both difficulty levels. The number of responses relating to understanding at the easy level before the prompt was almost the same (LD=41, NLD=43). This was the case also for the number of responses after the prompt (LD=18, NLD=17), and for the total (LD=59, NLD=60).

Secondly, frequency counts of the number of responses in each generated causal attribution category relating to understanding of the easy passage were made (see Table 61). There were no significant differences between the groups on the total number of responses as a result of the analyses. The totals in Table 61 also indicate that most attributions were made to "ability" by the LD children and to "task ease" by the NLD children.

With respect to causal attributions for understanding on the difficult passage, a comparison of the number of responses before and after the prompt and the total number of responses was made. The number of responses between the groups was virtually the same before the prompt (LD=40, NLD=41), after the prompt (LD=26, NLD=23), and for the total number of responses (LD=66, NLD=64) (see Table 60).

A count of the number of responses in each generated attribution category for understanding on the difficult passage was undertaken. Chi square analyses revealed no statistically significant differences (see Table 61). This table also shows that both groups most frequently made attributions to "lack of ability" and then to "task difficulty" for their understanding at the difficult level.

In addition to investigating the causal attributions for understanding at the easy and difficult level, the attributions for oral reading performance at both difficulty levels were obtained.

Table 60 indicates the number of responses before and after the prompt question, as well as the total number of responses. No significant difference between the groups was found for the number of responses before the prompt, $X^2(1) = 0.58$, $p>.05$. However, a significant difference was found for the number of responses after the prompt, $X^2(1) = 8.17$, $p<.01$. This suggests that the prompt did influence the children to make reference to further attributions relating to their oral reading performance at the easy level. Nevertheless, this difference had no further bearing as the differences between the groups for the total number of causal attribution responses relating to oral reading performance at the easy level was not significant, $X^2(1) = 0.45$, $p>.05$.

Table 62 shows the number of responses in each generated causal attribution category for oral reading performance at the easy level. Chi square analyses indicated no significant differences. Inspection of the data relating to the most frequently made attribution shows that both groups most frequently attributed their oral reading performance on the easy passage to "ability".

A comparison of the number of responses before and after the prompt question and the total number of responses for oral reading performance on the difficult passage revealed a similarity in the number of responses before the prompt (LD=43, NLD=39), after the prompt (LD=16, NLD=12), and in the total number of responses (LD=59, NLD=51) (see Table 60). The number of responses in each generated attribution category before and after the prompt and the total number of responses were summed (see Table 62). Chi square analyses of the total number of responses revealed no significant differences for any of the categories. The most common attribution made for oral reading performance at the difficult level was "lack of ability". Both groups made this attribution most often.

Table 60

Number of Causal Attribution Responses for Understanding and Oral Reading Performance for the Easy and Difficult Oral Reading Passages

	Before		After		Total	
	LD	NLD	LD	NLD	LD	NLD
Easy						
Understanding	41	43	18	17	59	60
Reading performance	39	46	19	5	59	51
Difficult						
Understanding	40	41	26	23	66	64
Reading Performance	43	39	16	12	59	51

Table 61

Total Number of Responses per Causal Attribution Category for Understanding for the Easy and Difficult Oral Reading Passages

	LD		NLD	
	Easy	Difficult	Easy	Difficult
Task ease/difficulty	18	20	25	17
Task interest	3	2	2	2
Ability	28	33	23	28
Attention	0	2	2	5
Immediate effort	0	1	1	1
Liking and interest	2	3	0	3
Strategies	3	1	3	6
Miscellaneous	3	3	1	0
Don't know	2	1	3	2

Table 62

Total Number of Responses per Causal Attribution Category for Oral Reading Performance for the Easy and Difficult Oral Reading Passages

	LD		NLD	
	Easy	Difficult	Easy	Difficult
Task ease/difficulty	7	7	10	7
Task interest	2	0	0	2
Ability	30	36	26	27
Attention	0	1	1	1
Immediate effort	0	2	2	1
Liking & interest	3	0	1	3
Strategies	6	4	5	6
Miscellaneous	4	5	2	2
Don't know	6	4	4	2

A separate analysis was undertaken to determine whether the children's perceptions of their understanding and oral reading performance on their easy and difficult passages influenced the type of attribution made. Only the first response to the questions "why do you think your understanding/oral reading was [good]/[average]/[poor]/?" were considered.

Table 63 presents the number of responses per causal attribution category as a function of their perceptions of understanding on the easy and difficult passage. The table shows that of the LD group who thought their understanding of their easy passage was "good" or "average", 53% made attributions to "ability", compared with 31% of the NLD group. For the easy passage, of the NLD group who perceived their understanding as "good" or "average", 52% made attributions to "task ease". Thus, perceptions of "good" or "average" understanding by the LD group lead to the making of an internal attribution ("ability"), while the NLD group made and external attribution ("task ease"). Both "ability" and "task ease" are "uncontrollable" factors.

Of the LD children on the difficult passage who thought their understanding was "poor", 67% made attributions to "lack of ability", while a further 33% thought "poor" understanding was due to the difficult nature of the task. The NLD children showed a similar pattern. Of the LD group who viewed their understanding as "poor", "lack of ability" attributions accounted for 50% of the responses, with "task difficulty" attributions accounting for a further 32%. Thus both internal uncontrollable and external uncontrollable attributions were made by those who regarded their understanding of their difficult passage as "poor" (see Table 63).

Turning now to oral reading performance on the easy passage, children in both groups who described their reading as "good" or "average", most often made "ability" attributions (for both groups 54%). For the LD children who perceived their oral reading performance at the difficult level as "poor", 81% of the attributions were "lack of ability" attributions. In the same way, for the NLD children who perceived their oral reading at the difficult level as "poor", 53% of the attributions related to "lack of ability" (see Table 64).

Table 63

Number of Responses per Causal Attribution Category as a Function of Perception: Understanding of the Easy and Difficult Oral Reading Passages

	Good		Average		Poor		Don't know	
	LD	NLD	LD	NLD	LD	NLD	LD	NLD
Easy								
Task ease/ difficulty	2	7	7	8		1		
Task interest	1		2					
Ability	7	4	11	5	1			1
Attention		1		1				
Strategies		1	1			1		
Miscellaneous			2					1
Don't know			1	2		1		
Difficult								
Task ease/ difficulty			1	1	8	9	1	
Ability	2		3	3	16	14		
Attention						3		
Strategies		1				1		
Miscellaneous	1					1		
Don't know								

Table 64

Number of Responses per Causal Attribution Category as a Function of Perception: Oral Reading Performance of the Easy and Difficult Oral Reading Passage

	Good		Average		Poor		Don't know	
	LD	NLD	LD	NLD	LD	NLD	LD	NLD
Easy								
Task ease/ difficulty	3	3	2	4				
Task interest			1					
Ability	5	6	9	8	6	1		
Immediate effort				2				
Liking & interest					1	1		
Strategies		1	2	2				
Miscellaneous			2	2	1		1	
Don't know		1	2	3				
Difficult								
Task ease/ difficulty				1	3	4		
Ability		3	3	6	17	9		1
Attention		1						
Immediate effort			1					
Liking & interest				1		1		
Strategies		1	3			2		
Miscellaneous	1		1	2			3	
Don't know	1		1	1	1	1		

The task-linked responses were also coded in terms of "causal attribution", "indicator", "ambiguous", "don't know", and "other" statements. "Indicator" statements were responses that refered to indications about why a particular outcome had occured (e.g., "I knew my understanding was good because I got the answers right"). "Ambiguous" responses were those that could be regarded as either causal attributions or indicators (e.g., "I knew my understanding was good because because I understood it"). "Other" responses were statements that could not be coded in any of the other four categories.

Table 65 presents the types of statement related to the children's understanding and oral reading performance at both levels of difficulty. On the easy passage, no significant difference was found between the groups for the types of statement in terms of understanding, $X^2(4) = 4.54$, $p>.05$. Similarly, on the difficult passage, no significant difference was found, $X^2(4) = 4.40$, $p>.05$.

Analyses of the types of statement relating to oral reading performance also revealed no significant differences. Specifically, on the easy passage, $X^2(4) = 2.20$, $p>.05$, and on the difficult passage, $X^2(3) = 1.06$, $p>.05$. Thus, the types of statements made by the children revealed no group differences for either understanding or oral reading performance at both difficulty levels.

Summary. Task-linked perceptions of understanding and oral reading performance at the easy and difficult levels showed no differences between the groups. Therefore, the hypotheses that both groups would have "high" perceptions of their understanding and their oral reading performance at the easy level and "low" perceptions of their understanding and their oral reading performance at the difficult level were supported.

In addition, the hypotheses that the LD children would make different attributions for their understanding and for their oral reading performance when compared to NLD children were not supported. Specifically, the LD children did not make more external attributions at the easy level, nor more internal attributions at the difficult level, than the NLD group.

Table 65

Type of Statement following Perception of Understanding and Oral Reading Performance of the Easy and Difficult Oral Reading Passages

	Attribution		Indicator		Ambiguous		Don't know		Other	
	LD	NLD	LD	NLD	LD	NLD	LD	NLD	LD	NLD
Easy										
Understanding	37.1[a]	61.8	20.0	14.7	34.3	17.6	5.7	2.9	2.9	2.9
Reading performance	25.7	32.4	45.7	35.3	11.4	14.7	11.4	5.9	5.7	11.8
Difficult										
Understanding	31.4	41.2	28.6	11.8	34.3	41.2	2.9	5.9	2.9	0.0
Reading performance	22.9	23.5	34.3	29.4	28.6	38.2	14.3	8.8	0.0	0.0

[a]Percentage of responses (number of responses divided by total for each group, multiplied by 100).

The findings of the separate analysis indicate that LD children regarded their perceived "good" or "average" understanding and oral reading performance at the easy level to be causally related to "ability", their perceived "poor" understanding and oral reading performance at the difficult level to be the result of the "lack of ability". The NLD children attributed their perceived "good" or "average" understanding of their easy passage to "task ease", and their perceived "good" or "average" oral reading performance at this level to "ability". The NLD children largely saw their perceived "poor" understanding and oral reading performance of the difficult passage due to a "lack of ability". The prediction that the LD children who have "low" perceptions of their understanding and oral reading performance would make attributions to internal factors, especially to "lack of ability" was supported.

Summary of Results of all Perception and Causal Attribution Measures

Causal Attribution Rating Scale for Success. In terms of reading success, significant differences were found between the groups for "ability", "stable attitude" and "luck" attributions. Specifically, the NLD children made stronger attributions for "ability" and "stable attitude" than the LD children. Stronger attributions to "luck" as a factor in reading success were made by the LD children in comparison to the NLD children.

Causal Attribution Rating Scale for Failure. Significant differences were found between the groups for "lack of typical effort" and "lack of ability" as causal factors in reading failure. LD children made stronger attributions to these two factors than did the NLD children.

Reading Perception and Attribution Questionnaire. Perceptions of reading achievement were significantly different between LD and NLD children. In terms of in-class reading achievement level, the LD children had lower perceptions than the NLD children.

In comparison to NLD children, the LD children did not differ in the attributions made for the success of others in reading. The most frequently reported attribution for the success of others by both groups was "ability". "Previous experience" and "stable attitude" respectively were regarded as the next most common causes of other children's reading success by both groups.

No significant differences between the groups were found for attributions related to the failure of others in reading. LD children most frequently reported "lack of ability" as a reason for the failure of others, while NLD children most frequently made attributions to "lack of stable attitude".

Turning now to causal perceptions of their own success in reading, no significant differences were found between the groups. The most common attribution made by both groups for their success in reading was "immediate effort".

The attribution most often made by the LD children for their reading failure was "lack of attention", while for NLD children it was "lack of liking and interest" in reading. There were no significant differences in the types of attributions made for either of the groups for failure in reading.

Task-linked Perceptions and Causal Attributions. Perceptions of understanding and oral reading performance on the easy passage were generally regarded as "good" or "average", while on the difficult passage they were generally described as "poor". There were no significant differences between the groups on their perceptions of understanding and oral reading performance.

In terms of the causal attributions reported for both their understanding and their oral reading performance on both levels of task difficulty, no differences in the types of attributions made by the two groups were revealed. Thus, neither group membership, the aspect of the task, nor task difficulty influenced the types of attributions made.

When the causal attributions are seen as a function of perceptions, perceived "good" or "average" understanding was seen as causally related to "ability" and "task ease" at the easy level by the LD and NLD children respectively. Perceived "good" or "average" oral reading performance at the easy level was regarded by both groups as being attributed to "ability".

Perceived "poor" understanding and oral reading performance at at the difficult level was seen as the result of a "lack of ability" by both groups of children.

C H A P T E R F I V E

DISCUSSION

The present study examined several areas of interest relating to learning disabled readers. Specifically, these areas included: metacognitive knowledge, oral reading and comprehension monitoring, self-perceptions, and causal attributions. In the following discussion the relevance of the present results in each of these areas is considered in turn. In addition, comment is made on the methodological innovations employed in this study.

Metacognitive Knowledge

Reading Strategies

Metacognitive knowledge in reading is concerned with awareness of variables that allow a reading task to be performed effectively. Knowledge of strategies, as one of these variables, is an area in which LD readers may be deficient. One of the purposes of this study was to investigate LD children's knowledge about reading, in particular knowledge about reading strategies. Attention was focused on two purposes for employing reading strategies: obtaining meaning from a story and decoding an unknown word. The strategies were seen as either positive (helpful) or negative (unhelpful), and either internal or external to the reader.

The results indicated that the LD children were as aware as the NLD children of the importance of positive strategies and the unimportance of negative strategies for deriving comprehension. In terms of awareness of the importance of positive strategies and internal-negative strategies for decoding an unknown word, both groups performed similarly. However, the LD children considered external-negative strategies and those irrelevant to decoding to be more important than NLD children.

Studies investigating metacognitive knowledge have reported that poor readers are less aware of strategy variables related to reading (e.g., Myers & Paris, 1978; Moore & Kirby, 1981), and that poor readers' knowledge of reading strategies tends to reflect a decoding focus (e.g., Canney & Winograd, 1979; Johns, 1979). In their study of knowledge of strategies which influence story comprehension and studying text, Paris and Myers (1981) found no differences between groups on positive and neutral strategies, but did find that in comparison to good readers, poor readers were less aware of the negative factors and their detrimental influence on comprehension. Similarly, in the present study, the results show that when two purposes for reading, which in the past have been attributed to good and poor readers, are separated out, group differences disappear. That is, in terms of the awareness of the importance of positive strategies required to achieve story meaning and to work out an unknown word, the LD and the NLD children performed similarly.

This suggests that the LD children are not lacking in metacognitive knowledge, although they may have greater difficulty in discerning the relative influence of external-negative strategies for decoding. The finding that the LD children perceived such negative strategies as "writing the word down twenty times" or "covering up the first letter of the word you are working out" to be more important for decoding than the NLD children, suggests that the LD children may have hesitated in indicating strongly that these types of strategies were unhelpful. For example, the LD children may have believed that because "writing the word down twenty times" may be a useful vocabulary learning technique, it may also be "somewhat important" for decoding. Similarly, because in instruction in reading, one central method of word attack involves using context and focusing on the initial letters of a word (Holdaway, 1980), the LD children may have become confused here by the reference to "cover up the first letter of the word" and thus rated this strategy also as "somewhat important". However, the fact that the neutral statements such as "owning a bicycle" were regarded more often as "somewhat important" for decoding, does indicate that these children do have difficulty discriminating plausible strategies from statements irrelevant to decoding.

Further, even though LD children rated external-negative strategies and neutral statements as more important than the NLD children, scrutiny of the patterns of ratings revealed that the self-positive and other-positive strategies were perceived by both groups as having greater importance than self-negative, other-negative and neutral statements across both the Strategies for Meaning Scale and the Strategies for Decoding an Unknown Word Scale. These results indicate then that LD children do have metacognitive knowledge, at least of positive strategies for gaining meaning and decoding an unknown word.

However, it is inappropriate to assume that possession of knowledge of strategies also implies that children will be able to employ strategies to accomplish a reading task, and furthermore to use them successfully. The second aspect of this study, investigating oral reading and comprehension monitoring, set out to establish if indeed LD children did make use of strategies.

Comprehension Monitoring

Oral Reading and Monitoring Behaviour

Another of the objectives of the present study was to examine the oral reading behaviours of the LD children in comparison to the NLD children. In order to do so an attempt to equate passage difficulty was made. During Phase A, the children read consecutively graded passages until they met the "easy" and "difficult" level criteria. In Phase B, the children read the parallel passages of their "easy" and "difficult" level. The miscue analysis and comprehension data were collected during that Phase. A check of the number of children who achieved the criterial accuracy and comprehension scores in Phase B revealed some inconsistency across the two phases. Specifically, four LD children and two NLD children were not within the accuracy criteria of 95% or above on their easy Oral Reading Passage. At the difficult level, five LD and 11 NLD children had accuracy scores higher than 90%. In terms of comprehension scores, 13 LD and 16 NLD children did not achieve the criteria of 75% or above on their easy passage, and 5 LD and 3 NLD children had comprehension scores of more than 50% on the difficult Oral Reading Passage. Nevertheless, the majority of the children met at least one of the elements of the criteria for each of their Oral Reading Passages.

Several reasons for the lack of consistency between Phases may be given. One of the reasons may have been the fact that in Phase B the children went straight from their "easy" level passage to their "difficult" level passage. In contrast, in Phase A, the children read through several other passages of increasing difficulty before reaching the difficult level accuracy and comprehension score criteria. Thus, there was a "warm-up" effect in the first Phase, which did not occur in the second Phase approximately three weeks later. Secondly, story interest may have been a confounding variable. Interest in the topic has been seen to influence predictions of text readability (Klare, 1984), as well as reading comprehension (Asher, 1984). Thirdly, the change in accuracy and comprehension rates for some children in Phase B may have reflected the increased attention given to the oral reading process following the researcher's directions to monitor errors or changes made during reading. Finally, the discrepancies between Phases may have been due to the interest given to use of the Monitoring Device. That is, despite the training sequences, the children were aware of using a novel implement or device.

Comparisons of the groups in terms of accuracy (errors as a function of number of words in the passage) revealed no significant differences at the easy level. However, at the difficult level, the LD children made more errors per 100 words than the NLD children. No group differences in comprehension were found at the easy level, although NLD females were better comprehenders than the other groups at the difficult level.

Reasons for the higher error rate by the LD children at the difficult level, may lie in the fact that those possible reasons for the inconsistency of performance across phases (e.g., interest, attention to monitoring etc.) effected the LD children more when they were reading at their difficult level. On the other hand, the higher error rate may indeed be a true indication that these LD children were poor readers. The data here demonstrate that, when LD children selected on the basis of poor achievement on standardized reading measures read at their difficult level, they still make more errors than NLD children.

Other studies which have involved establishing equivalent reading difficulty, using both oral reading accuracy and comprehension in the criteria, have also indicated problems in obtaining matched levels (Pflaum, nd; Pflaum & Bryan, 1980). Similarly, this study provides further evidence of the difficulty that researchers have when using dual components of reading, rather than just a single aspect such as accuracy (Pohl, 1981). The methodology employed here was one not previously used in a study of the oral reading behaviour of LD children. However, a more consistent result in deriving easy and difficult reading levels may be obtained if some of the above issues are borne in mind. In particular, paying attention to story interest when selecting parallel passages, allowing for the "warm-up", issuing monitoring instructions, and using the Monitoring Device in both phases would seem especially important.

Nevertheless, in considering the results of this study, it is particularly important to recall that while the two groups of readers were matched as closely as possible for their easy and difficult Oral Reading Passages, the LD children did differ in reading achievement from the NLD children. The LD children were selected on the basis of achieving approximately two years below their class reading level and they did differ from the NLD readers in terms of the particular passages at which they read at their easy and difficult level.

Types of miscue

The different miscue types made on the easy Oral Reading Passage and the Difficult Oral Reading Passage were investigated. In line with the research of Pohl (1981) both groups made all of the "tallied" miscue types under consideration. Some "tallied" miscue types were infrequently observed during oral reading. This was very evident at the easy level where fewer miscues were made. With regard to the types of "tallied" miscues made by the LD readers it is interesting to note that together very few "reversals" and "complex reversals" were made. The reading of LD children ("dyslexics") has often been characterized by reversals (e.g., Saunders, 1962). But this finding was clearly not supported here. The finding that "substitutions" were the most common miscue type is consistent with other research (Goodman, 1971; Pohl, 1981; Weber, 1970a). LD children, in the current study made similar percentages of "substitution" miscues at the easy level to the NLD children. While Pohl (1981) found that the high progress readers in her study made less "substitutions" than the low progress readers at the same easy accuracy level as in the current study, the difference was not statistically significant. In the present study, a significant difference for "substitution" miscues was made at the difficult level. Here, LD children made more "substitutions" than the NLD readers. This finding is consistent with that of Shepherd's (1978) study of high ability and low ability readers also reading at their "frustration" level. In addition, at the difficult level, the LD children made more "partial word substitutions". Furthermore, the results reveal that, of the whole word substitutions, the LD readers also substituted more "nonsensical words" per 100 words than the NLD children. This suggests that when LD children are reading at their difficult level, they attempt to make headway through the passage by tolerating a higher percentage of substitutions, even if those substituted words make no sense in the story. In contrast to NLD readers, the LD readers make more substitutions that result in meaning loss. It seems as if the LD readers tend to deal with each word as if it existed in isolation and do not, at least initially, use their sense of language to make predictions about the material being read.

Very few children made "untallied" miscues at the easy level. At both difficulty levels, however, all types of "untallied" miscues were made, except for "sounding out" miscues. No "sounding out" miscues were made at either level. These children did not make such laborious attempts at a word prior to saying it correctly. Rather, it was found that generally the first part of the word that was uttered was enough to either allow immediate successful correction (i.e., without further attempts at "sounding out"), or their "sounding out" resulted in an unsuccessful correction. Consequently, these miscues were coded instead as "partial word substitutions" (a type of "tallied" miscue) because immediately thereafter a successful correction was made or further attempts at correction were unsuccessful.

Where analyses of the "untallied" miscue types were undertaken no significant differences were found between the groups for "repetitions" and "substitution intonation" miscues at the difficult level. Based on these results the prediction that in comparison to the NLD children, the LD children would make more of each type of "untallied" miscue (except for "repetitions") per 100 words was not supported.

Theoretical discussion of the function of "repetitions"(a type of "untallied" miscue) has suggested that "repetitions" are indicative of comprehension monitoring. "Repetitions" are viewed as either having a checking function or as providing time for the processing of an upcoming difficult word. It was therefore anticipated that the LD children, if they were to be viewed as poor monitors of comprehension (e.g., Clay, 1973; Isakson & Miller, 1976) would make fewer "repetitions" per 100 words than the NLD children. However, no group differences were found at the difficult level. Based on this measure of monitoring then, the LD children could not be regarded as inferior to NLD children. The LD children employed "repetitions", regarded as an example of a positive self-regulatory strategy, with a facility equal to that of their peers.

In summary, at two levels of reading difficulty, the LD readers used a similar range of miscue types, as well as similar percentages of each miscue type, to that of the NLD readers. The exceptions to this were shown by the higher percentages of "substitutions" and "partial word substitutions" made by the LD children at the difficult level. These "substitutions" were typically "non words". This indicates that when LD children are faced with difficult textual material, their struggle to make sense of the story is manifested by "substitutions" which result in language that makes little sense. These readers then, are limited in the active implementation of sampling, predicting and confirming strategies and do not bring their rich language resources to bear on the text. When "non word" substitutions remain uncorrected, they reflect a reader's lack of proficiency in reestablishing meaning through the use of syntactic and semantic clues, and are of particular concern.

Errors, self corrections and linguistic cue use

The predictions that the LD children would make more errors and less self corrections than the NLD children were not supported by either the easy or difficult Oral Reading Passage. As a proportion of total tallied miscues, no group differences were found in the error rate. This suggests that both groups found the difficult passage hard to read and performed similarly. The finding appears to be consistent with studies investigating errors of good and poor readers (e.g., Rousch & Cambourne, 1979) but at variance with others (e.g., Au, 1977; Clay, 1973; Goodman, 1973; Goodman & Burke, 1973). With regard to self corrections, similarly, no group differences were found at either level. As an index of comprehension monitoring, the self correction rate indicates that the LD children monitor their understanding as well as NLD children. These findings are consistent with that of Ng (1979) and Pohl (1981) who investigated self correction behaviour of proficient and non proficient readers. The findings are also in accord with those who have investigated rates of self correction in LD and NLD samples. Pflaum and Bryan (1980) and Rousch and Cambourne (1979) also found that the LD children self corrected as often as the normal readers. The results of self correction behaviour are, however, at variance with those of Clay (1973) and Goodman and Burke (1973). But, these two studies did not control for difficulty level. Just as Ng (1979) and Pohl (1981) found that when children read at equivalent accuracy levels self correction ability was not significantly different between groups, this study also showed that when children were reading at both their easy and their difficult levels, differences in the percentages of self corrections disappeared. The same also applies to error rate. When children read at their easy and difficult levels, differences in error rates also disappeared. These findings suggest that when oral reading behaviour is observed, in terms of errors and self corrections, for individual easy and difficult levels, the LD readers perform in the same manner as NLD readers. This further implies that given texts based on personal difficulty levels, LD readers are no better or worse than their counterparts.

Self corrections were more frequent for both groups at the easy passage than at the difficult passage. The suggestion that the easier text provides more context cues for readers to use while monitoring their reading was therefore confirmed. This finding in turn, means that at the easy level more errors are detected, and hence, more self corrections are made.

Linguistically based theories suggest that graphic, phonemic, syntactic and semantic sources of information are used during reading. Both groups in the present study used all four cueing systems at both the easy and the difficult level. This finding is consistent with the results of other miscue studies (Goodman & Burke, 1973; Pohl, 1981; Rousch & Cambourne, 1979).

In terms of the relationship between errors and graphic cue use, the hypothesis that the LD group would make fewer errors having "high graphic proximity" was supported only at the difficult level. This is in agreement with other studies that have indicated that poorer readers are less likely than good readers to make errors that have high visual proximity to the text word (Au, 1977; Goodman, 1973). Other results derived from additional analyses of the other levels of graphic cue use found no group differences for errors having "no graphic proximity" at either level, but LD children made more errors that had "some graphic proximity" to the text word at the difficult level. Thus, while LD children made a similar percentage of errors having no letters in common with the text word as the NLD children, they made more errors with some letters in common with the text word, and fewer errors that had a high degree of orthographic correspondence with the text word. It appears then that LD readers use less graphic information in making a tentative choice about an upcoming word. As such they use graphic cues less effectively when text is difficult.

It was anticipated that in comparison to the NLD children, the LD children would also make fewer errors having "high phonemic similarity" with the expected response. However no support was found for this hypothesis at either difficulty level. Several other studies have also reported no difference between groups in terms of errors having "high phonemic similarity" (e.g., Pflaum, nd; Plaum & Bryan, 1980; Rousch & Cambourne, 1979). Thus, it is apparent that the LD group were no different from the NLD group in their production of errors that reflected "high sound similarity". That is, they were not poorer readers because they did not make "high phonemic" matches with the text word. Additional analyses revealed that neither were they poorer readers because they made more errors with "no phonemic similarity." Here there were no statistically significant differences between the groups at either level. The only significant group difference in terms of errors and phonemic cue use was found for errors having "some phonemic similarity" at the difficult level. The fact that the LD children made more errors having both "some graphic proximity" and "some phonemic similarity" probably relates to the integrated nature of the graphic and phonemic aspects of language.

In terms of a profile of "graphic" and "phonemic" cue use, the reading errors of the LD children at the difficult level reflected more frequent use of initial, middle and final letters of the text word as visual and sound cues. In addition, their errors less often reflected "high graphic" correspondence with the text word than those of NLD readers. This suggests that the LD reader attempts to use the graphophonic system during reading, but, when it comes to using knowledge of the orthography of the language to make the closest approximation to the text word, they are less effective.

The research of Rousch and Cambourne (1979), Watson and Clay (1975) and Goodman (1976) has indicated that poor readers do not use the grammatical structure and meaning of the text as effectively as good readers. In this study, an examination of syntactic and semantic cue use at two difficulty levels revealed no group differences for errors having "no syntactic acceptability" and "no semantic acceptability" at either level. The corresponding hypotheses predicting that NLD children would make more errors having "high syntactic" and "high semantic acceptability" at both difficulty levels were also not supported. Here again no group differences were found. While these findings then are at variance with the studies indicated above, they are in line with those of Allington and Strange (1977) and Kolers (1975). It is indicated in the present study that at their easy and difficult level, errors reflecting great insensitivity to the syntactic and semantic parameters of print were made to the same extent by LD and NLD readers. However, the LD children were also no different from the NLD readers in their errors that reflected the highest level of attempts to reproduce grammatically correct and meaningful text. Goodman and Goodman (1977) have argued that the major differences between proficient and non proficient readers lie in how well they control the semantic and to a lesser extent syntactic information of the text. The results here show that this distinction does not hold when children read at their individual easy and difficult level. The LD children here made oral reading errors which displayed their control of the rules and syntax of oral language and their active striving to construct the author's meaning. LD children, then, appeared not to be poor readers because of their application of strategies involving linguistic awareness of syntax and semantics. Indeed, other factors must be sought as an explanation for their poor reading achievement.

Turning now to self correction behaviour, it should be recalled that at a global level no difference between the groups for self correction rate was found for either passage. However, when these self corrections were seen in relation to types of linguistic information, group differences did emerge.

The LD children self corrected fewer errors having "no graphic proximity" and "no phonemic similarity" at the difficult level. This indicates that the LD readers at this difficulty level were less aware that they had deviated from the text word both visually and orally. In addition it indicates that they were less successful in applying corrective strategies and so change their original response to that which the author intended. The LD children also self corrected fewer errors having "no syntactic" and "no semantic acceptability" at the easy level. No group differences were found at the difficult level. Thus, on the easier passage, errors which severely disrupted grammar and meaning were more easily detected by the NLD readers. The LD readers may have self corrected errors bearing "no syntactic" and "no semantic" relationship to the text word less because they tend to focus on smaller units of language and appear to ignore the syntactic and semantic aspects of print when the text is easy. The findings regarding self correction at the easy level are consistent with other studies (e.g., Goodman & Burke, 1973; Rousch & Cambourne, 1979). However, the inconsistency of performance in self correction at the easy and the difficult level is complicated further by the finding that the LD children self corrected proportionately more "semantically unacceptable" errors at the difficult level. This finding was likely influenced by the LD females self correcting more "semantically unacceptable" errors than the other groups at this level. Surprisingly, therefore, LD readers were more aware of those errors that produced totally distorted meaning and corrected them successfully. Maybe the LD readers were able to utilize the other cueing systems to a sufficient degree to allow self correction to occur? That is, perhaps the integrated use of graphic, phonemic, and syntactic strategies permitted the most severe errors in terms of distorted meaning to be corrected?

The findings point to a lack of a consistent pattern in self correction behaviour for LD children when self correction and linguistic cue use are examined at two different levels of text difficulty. This may mean that self correction behaviour in LD children is triggered by an interplay of factors additional to that of linguistic cue use. These factors may include reader interest in the story and motivation to self correct.

The role of text difficulty was seen when errors and linguistic cue use were examined. Specifically, as predicted, both groups made more "high graphic" errors as passage difficulty increased. Past studies of good and poor readers (Goodman & Burke, 1979; Ng, 1979) have found similar results. Further, in line with the findings of Ng (1979), as text difficulty increased, the proportions of "high syntactically" and "high semantically acceptable" errors decreased. Interestingly, the proportion of "high phonemic" errors on the easy and the difficult passage remained virtually the same for both groups. That is, while it appeared that the more difficult text meant that more errors having high visual proximity were made, the more difficult text did not influence the sound association of the observed and expected responses. Further, the more difficult the text the fewer the errors that most closely matched the author's syntax and semantics. These results indicate that when comparisons of errors are made across texts, then the influence of difficulty level must be taken into account.

The apparent influence of text difficulty on errors did not follow in a similar manner for self corrections and linguistic cue use. As anticipated, the NLD readers did decrease their self correction rate of "high graphic" and "high phonemic" errors when the reading task got harder. But the LD readers slightly increased their correction of these error types as text difficulty increased. Thus, the influence of a more difficult text actually meant that the LD readers were more likely to self correct errors having "high graphic" and "high phonemic similarity". They were therefore triggered by basic aspects of linguistic processing such as word recognition which in turn led to successful correction, more at the difficult than at the easy level. However, in terms of the influence of text difficulty on the self correction of "high syntactic" and "high semantic" errors, as predicted, both groups did reduce their rate of self correction as the text became harder.

Errors, self corrections and meaning change

Of the total number of miscues that both groups of children made, the vast majority were "severe meaning change" miscues rather than "no meaning change" or "non severe meaning change" miscues. This suggests that, at both the easy and the difficult level, the children tended to make errors which were most anomalous. The additional analyses undertaken for "no meaning change" and "non severe meaning change" miscues at different levels of correction revealed that the LD and NLD children had the same patterns of behaviour. Of interest here is that when Pflaum and Bryan (1980) investigated "non severe meaning change" errors as a proportion of total miscues, they found that the LD children made more "non severe meaning change errors" at both the "instructional" and "frustration" levels. (Note they use the term "meaning change" to describe these error types). However, the current study found no group differences for uncorrected and unsuccessfully corrected "non severe meaning change" errors at either the easy or difficult level. Two possible reasons for the discrepancy between the two studies can be posited. Firstly, in the Pflaum and Bryan study, the "instructional" and "frustration" levels were assigned after the reading had occurred on the basis of error rate, with more LD children reading at the frustration level than NLD readers. Secondly, and as a result of the above method of determining difficulty level, two different groups of readers read at each level. In comparison, in the current study, both groups of children (LD and NLD) read at their predetermined easy and their difficult level.

When "severe meaning change" miscues, as a proportion of total miscues, were analyzed at different levels of correction, group differences did emerge. These differences however were limited only to the difficult level. LD children made significantly more "severe meaning change" miscues than the NLD children at the difficult level. That is, irrespective of correction type, the LD children made more miscues at the difficult level that involved the distortion of context.

When these miscues were broken down in terms of level of correction, no differences were found between the groups for "uncorrected" errors. In addition, no group differences were found for "successfully corrected" severe meaning change errors. That is, at both difficulty levels when "successful correction" of severe meaning change errors was examined, the LD children indicated they were just as able as the NLD children. They made proportionately just as many "successfully corrected" errors as the NLD children. When seen in terms of the findings relating to the ability to self correct (again as a proportion of total tallied miscues) reported earlier, it is of interest to note that just as self correction ability generally did not differ between the groups at either level, neither did the rate of self corrected "severe meaning change" errors differ here at either level.

However, as a proportion of total tallied miscues, more "unsuccessful attempts at correction" were made by the LD group than the NLD group. This finding in turn contributed to the significant difference between groups found for "uncorrected" and "unsuccessfully corrected" errors combined. These results indicated that the role of "severe meaning change" errors was greater for LD than for NLD children and that the greatest contributor to this error rate was not the LD children's "uncorrected" errors so much as their high rate of "unsuccessful" attempts at correction. In addition the hypothesis that both groups would make more severe meaning change miscues as difficulty level increased was supported.

Therefore, the results relating to meaning cue use indicate that at the difficult level, the reading of the LD group was characterized by more "severe meaning change" miscues, and in particular more "severe meaning change" errors. However, LD readers do appear to be sensitive to the severe breakdown of meaning, as is evidenced by their monitoring via self correction where no group differences emerged. LD readers' higher proportion of unsuccessfully corrected errors, nevertheless, suggests that their attempts at correction are not always successful. This indicates a willingness to reestablish meaning but an inability to consistently apply corrective strategies effectively at the difficult level. Therefore, LD readers must not only be taught to minimize loss of meaning by making fewer severe errors but also be instructed in selecting and flexibly applying appropriate "fix-up" strategies. This flexibility of strategy use would in turn lead to a higher level of success in reestablishing meaning.

Signaled Monitoring

Types of signaled monitoring.

Pflaum's (nd) study employed a device which allowed awareness of comprehension monitoring to be signaled. In this study, the Monitoring Device (Bleep) was also used. As anticipated, both groups of readers signaled monitoring while reading both the easy and difficult passages. The children indicated awareness of monitoring "before", "during", "immediately after", "one or more words after" and "when there was no miscue". As predicted, the LD children made more "unbleeped" responses per 100 words than the NLD readers at both difficulty levels. This shows that LD children did not signal as often as the NLD readers. However, it is more important to look at unbleeped responses as a proportion of the total number of miscues, rather than per 100 words to determine whether LD children lacked awareness of monitoring in comparison to the NLD readers.

When the children did signal monitoring at the difficult level there were no differences in bleeping "during", "immediately after", and "one or more words after" the miscues per 100 words. Thus, with the different levels of speed of response, no group differences appeared. However, it is interesting to note that the vast majority of the bleeps occurred "immediately after" the miscue for both groups. Thus, if the children did signal monitoring, their reaction was prompt.

Signaled monitoring and linguistic cue use

It was expected that in comparison to NLD children, LD children would be less aware that comprehension had failed and that this would be seen by less frequent signaling of errors using the Monitoring Device. However, as a proportion of total tallied miscues, it was found that the LD children did not indicate their errors (i.e., uncorrected, unsuccessfully corrected, and abandoned correct words) less than the NLD children at either level of difficulty. When Pflaum (nd) conducted her study she did not report errors and self corrections separately. She found that LD children in the "bleep" condition, signaled fewer miscues than did the NLD children in the "bleep" condition. This current study revealed that when signaling of errors alone was considered, then the LD children were as sensitive to comprehension failure as the NLD children at their easy and difficult level. The LD children therefore, were not poor metacomprehenders of errors.

The results of the monitoring of self-generated errors through the use of the Monitoring Device have revealed quite different results from those studies investigating monitoring of researcher-inserted errors, ambiguities and anomalies. In those studies (e.g., Baker, 1979b; Bos & Filip, 1984; Garner, 1980; Markman, 1979; Winograd &

Johnston, 1980), poor and LD readers did not always monitor as well as good readers. In contrast, both groups in the current study, detected their own errors to the same extent. This indicates that when the errors were self-generated they were more likely to be noted and signaled. It may be argued that because they did monitor their own error behaviour they cannot be regarded as passive learners (Torgesen, 1977a) nor can the term "production deficient" (Flavell, 1970) be applied to these LD readers on these reading tasks. The finding here suggests that the level of awareness may well depend on the specific characteristics of the task. When the task involves the monitoring of self-generated errors, children may attend to comprehending the written material in quite a different way to which they comprehend material involving deliberately inserted errors.

When consideration is given to the signaled monitoring of self correction (i.e., signaled monitoring of successfully corrected errors) however, the LD children bleeped fewer self corrections than the NLD children at the difficult level. No group differences were found at the easy level. The results of studies involving both the monitoring of inserted ambiguities and correction ability (Baker, 1979b, Isakson & Miller, 1976; Paris & Myers, 1981) have indicated that good readers were more adept than poor readers. The findings of the current study indicate this to be true also, but only at the difficult level. The LD children were less sensitive to comprehension breakdown and the successful application of corrective strategies on their difficult passage.

This may well indicate then that LD children are less aware of these automatic and subconscious monitoring events. The very nature of successful corrections may make LD children less sensitive to them. In addition, the LD children may have regarded successful correction as having less value in terms of signaling. Although they had been directed to signal any changes to words originally read, they may have perceived self corrections as being less important to signal and therefore did not do so as often. On the other hand, the lack of sensitivity to self corrections at the difficult level may have been influenced by the complex demands of the task and the demands on selective attention. That is, the signaling of self correction meant that the children not only had to monitor meaning but they also had to spontaneously note that indeed an error had been made, evaluate whether it was worth correcting, apply a successful correction strategy and use the Monitoring Device. From the findings of signaled monitoring of errors where no group differences were found, we know that the LD children could simultaneously engage in some of these executive processes. The group differences at the difficult level for the signaling of self corrections however, may indicate that there is a limit to the number of executive processes that can be handled simultaneously by LD children. This hypothesis does not contradict the assertion that the LD children were not inactive comprehenders. Rather it suggests that when additional task demands, beyond signaling monitoring were made then the LD children were less efficient. That is, when asked to signal monitoring in addition to engaging in further cognitive processing (such as making decisions about the worthwhileness of correcting) the LD children had difficulty.

Analyses of signaled monitoring in relation to linguistic cue use were only investigated where sufficient children made responses. The additional analyses revealed that in proportion to total tallied miscues, and in comparison to the NLD children, the LD group made more bleeped errors having "some graphic proximity" at the difficult level. This indicates that the LD children signaled errors bearing orthographic features consistent with the initial, middle or final letters of the text word more frequently than the NLD children. At the difficult level then, they were alert to their errors that had some visually similar features but where the greatest part of the word was discrepant. The additional analyses also revealed that the NLD group bleeped self correction of errors with "some graphic proximity" more frequently than the LD readers. This indicates that the better readers were more sensitive to the successful correction of errors where partial correspondence was found between the letters of the expected and observed responses. Further, this finding was also mirrored for bleeped self corrections of "some phonemic similarity". Here again the NLD readers signaled awareness of self corrections more often than the LD readers at the difficult level.

Thus far, LD readers may be characterized as readers able to apply monitoring skills. The LD reader is able to signal awareness of errors to the same extent as the NLD reader at both difficulty levels. When seen in relation to linguistic cue use at their difficult level, the reading of LD children is characterized by more frequent monitoring of errors having only "partial graphic proximity" to the text. In addition, when both self correction and signaled monitoring are employed, at the easy level the LD children perform similarly to the NLD children. At the difficult level, the LD readers make fewer signaled self corrections in comparison to the NLD readers. They less frequently signal monitoring of self corrections having only "partial graphic" and "partial phonemic similarity" to the text word. The difference between the groups in metacognition, specifically in self regulating behaviours, is found particularly when text is difficult and when both signaled monitoring and self correction ability are jointly taken into account. It appears then that the difficulty level of the text acts as a catalyst for the breakdown of the metacognitive abilities of signaling monitoring and self correction which are evident at the easy level. In all other respects on tasks involving the signaled monitoring of self-generated errors the LD children have indicated they are as proficient as the NLD children.

Signaled monitoring and meaning change

"No meaning", "non severe meaning" and "severe meaning" change miscues were analyzed as a proportion of the total number of occasions that monitoring was signaled. All three miscue types were signaled. This finding is in agreement with Pflaum's (nd) study where the participants marked all the meaning change miscue types.

In this study, when indicated awareness of comprehension monitoring occurred, it was mainly signaled at words where meaning had been most severely distorted. The two groups monitored their "severe meaning change" miscues at both difficulty levels to the same extent. However, when analyses included the levels of correction within the bleeped "severe meaning change" miscues, no clear pattern emerged either across levels or for the groups. For example, as a percentage of all bleeped tallied miscues, the LD children signaled fewer uncorrected "severe meaning change" errors at the easy level, but no group differences were found at the difficult level. It appears that the easy passage provided sufficient cues for the NLD children to signal that they were aware of uncorrected severe meaning distortions, but this was not so for the LD children. In contrast, at the difficult level, the results indicated that both groups were no different in signaling totally anomalous meaning. At this level both groups indicated their sensitivity to severe errors which remained uncorrected to the same extent.

The assumption that LD children would be characterized by their unpreparedness to signal comprehension monitoring at other levels of correction for "severe meaning change" errors was not substantiated. Given the above results then, one might assume that investigation of the other levels of correction would reveal a similar pattern of signalling awareness. However, this was also not the case. Instead, at the easy level for bleeped unsuccessfully corrected "severe meaning change" errors, no group differences were found, and at the difficult level, these bleeped error types occurred more frequently for the LD than for the NLD children. That is, the pattern found for uncorrected errors was reversed for unsuccessfully corrected errors. Here, at the difficult level, the LD children were aware of consciously applying word attack skills following comprehension failure, and they signaled these attempts more frequently than the NLD readers. That is, they were more sensitive to their attempts at correcting serious errors at the difficult level than the NLD group.

The findings of the bleeped uncorrected "severe meaning change" errors at the easy level and the bleeped unsuccessfully corrected "severe meaning change" errors at the difficult level also influenced the results of the combined uncorrected and unsuccessfully corrected "severe meaning change" errors. Thus, in terms of the signaled monitoring at the easy level the NLD group were superior. However, at the difficult level, the LD children more frequently made bleeped "severe meaning change" errors than the NLD children. This suggests that the monitoring of "severe meaning change" errors by the LD children at the difficult level reflected a higher level of awareness than that of the NLD children. This was contrary to expectations and also not in keeping with the other findings reported here.

The inconsistency of behaviour in terms of awareness of miscues was further evident when signaled monitoring of self corrected "severe meaning change" errors was examined. In line with the hypothesis, the LD group bleeped fewer successfully corrected "severe meaning change" errors than the NLD children. This occurred however only at the difficult level. When the task was hard, the LD children displayed less sensitive monitoring of the most serious errors involving successful correction.

One further surprising result was that as task difficulty level increased so too did the percentages of bleeped "severe meaning change" miscues. This indicates that at the difficult level, in relation to the total number of signaled miscues, the awareness of "severe meaning change" miscues was stronger than at the easy level. One would have expected the reverse to be true. That is, the easier context it was anticipated, would have helped the reader note distortions of meaning and thus have triggered the signaling of monitoring more often. The equivocal nature of the results here for groups and across levels of passage difficulty provides only some support for Pflaum's (nd) study. It is suggested that the introduction of the two levels of task difficulty and the separation of levels of correction within the types of meaning change may have contributed to the lack of consistency in the results. The results may also be a reflection of the reasons why signaled monitoring was or was not undertaken at the two difficulty levels. For example, one of the reasons why the LD children signaled both their uncorrected and combined uncorrected and unsuccessfully corrected errors less at the easy passage was because the LD readers did not capitalize on the cues for understanding the easy passage which should have triggered comprehension breakdowns. On the other hand, LD children may have found it simpler to ignore the fact that they didn't understand, or they resolved the comprehension obstacles internally or believed that the obstacle would be resolved later in the easier text. However, at the difficult level, the more frequent signaled monitoring of unsuccessfully corrected and combined uncorrected and unsuccessfully corrected errors by the LD children may directly be a result of the overt striving to apply corrective strategies on text that was harder. That is, the very nature of multiple correction attempts on a greater number of errors would be more obvious in terms of occasions for the child to signal monitoring, whereas words not corrected could be more easily ignored. In addition, the LD readers may have regarded the signaling of monitoring of successful corrections at the difficult level to be redundant, in that they interpreted signaling as unnecessary, once successful correction had been made.

In addition to describing comprehension monitoring behaviour as a proportion of total signaled monitoring, analyses were undertaken of signaled monitoring and meaning cue use as a proportion of the different levels of meaning change. Analyses were not performed for "no meaning" or for "non severe meaning change" miscues, but were limited to "severe meaning change" miscues. Additional analyses revealed that as a proportion of "severe meaning change" miscues at the easy level, the LD pupils did not signal monitoring as often as the NLD children. At the difficult level, "severe meaning change" miscues were signaled more often by NLD females than by the other groups. When the levels of correction of the "severe meaning change" miscues were also taken into account, the LD group signaled fewer of their uncorrected "severe meaning change" errors at the easy level. At the difficult level there were no group differences. Thus, of the miscues that most severely distorted meaning and remained uncorrected, the LD children indicated less awareness of monitoring. One can see then that whether the signaled awareness is viewed in terms of the total number of occasions that signaled monitoring occurred or in terms of the total number of "severe meaning change" miscues, the LD children monitored the uncorrected "severe meaning change" errors at the easy level less frequently than the NLD children, but to the same extent at the difficult level.

As a proportion of severe meaning change miscues, bleeped uncorrected and bleeped unsuccessfully corrected "severe meaning change" errors combined were made as frequently by the LD as by the NLD group at both difficulty levels. This is at variance with Pflaum (nd) who found that as a proportion of "severe meaning change" miscues, the LD children bleeped "severe meaning change" errors less frequently. It may be argued that when the analyses were completed in this study at two difficulty levels, group differences disappear. The

LD children are as sensitive as their peers to their "severe meaning change" errors when they read at their individual easy and difficult level. It would seem important to take into account task difficulty on signaled monitoring of errors.

In terms of indicating self corrected meaning change errors, the LD children showed that they were less sensitive to their monitoring of successfully corrected "severe meaning change" errors at the difficult level. This also parallels the results found for bleeped self corrected "severe meaning change" errors when seen as a proportion of the total number of signaled monitoring occasions.

Finally, the percentage of total bleeped "severe meaning change" miscues was lower for LD children at the easy level compared with the difficult level. However, as task difficulty increased for the NLD children the rate of signaling of "severe meaning change" miscues increased.

Again, the results relating to signaled monitoring and "severe meaning change" as a proportion of "severe meaning change" miscues reveal an inconsistent pattern across levels of task difficulty and for groups. Such fluctuations of results may be due to several factors which require further investigation. It appears that task difficulty does play an important role in the level of signaled monitoring. However other salient factors may include children's deliberate ignoring of errors and/or corrections, immediate, internal resolution of comprehension breakdown, unwillingness to indicate errors when further reading may enlighten, inability to attend to both the reading task and the use of the Monitoring Device, and story interest.

Metacognitive Knowledge

Self Report of Oral Reading Behaviour

Examination of the metacognitive knowledge of regulatory behaviours employed in oral reading, especially knowledge of cognitive monitoring during a typical classroom activity, has not been attempted before. Certainly, no studies have reported comprehensive self reports of the monitoring of self-generated errors and self corrections at two levels of task difficulty.

Studies requiring introspection of the activities involved in comprehension monitoring have generally been concerned with reports of what strategies were used following the detection of difficulties in understanding (e.g., Garner, 1980; Winograd & Johnston, 1980). However this study investigated awareness of comprehension monitoring both prior to and following errors (including repetitions) and self corrections.

The children were questioned at points in their oral reading where they had signaled awareness of an error or change using the Monitoring Device, and at both self corrections and repetitions where signaled awareness was not indicated. These points were all considered to be demonstrative of comprehension monitoring at either a conscious or subconscious, automatic level. The results indicated that two-thirds of the 68 children were initially unable to describe some 110 monitoring events at the difficult level. In this regard the LD pupils were similar to the NLD children. But only 16 of the 68 children were still unable to describe 21 monitoring events after the tape of their difficult Oral Reading Passage was replayed.

The children in this study were however immediately able to describe the majority of their monitoring events (approximately 600 events) quite specifically at both levels of difficulty. These data indicate that both groups of children were able to verbally externalize covert cognitive processes. The results showed that for both difficulty levels, "specific" descriptions predominated over "global" descriptions and "repeated don't know" responses. The prediction that the LD children's descriptions would be "global", rather than "specific" in comparison to the NLD children was not supported. Additional analyses for "specific" descriptions revealed no group differences at the difficult level. Thus, the children appeared to be similar in accessing their metacognitions.

In terms of the cognitive monitoring which led up to a triggering event, the LD children were as specific in their descriptions as their

NLD counterparts. This is important evidence in terms of criticism of introspective reports and metacognition research (Cavanaugh & Perlmutter, 1982; Nisbett & Wilson, 1977). Cavanaugh and Perlmutter (1982) have suggested that the verbal ability of some groups of children may make the use of verbal reports problematic. While it has been suggested the LD children have language deficits (e.g., Vogel, 1974; Kirk & Elkins, 1975), it is evident from the data here that the LD children were as able as the NLD children to articulate the monitoring of reading events. This finding is also important when seen in the context of questioning further about the strategies used during reading. That is, because the groups were seen as equivalent in their ability to identify what was happening at monitoring points, any subsequent differences, if any, would then not be a result of difficulties the LD children had in terms of expression.

Previous studies of metacognitive knowledge about reading had indicated that good readers view reading as a meaning-getting rather than a decoding activity (e.g., Baker, 1979b; Garner, 1980), and it had been hypothesized that such a dichotomy might emerge when children were asked for their reasons for comprehension monitoring at the data collection points. The categories of reasons for comprehension monitoring were generated from the responses and not developed prior to data collection. The categories included "expectation of another word", "reading on", "phonemic cues", "lack of concentration", "understanding", "previous error", "graphic cues" and "don't know" responses. From this list it can be seen that the reasons may be grouped according to whether contextual constraints or within-word features triggered monitoring.

Prior to determining whether the LD children provided more reasons reflecting a decoding focus however, analyses concentrated on establishing group differences within the categories. The most commonly cited reasons at the difficult level were "expectation of another word", "graphic cues" and "phonemic cues". It seems then, in line with reading theory (Goodman, 1967; Smith, 1971), that the children were making predictions or tentative hypotheses about up-coming text based on their thought processes, their language knowledge and the graphic cues of the text. They were triggered to signal awareness, self correct, or repeat a word when their tentative hypotheses were disconfirmed. The appearance of an unanticipated word, or a mismatch of letters, or sounds within the word acted as triggers. No group differences were found for "expectation of another word" or for "graphic cues". However, at the difficult level, the LD readers reported less often that a phonemic mismatch between the expected and observed response had caused monitoring behaviour. The NLD children indicated therefore more frequent use of "phonemic cues" as monitoring triggers. The hypothesis that, in comparison to NLD children, the LD children would provide more reasons for comprehension monitoring which mirror their conception of reading as a decoding process could not be addressed because no clear cut dichotomy of "meaning-related" or "decoding-related" reasons emerged for the NLD and LD readers respectively as a result of the within category analyses.

Garner and Reis (1981) have stated that research of comprehension monitoring has still not determined whether successful comprehension monitors have "corrective strategies in hand". After indicating their awareness of comprehension failure and attempted recovery (regardless of whether or not it was successful) through both bleeped and unbleeped correction attempts, this study found that most children were able to describe the strategy/strategies they had put into operation during the recovery procedure. Again the LD group was as articulate as the NLD group. The types of activities both groups of children used in debugging their errors included: "reread", "read ahead", "inner image", "syllabification", "comparison" and "don't know" responses. The types of solutions given when comprehension failed were not unique to either group. Indeed, where the children commented on the strategies used to correct their own errors, the LD and NLD children referred to the same range of strategies. This is contrary to the findings of Forrest and Waller (1981b) and Garner and Kraus (1981-1982), who found unique differences in the types of strategies mentioned by good and poor readers. One reason however for the different findings of the above studies and the current study is that the studies of Forrest and Waller and Garner and Kraus involved asking readers what strategies they would employ in order to be considered a good reader, or in order to read well, or if they did not understand something they were reading. That is, their focus was more on reading strategies generally, not on knowledge of correction strategies alone. The current study is unique in that it sought to determine knowledge of strategies directly tied to the correction attempts that the individual had just made. The results show clearly that the LD group were able to describe their corrective strategies, and those used were common to both groups.

The number of responses across respondents was too small in many of the categories for analyses to be applied. However "rereading" was found to be the most common strategy referred to by both LD and NLD children. This confirms the results of Alessi, Anderson and Goetz (1979) who found that "rereading" was important as a fix-up strategy following comprehension failure.

Several studies (Baker & Anderson, 1982; Garner & Kraus, 1981-1982; Garner & Reis, 1981) have reported that good and mature readers employ reading strategies, including "rereading", more than poor and young readers. These findings were only partially replicated here. The present results revealed that both groups used "rereading" to the same extent at the easy level, but the proficient readers reported using this strategy more frequently at the difficult level. No differences between groups for "inner image" and "syllabification" were found at the difficult level. The LD children were just as likely to mentally form an image of the word requiring correction (thinking or saying it in their minds) or using word attack skills of syllabification, when attempting correction, as the NLD children at the difficult level. The expectation that the LD children would more frequently report strategies that focused on word solving strategies that did not involve the use of contextual cues, could not be addressed. Again, the within category analyses did not reveal sufficient differences between the groups in terms of the strategies employed to allow a dichotomy involving "context free" versus "context bound" strategies to emerge.

The types of reasons that emerged referring to why particular corrective strategies were used, included: "check it", "make it right" (global), "help with pronounciation", "help with understanding", "habit" and "don't know" responses. Both groups referred to the same types of responses at both difficulty levels.

The findings of studies by Goodman and Burke (1973) and Clay (1973) have shown that poor readers tend to rely mostly on graphophonic cues. In considering the above categories it may have been expected that the LD group would have selected their strategies for correction on the basis of phonemic features (i.e., pronounciation), rather than on contextual features of the sentence or story (i.e., understanding). However, such an expectation was not substantiated. In fact the very small number of responses at both difficulty levels referring to "help with pronounciation", showed that both groups of children had other concerns than just reestablishing aural correspondence with the expected response. These concerns tend to be either more global or vague, or to involve reestablishing comprehension. It is however interesting to note that while NLD children more frequently suggested "phonemic cues" as triggers for monitoring, both groups very seldom cited pronounciation-related responses as reasons for use of particular corrective strategies. This may suggest that a dissonant sound may trigger monitoring, but when corrective strategies are employed it is for reasons beyond reestablishing the sound-letter correspondence. Indeed, the most common reasons, at the difficult level, for the use of particular corrective strategies were "to make the error right" and to "help with understanding". No group differences were reported for these two reasons. Thus both groups in monitoring their oral reading employed corrective strategies on the basis of knowledge that the errors had to be corrected and that meaning must be reestablished.

Awareness of correction behaviour however, goes beyond the implementation of activities to supply the correct word. It also includes knowledge of the success or otherwise of those activities. It was anticipated that the LD children would be less aware of the outcome of their corrective strategies. This anticipation follows from research suggesting that poor readers were less able to judge how well they had comprehended a story (Forrest & Waller, 1979). At the easy level, both groups were similar in their beliefs that they had been "successful" in their correction attempts. However, at the difficult level, the LD children made fewer "knowledge of success" statements. Given that there were an equal number of monitoring points involving "successful" correction for each group at the difficult level, this finding indicates that the LD children were less confident in their knowledge of success. They lacked metacognitive awareness of their "successful" correction at the difficult level. However, the groups showed no difference with regard to their knowledge of "unsuccessful" correction attempts at the difficult level.

These findings are confusing. They indicate that when the oral reading task became difficult, the LD children were less aware of their successful corrections than the NLD children, but showed that they were as aware as the NLD children of their unsuccessful correction attempts. Based on the finding for "knowledge of successful corrections" it may be argued that the LD children need to learn how to employ their own background knowledge ("schema") and linguistic knowledge as well as clues from within the text to help them make judgements about successful corrections. However, it does not make logical sense that it is easier (as these results have suggested) to determine that a correction was unsuccessful in comparison to determining that a correction was successfully applied. One would expect that the plausability/implausibility of a new word, following a correction attempt, would be established in a similar way for both successful and unsuccessful corrections.

In order to examine the basis on which the children established successful and unsuccessful application of corrective strategies, the children were asked how they knew that they had been successful and unsuccessful. The indicators on which knowledge of success and lack of success in correction were based included: "meaning", "inner knowledge", "graphic cues", "phonemic cues", and "don't know" responses. Both groups referred to all of these ways of knowing, although most commonly the children referred to "phonemic cues" at the difficult level. Thus, the children most often used the phonemic features within the word (that is the sounds within the word) as the check for successful and unsuccessful correction. In addition, the children often referred to "inner knowledge" at the difficult level. Here the children asserted that a form of self knowledge (knowledge about the self as a reader) was used to establish successful and unsuccessful correction. This self knowledge may be achieved when there is a "fit" between the reader's existing knowledge structures or schema, the cues provided by the text and the author's intended meaning (Anderson, Spiro, & Anderson, 1977; Rumelhart & Ortony, 1977). No group differences were found for "phonemic cues" or "inner knowledge". Thus, the LD children reported similar usage of these two indicators of knowing.

Finally, examination of the respective influences of instruction and inherent learner characteristics on the deployment of corrective strategies revealed that teachers or parents most often were the source of strategy knowledge. Both groups, at the difficult level, viewed to the same extent sources external to themselves as responsible for their knowledge of corrective strategies. While it was anticipated that the LD children would indicate greater reliance on outside support, this finding reveals that for both groups the application of corrective strategies was something that one learned how to do. Thus the children regarded knowledge of debugging strategies to be the result of instruction and not simply the result of being a better (NLD) reader. The implications for teaching here are clear. If readers view their knowledge of reading strategies for correction as a product of instruction, then it seems important to encourage the use of self correction in reading explicitly and directly.

Much concern has been expressed about the validity of using verbal self report data (Nisbett & Wilson, 1977; Cavanaugh & Perlmutter, 1982). The ecological validity of self report statements can be enhanced by verifying the reported statements with actual reading behaviour. The results regarding correspondence of "specific descriptions" of monitoring and actual behaviour and "knowledge of successful" and "knowledge of unsuccessful" strategy use and correction during oral reading reveal that in both measures of correspondence the LD children's statements were as accurate as those of the NLD children at both difficulty levels. Other studies that have examined correspondence between reported strategies and actual behaviour during reading have found that readers did not necessarily employ the strategies they professed to use. For example, Garner and Reis (1981) in a study of "rereading" as a corrective strategy, found that only the older children used "rereading" as a fix-up strategy although the younger children reported that they used them. Similarly, Phifer and Glover (1982) found that university students did not necessarily employ the comprehension techniques they reported using to assist in their understanding. However, the current study is different from these studies because the children were commenting on their own errors. That is, when the descriptions of monitoring and the statements of the knowledge of successful or unsuccessful implementation of correction were obtained, the children were reporting on very specific discrete reading events of their own making. As such, the immediacy and the "ownership" of the behaviours may have meant that both groups of children were much more accurate in their reporting.

In light of other studies of metacognitive knowledge, the lack of group differences on the Self Report of Oral Reading Behaviour is important. It is suggested here that when awareness of self regulation is examined at the level of specific, individual, self-generated reading events at two levels of difficulty, the LD readers show that they do have knowledge of cognitive processes and that they do manipulate that knowledge in order to respond to changing reading behaviours. Under these conditions they are as metacognitively proficient as NLD readers. This suggests that in terms of LD children's achievement, their poor reading is not due to their lack of ability to introspect on their thinking about particular reading behaviours, or a lack of knowledge relating to the cognitive processes involved in making errors and/or corrections.

Perceptions and Causal Attributions

Self perceptions of ability and causal beliefs about success and failure in reading may well determine whether or not comprehension monitoring is undertaken during oral reading. This is because feelings of competence and perceptions of control influence motivation. In particular, these learner characteristics are used in evaluating the worthwhileness of an activity (such as allocating effort in activating strategies) as well as affecting expectations of future achievement outcomes.

Few studies of reading-related causal attributions have been undertaken. Studies of causal attributions of poor readers and LD children have pointed to the tendency for these children to make external attributions for success (Butkowsky & Willows, 1979; Chapman & Boersma, 1979; Finchman & Barling, 1978; Hallahan, Gajar, Cohen & Tarver, 1978; Pearl, Bryan & Donahue, 1980). In the current study, the results of the Causal Attribution Rating Scale for Success indicated that the LD children attributed reading success more to "luck", an external, unstable factor, while the NLD children attributed reading success more to "ability" and "stable attitude" internal, stable factors. In terms of results for success these findings for the NLD children are consistent with the studies cited above. Thus, in contrast to the NLD pupils, the LD pupils were more likely to view their success as being due to external, uncontrollable forces for which they had little responsibility.

With regard to the Causal Attribution Rating Scale for Failure, the LD children, as predicted, perceived internal, stable causes as major contributors to their failure in reading. Specifically, the LD children made stronger attributions to "lack of ability" and "lack of effort". This is consistent with the findings of Hill and Hill (1982), who found that both LD and NLD boys perceived failure as caused by "lack of ability" and "lack of effort". In addition, in a study by Palmer, Drummond, Tollison and Zinkgraff (1982), LD males made attributions to "lack of ability" and "lack of effort" in the failure condition. LD males, in that study, regarded failure more as the result of "lack of ability" than the NLD males, and as the result of "lack of effort" to the same extent as NLD males.

The implications of the attributions for failure by LD children found in the current study are important. In an educational context, individuals who make attributions to internal factors, such as "lack of ability", may feel that they have little hope of changing future outcomes. In addition, these individuals may be less motivated and develop a lower self esteem (Canino, 1980). An interpretation of the findings relating to "lack of ability" attributions coupled with "lack of effort" attributions in a reading failure situation can be undertaken in terms of Covington and Beery's (1976) self worth theory of achievement behaviour. This theory suggests children are motivated to attempt to maintain a self concept of high ability, particularly when facing failure. Research findings based on this theory, suggest that expending effort may lead to feelings of shame, because failure after trying hard indicates low ability (Covington & Omelich, 1979). Thus, pupils may avoid trying in failure situations in order to maintain a high self concept of ability and consequently self worth. By citing both "lack of ability" and "lack of effort" as causal factors in reading failure situations, the LD children indicate that they regard themselves as neither able nor virtuous. They clearly suggest that because they lack ability in reading there is no reason for trying.

Results from the Reading Perception and Attribution Questionnaire revealed that self perceptions of reading achievement differed for the LD children in comparison to the NLD children. The LD children had lower perceptions of their in-class reading achievement. This finding is in line with other studies that have found that LD children have lower academic self concepts (Chapman & Boersma, 1980; Hiebert, Wong & Hunter, 1982). Their difficulties with reading therefore, produced in the LD children feelings of inadequacy and inferiority. This is especially understandable in these older intermediate school children, who may have experienced the effects of cumulative failure in reading.

When questioned about possible causes for the reading success and failure of their <u>peers</u>, using the open-ended format, no significant difference was found in the causal attributions offered by the LD and the NLD children. Thus, the rationale and resulting hypotheses suggesting that the LD children would make sense of their own success and failure by making attributions for their peers' success and failure to different causes than their own was not supported. LD children's own attributions for success to external factors did not lead the LD children to assert that their peers' success was more likely to be due to internal attributes. Concomitantly, causal attributions for failure to internal causes, did not lead the LD children into believing that other people's failure was due more to external events. Most commonly, both groups indicated that other children's success was due to "ability" and their failure to a "lack of ability". These results indicate that both LD and NLD children consider both success and failure to be causally related to inherent personal characteristics.

In terms of the free-response causal attributions for their own reading success and failure, no group differences were found. "Ability" was cited as the most common attribution for success by both groups, while "lack of attention" and "lack of liking and interest" in reading was perceived to be the most common cause of failure by the LD and the NLD groups respectively. Because there were no group differences the expectations that LD children would make more external attributions for success and more internal attributions for failure were not supported. The lack of significant findings in the attribution categories of the Perception and Causal Attribution Questionnaire may have been a function of the sample sizes in each category.

The findings relating to attributions for personal success and failure in reading on the open-ended questionnaire are in contrast to other studies of LD and NLD children which found LD children more externally orientated for success (Chapman & Boersma, 1979; Pearl et al., 1980) and more internally orientated for failure (Hill & HIll, 1982; Palmer et al., 1982; Williams et al., 1985). They are also at variance with current results of the Causal Attribution Rating Scales for Success and Failure. The differences in attribution results stem from the nature of the attribution instruments. The structured rating scales were employed to make comparisons between the groups on specified types of attributions, while the open-ended format allowed comparison of free response attributions. Here, the response format variance contributed to the differences in the findings. Generalizations and interpretations resulting from the findings should therefore be made cautiously.

The current study was the first to examine the influence of task difficulty on reading-related perceptions and causal attributions in LD children. The investigation was also unique in that the perceptions and causal attributions were obtained immediately following the completion of actual reading tasks at two difficulty levels. To date studies of good and poor readers' attributions have involved the examination of different reading situations (e.g., reading for meaning and evaluation of reading; Hiebert, Winograd, & Danner, 1984) but at a hypothetical level using an independent rating scale. No studies have examined both perceptions and attributions for two aspects of a real reading situation at two difficulty levels using an open ended-format.

In terms of reading-related perceptions, both groups, as predicted, reported similar views of their understanding and their oral reading performance at the easy level. That is, their perceptions of the two aspects of reading (understanding and oral reading performance) were largely considered to be "good" or "average". In addition, both the LD and the NLD groups perceived their understanding and their oral reading performance at the difficult level as largely "poor". These findings indicate that the criteria of "easy" and difficult" passage levels translated into feelings of successful and less successful reading performance respectively.

Causal attributions were also elicited following completion of the tasks. The categories of causal factors that were generated as a result of the free response technique included: "task ease/difficulty", "task interest", "ability", "attention", "immediate effort", "liking and interest", "strategies", "miscellaneous" and "don't know" responses.

The hypotheses in the current study suggested that the two aspects of reading situation (understanding and oral reading performance) would not influence the type of attributions made, but rather, that the level of task difficulty (easy/hard) would play a greater role in the types of attributions referred to. However, the analyses did allow for the effect of the separate aspects of reading to be assessed. The results indicated that similar types of attributions were generated for both aspects of the reading situation.

This suggests that the children were able to explain their understanding and their oral reading performance in terms of causal factors common to both components.

In terms of the role of task difficulty on the causal attributions, the LD group most commonly reported attributions to "ability" at the easy level for both understanding and oral reading performance at the easy level. For the difficult passages, "lack of ability" was most frequently reported as a causal factor for both aspects of reading by both groups. However, no group differences for any of the attributions for understanding at both difficulty levels, nor for oral reading performance at both difficulty levels, were found. No support was found for the prediction that, in comparison to the NLD children, the LD children would make more external attributions on the easy passage and more internal attributions on the difficult passage. However, a relationship was found between low ("poor") perceptions of understanding and oral reading performance at the difficult level and internal attributions, especially to "lack of ability" in LD children. Interestingly, the NLD children, who similarly described their understanding and oral reading performance at the difficult level as "poor", also made causal ascriptions to "lack of ability".

The lack of influence of task difficulty on causal beliefs, when comparisons between groups were made, is surprising and in contrast to the results of Aponik and Dembo (1981). While these authors found that task difficulty was not a factor in influencing attributions to ability, it was significant in the attributions for effort, task difficulty and luck in the success conditions and for effort and task difficulty in the failure condition for LD children. However, the lack of group differences found on the Task-linked Perceptions and Causal Attributions measure may be due to several factors.

Firstly, the children's attributions were collected in a real reading situation, involving common classroom reading tasks. The perceptions and attributions were elicited immediately following tasks which the children could identify with. Therefore, the perceptions and attributions were about tasks that were relevant and meaningful to the participants. Secondly, the very nature of the tasks themselves (easy/hard) allowed individually important perceptions of task difficulty to be formed, rather than conveying the "assigned" difficulty of the task to the participants and checking that it matched the researcher's perceptions (as in the Aponik and Dembo (1981) study). Another reason may be due to the instrumentation used. The Aponik and Dembo study involved a forced-choice attribution tool rather than an open-ended format.

In summary, the present investigation of LD children's perceptions and causal attributions has clearly shown the influence of methodology on causal attributions. In terms of future investigations into reading-related attributions this aspect should be taken into account. Nevertheless, the LD children did reveal lower perceptions of reading achievement, and there was some suggestion that LD children appear to be more external for success and more internal for failure. In addition, while the findings of the free-response formats were not significant, the roles of effort and ability in achievement were apparent.

C H A P T E R   S I X

CONCLUSION

Factors relating to metacognition, reading and causal attributions were examined in this study involving sixty-nine intermediate school children. Comparisons of LD and NLD children's performance in each of these areas were made. The LD children were defined as those with average or better intelligence, but underachieving in reading.

Learning Disabled Readers

Based on the results of this study, LD readers may be profiled as similar in many respects to their NLD peers. LD readers were not distinguishable from NLD readers in terms of knowledge about positive strategies that may be employed during reading. The LD readers indicated they were aware that certain strategies for gaining meaning from a story and decoding an unknown word would be more helpful than others. This finding is at variance with those who have stated that LD children lack metacognitive knowledge (Leong, 1981), and suggests that LD children can meaningfully evaluate the contributions of particular strategies in terms of helpfulness. However, LD children also revealed that they may have difficulty in evaluating the impact of unhelpful elements which detract from the ability to unlock new or difficult words. This lack of discrimination may lead to the implementation of strategies during decoding that are counter-productive.

The findings of the Self Report of Oral Reading Behaviour add further support to the suggestion that LD readers have metacognitive knowledge. This support is indicated by the similarities between the two groups when they reported on the monitoring of their reading behaviour following prompted recall of their errors and self corrections. The LD readers revealed that they did have knowledge of cognitive activities occurring prior to taking corrective action. They were able to describe their comprehension monitoring quite specifically. LD readers were capable of reporting on reasons for monitoring, making references to reasons similar to those of NLD readers. Only at the difficult level did LD readers report less use of phonemic cues as a monitoring trigger. LD readers mentioned corrective strategies in line with those reported by NLD readers. Rereading emerged as the most common strategy, although, the LD readers appeared to use this strategy less frequently at the difficult level than the NLD readers. The reasons why LD readers used specific corrective strategies were no different from those of NLD readers.

The judgements that the children made about their miscues at the difficult level showed that LD readers had less awareness of their successful corrections, while being as able to determine their lack of success in reestablishing meaning as the NLD readers. In examining the basis on which children established successful and unsuccessful application of corrective strategies, LD and NLD children provided similar reasons. Phonemic cues and inner knowledge were most commonly used to establish successful and unsuccessful correction. Finally, both groups of readers asserted that external agents, such as parents or teachers, had been the source of strategy knowledge.

Concern about the validity of using verbal self report data (Nisbett & Wilson, 1977; Cavanaugh & Perlmutter, 1982) meant that establishing correspondence between the verbal responses and actual reading behaviour was important. Two particular elements were verified by making comparisons with the reading data. Specific descriptions of monitoring and knowledge of successful and unsuccessful strategy use statements corroborated with the reading behaviours. No group differences were found.

Thus, when awareness of self regulation is examined at the level of specific, individual self-generated reading events at two levels of difficulty, LD readers are as metacognitively proficient as NLD readers. Consequently, the poor reading achievement of LD children does not appear to reside in an inability to reflect on their thinking during reading, or in a lack of knowledge relating to the executive functions employed when making errors and/or corrections.

In terms of oral reading behaviours for the children's individual "easy" and "difficult" levels, the LD children also often performed in a manner similar to that of NLD children. This is a surprising finding given that the LD children were selected on the basis of poor reading performance. Where differences were found, these typically were at the difficult level. This suggests that the level of difficulty in some cases affects the way in which LD children respond during reading.

The LD children's reading was characterized, at the difficult level, by more substitutions and partial word substitutions than that of the NLD children. Typically, the substitutions were inappropriate or implausible words revealing that when text is difficult, LD children appear to treat the words as isolated units and fail to bring their linguistic resources to bear on the text. Goodman (1967, 1976) would argue that these poor readers approach text in a fragmented manner and do not perceive text in meaningful chunks.

The error rate of LD children was similar to that of their peers. This similar performance suggests that the NLD children also found the difficult level hard. The self correction rate was also not significantly different for the two groups. As an example of a metacognitive skill and an index of comprehension monitoring, the finding relating to self correction showed LD children to be proficient monitors. They were aware of comprehension failure and were able to implement corrective strategies. This is important as it reveals that on both easy and difficult text, LD children appear capable of regulating their oral reading behaviour. In addition, fewer self corrections were found on the difficult passage as compared with the easy passage for both groups, indicating that a high rate of self correction is generally found when the text makes sense, and a low rate when the text is not understood (Ng, 1979).

In examining the relationship between error behaviour and linguistic sources of information, the LD readers used graphic, phonemic, syntactic and semantic cues at both levels. However, the LD readers' use of graphic and phonemic cues was not so effective at the difficult level. Thus, LD readers may be regarded as failing to use all the visual and aural cues available in making predictions and confirmations. On the other hand, the use of syntactic and semantic information was similar for both groups. The LD readers showed the ability to control syntactic and semantic information as well as the NLD readers. Thus, LD readers do make use of these important cue sources which provide support for intelligent hypothesis-testing routines.

An examination of linguistic information and self correction behaviour shows that LD readers may be regarded as less able to correct errors that require correction the most. Specifically these included errors having no graphic and no phonemic similarity at the difficult level, and errors having no syntactic and semantic acceptability at the easy level. Surprisingly however, the LD readers in this study self corrected proportionately more errors bearing no semantic acceptability at the difficult level. Here, the LD readers' successful use of other cue sources may have had a role in reestablishing meaning. Two observations should be made here. First, in terms of the contribution of task difficulty on self corrections and linguistic cue sources of information, no clear pattern emerged. Secondly, for the LD readers, the self correction behaviour was erratic within the linguistic cue system (e.g., semantic acceptability). The LD readers may instead have been influenced by an interplay of factors other than linguistic cue use, such as familiarity of vocabulary, story interest, and motivation to self correct.

Both LD and the NLD readers made more severe meaning change miscues than miscues not affecting the sense of the text, or where meaning was affected but the grammatical structure of the sentence remained intact. The higher proportion of severe meaning change errors, characteristic of LD readers at the difficult level, indicated a problem with the maintenance of comprehension. But the LD readers did show their awareness of the seriousness of their errors by making corrections. Successful correction of severe meaning change errors was as frequent for LD as for NLD children. However, because the severe meaning change errors were largely made up of unsuccessfully corrected errors, this indicated the LD readers were not always able to apply corrective strategies effectively. It appears then that LD readers need help with learning to apply fix-up strategies with more consistent success. LD readers may need to be introduced to a wider range of strategies for correction, in addition to being taught how to select and flexibly apply these strategies.

While self corrections represent overt displays of comprehension monitoring, the Monitoring Device employed in this study allowed comprehension monitoring at the word level to be tapped in another unique manner. Both groups of readers signaled monitoring while reading; mainly, immediately after the miscue was made. Again the LD readers' behaviour was like that of their peers. No difference in awareness of errors at both difficulty levels was found. It may be suggested that the particular task characteristics--detection of self-generated errors--meant that the attention given to comprehension was quite different from situations requiring monitoring of other-generated errors. Therefore, LD children did seem aware of an on-going comprehension process which included the detection of their own errors. This indicates active reflection and regulation of the cognitive processes and conflicts with theories which suggest LD children are "passive learners" (Torgesen, 1977a) and "production deficient" (Flavell, 1970).

However, LD children may be less sensitive to the monitoring of automatic and subconscious monitoring events (as evidenced by less signaled monitoring of self corrections). The LD children may have felt that their successful correction meant that signaled monitoring was not so essential, after all meaning had been reestablished. On the other hand, this finding may reflect the fact that the LD children found that the complex task demands and simultaneous demands on attention were debilitating. If the latter reason is true, then it adds to the picture of LD children as metacomprehenders. They are active in detecting their errors (as indicated by the Monitoring Device), but they run into problems when multiple demands are made of the executive functions.

In terms of the relationship between signaled monitoring and linguistic cue use, the LD readers were more sensitive to their errors which had only minimal orthographic similarity to the text. But they showed less sensitivity to their correction of these errors and their correction of errors with minimal aural similarity. Nevertheless, in terms of all the other aspects of the relationship between signaled monitoring and linguistic cue use, the LD readers were metacognitively as competent as the NLD readers.

Bleeped severe meaning change miscues predominated over other types of bleeped meaning change cues. The LD readers signaled fewer uncorrected severe meaning change errors at the easy level, more unsuccessfully corrected errors at the difficult level, fewer combined uncorrected and unsuccessfully corrected errors at the easy level, but more at the difficult level, and fewer successfully corrected errors at the difficult level.

In addition, when bleeped severe meaning change miscues were analyzed as a proportion of severe meaning change miscues, LD children monitored the uncorrected severe meaning change errors less frequently at the easy level. Both uncorrected and unsuccessfully corrected errors were bleeped to the same extent by both groups on both passages, while LD readers less frequently signaled successfully corrected severe meaning change errors.

The composition of findings here is complicated. However, it seems that whether signaled monitoring and meaning change is seen as a proportion of all occasions of signaled monitoring, or as a proportion of each type of meaning change, awareness of comprehension monitoring by LD (and the NLD) readers using the Monitoring Device, is erratic. Neither correction type or difficulty level, alone or in combination, can account for the inconsistent pattern, although it appears difficulty level may have a greater influence for LD readers. Therefore additional factors which may be relevant and have influenced the current findings warrant investigation.

The third major component of this study investigated LD children's perceptions of reading achievement and beliefs about the causes of their reading success and failure. Findings from the rating scales indicated that the LD readers made stronger attributions to luck (an external factor) for success, while NLD readers made stronger attributions to ability and stable attitude (internal factors). It seems apparent that because LD children so often experience failure, when they do succeed, it is infrequent, and as a result it is attributed to external factors, such as chance. In accounting for their failure in reading, LD children made reference to both lack of ability and lack of effort. Lack of ability attributions suggest that LD children see little hope of altering their achievement status in the future. Canino (1981) has argued that these individuals may be less motivated and develop a lower self esteem. However, by also citing lack of effort as a reason for failure, LD children may be trying to protect their self concept (Covington & Omelich, 1979), and thereby perpetuate a cycle of negative affect. Failure is seen as resulting from lack of ability and therefore effort is seen as unproductive. Furthermore, if they did try and still failed, that would just confirm that they were indeed lacking in ability.

In addition, the LD readers perceived themselves as having poor in-class reading achievement compared with their NLD peers. The low perception of achievement, coupled with internal locus of control beliefs in failure situations, indicate a lack of self confidence. This is likely to have a detrimental effect on persistence and effort in learning. In a similar way, Thomas (1979) describes LD children as "typically low in persistence and effort, easily frustrated, anxious, unwilling to attempt tasks at appropriate ability levels" (p.210). In turn, these attitudes lead to further failure experiences with a resulting consolidation of the negative feelings, a heightening expectation of future failure and an increase in the likelihood that tasks, in particular those where difficulty has been previously experienced, will be avoided. Furthermore, by attributing success to outside sources, LD children with a low self concept maintain their poor self appraisals and diminished self-efficacy.

When the children were asked to respond freely to questions about their success and failure in reading, the LD children had similar causal beliefs about other children's success and failure and their own reading success and failure. In addition, in a contextualized setting, the LD readers described both their understanding and their oral reading performance of their easy passage using adjectives such as good and average, as did the NLD readers. Poor perceptions of understanding and oral reading performance were reported for the difficult level. Both groups made reference to similar attributions for both aspects of the reading task. No group differences were found. Furthermore, task difficulty did not appear to differentiate the attributions of the LD and NLD groups for either aspect of reading. The difficult level passage however did cause both groups to make more ascriptions to lack of ability. This suggests that given specific naturalistic contexts and similar conditions and tasks, LD children's affective responses will parallel those of NLD children. This, in turn, implies that poor self perceptions of ability and associated beliefs about failure may be altered, or at least minimized, given certain conditions.

Educational Implications

Several educational implications can be drawn from this study. The first relates to the finding about LD children's awareness of strategies. It seems necessary for teachers to assess children's sensitivity to the importance of strategies that may be used under different purposes for reading. In an informal way, a child's repertoire of strategies can be tapped by asking which of several strategies would be more important in one situation than another. These strategies could be provided by the teacher or elicited from the child. Eliciting the strategies also provides an opportunity for the teacher to check on the extent of the child's strategy knowledge. Diagnostic information can also be derived by asking the child the reason(s) why one strategy may be more appropriate than another. Based on the results of such diagnostic assessment, teachers may find a need for instruction in strategy use. For example, the LD children in the present study had difficulty in recognizing the more unhelpful strategies for decoding an unknown word. Here it would seem that instruction focusing on improving children's awareness and use of specific strategies would be appropriate. This instruction should also include reasons why some strategies would be helpful or more helpful than others.

Laboratory-based training studies (Brown, 1978; Brown, Bransford, Ferrara & Campione, 1982; Feuerstein, 1982) and classroom-based studies (Paris, Cross & Lipson, 1984; Paris & Jacobs, 1984) of strategy use have shown that poor readers can be explicitly taught to be aware of certain strategies and how to use them. However, it would seem important also for this group of readers to know particularly when and why to use (or not to use) particular strategies. Thus, assessing the extent of children's metacognitive knowledge in reading could be an initial step in collecting data in a diagnostic situation. Further, while the LD children in this study indicated they possessed similar metacognitive knowledge of positive strategies to the NLD children, instruction for both groups of children that included discussions of how to evaluate situations and how to decide which strategy should be implemented first, would make their knowledge of strategies stronger still.

A second implication is based on the findings relating to the oral reading and comprehension monitoring behaviours. In many respects the LD reader performed similarly to the NLD reader. This was apparent in the lack of differences for many of the oral reading behaviours. Lipson and Wixson (1985) have stated that research that does not reveal differences between good and poor readers is important. Results of this nature may contain

> one or both of the following educationally significant possibilities. First, there are aspects of the reading process that do not differentially affect performance for poor versus good readers and, consequently need not be of concern instructionally. Second, there are features of texts and tasks that can be introduced such that poor readers are as successful as their counterparts. (Lipson & Wixson, 1985, p.26)

However, the present study also showed that within the LD group the children were very idiosyncratic in their reading performance. This individual variability must be taken into account and the use of individual assessment to obtain a reader profile with the development of child-specific intervention (that is, individualized educational programmes) is strongly supported by the findings of this study. Group administered assessment for diagnosis and treatment practices based on an assumption that LD children are a homogenous group of learners would be dysfunctional.

Typically, LD children's reading performance differed from the NLD readers for the poor performance typically occurred at the difficult level. For example, the higher proportion of non word substitutions, less effective use of graphic cues, and higher proportion of severe meaning change errors, particularly unsuccessfully corrected errors were found at the difficult passage level. This implies that teachers might not only assess the level at which individual LD children can read with high accuracy and good comprehension, but that the information provided when individuals read at their difficult level might also be valuable. "The extent to which, and manner in which self-correction and other strategies break down under increased difficulty is of considerable interest to the diagnostican" (Johnston, 1984, p.174). The direct assessment of a pupil's reading performance on classroom materials that have proven both easy and difficult for the pupil will allow the teacher to establish the level of instruction and to document the types of behaviours made under particular conditions. Miscue analysis may be used during this direct assessment. Its use as a diagnostic tool has been documented in clinic settings (Goodman & Burke, 1973), and as an aspect of "running records" in both the regular classroom and during "Reading Recovery" (Clay, 1979). The diagnostic information obtained from the miscue analysis can then be used in determining appropriate remedial goals and in planning intervention.

In addition, during instruction, LD children should be provided with material which they can read comfortably with ease. Because the selection of appropriate material is crucial to the successful implementation of instruction in a remedial situation, it seems that exposure to material that is too difficult would be cognitively and affectively counterproductive. Furthermore, arranging conditions that will result in successful performance by providing materials to achieve this end may influence the self concept of reader and encourage sustained effort in reading.

The results of this study also indicated that the LD readers were quite inconsistent in many particular reading behaviours. For example, LD children were able to make successful corrections, but also showed they were less able to use correction strategies effectively all the time. That is, they made more unsuccessful corrections of severe meaning change errors than NLD children. This indicates that LD children may require more intensive instruction in selecting and applying corrective strategies so that they are successful more often.

One of the central issues of debate in the reading field is that of teaching methods in the instruction of LD children. Kirk, Kliebhan and Lerner (1978) have reported that research into methods of teaching reading has failed to demonstrate that one method is more superior to another for every child. However, Guthrie and Seifert (1978) have stated that "usually the most effective means for attaining an instructional goal is to teach it directly..." (p.251). In line with this, Lovitt (1977) has argued that the direct teaching of a particular reading skill appears to be more successful than many of the instructional techniques that train related skills on the assumption that these skills transfer to reading. Thus, if LD children are to become more effective in applying fix-up strategies, then direct instruction in self correction procedures, including teaching LD children to select alternative strategies when attempting to correct, seems important. The instructional programmes of Pflaum and Pascarella (1980) and Paris and Jacobs (1984) for enhancing children's use of strategies for correction are seen as particularly positive in this regard.

In addition, there is evidence that while all children acquire similar reading skills, poor readers learn them at a slower pace (Calfee, Venezky, & Chapman, 1969; Mackworth & Mackworth, 1974; Guthrie & Seifert 1977). This implies that LD readers will require substantial amounts of instructional time. In order to maximize the instructional time available it is also particularly necessary for lessons to be focused and systematic. This is consistent with findings about LD pupils' limits of attention (Hallahan, Gajar, Cohen, & Tarver, 1978; Ross, 1977). In summary, individualized data-based lessons, involving direct instruction of specific strategies should be the core of remedial intervention for LD children in reading.

The findings regarding self perceptions and causal attributions in this study have implications for the diagnostic process and in planning and implementing intervention programmes for LD children. The LD children's poor perceptions of their reading achievement coupled with attributions for success to luck and for failure to lack of ability and lack of effort suggest that the relative influence of the attributions should be determined at an individual level. Instruction which involves attribution retraining (Dweck, 1975; Chapin & Dyck, 1976; Fowler & Peterson, 1981) may be useful. The intervention could involve matching the instruction and attribution retraining to the children's attributions (Pascarella & Pflaum, 1981; Pascarella, Pflaum, Bryan & Pearl, 1983). In this way, those children who believe that they have no control over their own achievement outcomes may be helped by altering their attributions for failure to insufficient effort. The use of direct retraining to increase effort attributions and to improve persistence has been successful in this regard with NLD (Fowler & Peterson, 1981) and LD children (Shelton, Anastopoulos, & Linden, 1985). For those children who indicate some feelings of control over their failure it may be important to enhance their belief that their efforts will pay off. This may be coupled with instructional procedures which encourage effort and concomitant high initial measures of success. When confronted with difficult material, achievement efforts are lessened and so it is necessary to provide reading tasks at a level which ensure success. The children will immediately see the results of their additional effort and in turn, increased persistence and improved motivation may follow.

However, the negative self concept of these LD children and debilitating causal beliefs are likely to mean that they will require more than retraining to increase effort attributions or higher levels of immediate success in overcoming feelings of failure and lowered expectations for future success. Rather, it is suggested that they will need to refine and be more consistently effective in employing their repertoire of strategies for coping with failure situations in reading. Thus, in addition to techniques that restore self confidence, the children require the teaching of fix-up strategies for dealing with comprehension failure, that also guarantee success (Limbrick, McNaughton & Glynn, 1981).

To recapitulate, the LD children do have the strategy knowledge, and they tend to use this knowledge. However it is not always totally successful. Teaching of flexible approaches and the adoption of alternative strategies, as well as placing emphasis on personal control of their learning appear to be central goals in intervention programmes for LD children based on the results of this study.

Directions for Future Research

This study has established that LD children do have metacognitive knowledge of strategies and in particular that they are aware of the contribution of positive strategies which can be used when reading. The basis on which strategies are rated as being more or less important has not been investigated. In addition, the flexibility of children's knowledge regarding strategy use requires examination. That is, what knowledge do children have about the implementation of alternative strategies if the first strategy is unsuccessful? The use of rating scales or self report interviews similar to those used in this study may be considered as vehicles for examining such variables.

The present study also involved a critical examination of the oral reading and comprehension monitoring of LD children. In relation to these behaviours the impact of two difficulty levels and the contribution of LD children's use of language and problem-solving abilities in reading were investigated. The use of miscue analysis, employing a taxonomy which focused on both linguistic relationships and meaning change relationships revealed very few behaviours that distinguish the reading of LD children from that of NLD children. Where differences did emerge, the more difficult task did play an important role. However, the patterns of behaviour lacked stability across the difficulty levels and for the groups. Further investigation of errors and self correction as text difficulty increases, the relationship between self corrections and linguistic sources of information, signaled monitoring of meaning change and the relationship between signaled monitoring, meaning change and correction may clarify reasons for this lack of stability.

The use of case studies to further examine these variables may prove fruitful. Single subject and small sample studies may assist in obtaining in depth examination of problem-solving behaviour in reading, allowing for more intensive probing of the cognitive processes. While no conclusive results can be made about the role of motivational variables on the use or modification of strategies on different tasks on the basis of this study, these types of studies in the future, may allow for a closer and more creative examination of the relationship between willingness and ability in the application of strategies. Furthermore, the influence of different task parameters (other than difficulty level) could be investigated. Such parameters might include narrative versus expository text, different purposes for reading, syntactic difficulty of the text, the reader's prior knowledge of the reading material, and so on. The efficacy of concurrent monitoring and retrospective interviewing techniques demonstrated in the current study, suggest that such measures would be appropriate in case study research in the future.

Finally, the present study has highlighted the complexity of studying metacognition, reading and causal attributions of LD children. In addition, several possible explanations for the poor achievement in reading of LD children have been called into question. Researchers must therefore continue to explore other factors or other combinations of factors that may impinge on learning. However, this study has also shown that LD children do require assistance with specific aspects of their reading and help in building a more positive self image. This assistance can be provided through appropriate intervention.

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A P P E N D I C E S

APPENDIX A

Questions for Self Report of Oral Reading Behaviour

Knowledge of what happened

What happened there?
Tell me about that part.
Tell me about it.

Knowledge of the cause of the signaled awareness

Why?
Why did you do that?

Knowledge of the type of strategy used

What did you do?
What did you do then?
What did you do next?
What did you do inside your head silently?

Knowledge of why that strategy was used

Why?
Why did you do that?

Awareness of whether the strategy resulted in a successful/unsuccessful correction

Was that successful or unsuccessful?

Knowledge of why the strategy resulted in a successful/unsuccessful correction

How do you know?

Knowledge of source of the strategy

How do you know to do that?

Probes

Can you explain that a bit more?
Can you tell me more about it?
What else?

APPENDIX B

Reading Strategies for Meaning Scale

I want you to think about the importance of things. We will mark how important each of these things is for you.

How important do you think it is?

	Very important		Somewhat important			Not important	
A. To put petrol in your car?	1	2	3	4	5	6	7
B. To mow the lawn every week?	1	2	3	4	5	6	7
To help you to get meaning from a story you are reading how important do you think it is ...							
1. To ask yourself does the story make sense?	1	2	3	4	5	6	7
2. To look up <u>all</u> the meanings of the words in a dictionary?	1	2	3	4	5	6	7
3. To think about the main ideas and important details in a story?	1	2	3	4	5	6	7
4. To ask yourself do the ideas fit in with the other information in the story?	1	2	3	4	5	6	7
5. To write down all the words in the story?	1	2	3	4	5	6	7
6. To read the story backwards?	1	2	3	4	5	6	7
7. To think about the order of events in the story?	1	2	3	4	5	6	7
8. To ask someone questions about the parts you don't understand?	1	2	3	4	5	6	7
9. To read the story in a book instead of a journal?	1	2	3	4	5	6	7
10. To think about what the writer is trying to say?	1	2	3	4	5	6	7
11. To look at the picture?	1	2	3	4	5	6	7
12. To read the story as fast as you can?	1	2	3	4	5	6	7
13. To have - (black, brown, blond, red) hair?	1	2	3	4	5	6	7

	Very important		Somewhat important			Not important	
14. To be (shorter, taller) than others in your class?	1	2	3	4	5	6	7
15. To say every word over and over?	1	2	3	4	5	6	7
16. To underline the important parts?	1	2	3	4	5	6	7
17. To think about something else while you are reading?	1	2	3	4	5	6	7
18. To have a TV set at home?	1	2	3	4	5	6	7
19. To run faster than the other children in your class?	1	2	3	4	5	6	7
20. To listen to the radio while you read?	1	2	3	4	5	6	7
21. To do your science at the same time?	1	2	3	4	5	6	7
22. To change from reading aloud to reading silently?	1	2	3	4	5	6	7
23. To look up the words you don't know in the dictionary?	1	2	3	4	5	6	7
24. To take notes of the main points of the story?	1	2	3	4	5	6	7
25. To cover up the title of what you are reading?	1	2	3	4	5	6	7

APPENDIX C

Reading Strategies for Decoding Scale

To help you work out a word you don't know when you are reading how important do you think it is ...

	Very important		Somewhat important			Not important	
1. To leave the word out, read on, and then go back to the word you left out?	1	2	3	4	5	6	7
2. To cover up all the words with your hand except the one you don't know?	1	2	3	4	5	6	7
3. To ask someone the word?	1	2	3	4	5	6	7
4. To write the word down 20 times?	1	2	3	4	5	6	7
5. To look at the picture to help you?	1	2	3	4	5	6	7
6. To skip the word?	1	2	3	4	5	6	7
7. To reread the sentence with the word in it from the beginning?	1	2	3	4	5	6	7
8. To be in Form 2?	1	2	3	4	5	6	7
9. To read a story 3 pages long?	1	2	3	4	5	6	7
10. To be wearing socks?	1	2	3	4	5	6	7
11. To use the words around it to help you (use the context)?	1	2	3	4	5	6	7
12. To sound out the word (syllabify it)?	1	2	3	4	5	6	7
13. To read the word in a journal?	1	2	3	4	5	6	7
14. To watch TV while working it out?	1	2	3	4	5	6	7
15. To look up the word in a dictionary?	1	2	3	4	5	6	7
16. To look at the first and last letters of the word to help you?	1	2	3	4	5	6	7
17. To change from reading aloud to reading silently?	1	2	3	4	5	6	7

	Very important		Somewhat important			Not important	
18. To name the middle letters of the word?	1	2	3	4	5	6	7
19. To own a bicycle?	1	2	3	4	5	6	7
20. To think of something else while you are working out the word?	1	2	3	4	5	6	7
21. To cover up the first letter of the word you are working out?	1	2	3	4	5	6	7
22. To say the word backwards?	1	2	3	4	5	6	7
23. To do your maths while working out the word?	1	2	3	4	5	6	7
24. To break up the words into syllables with a pencil?	1	2	3	4	5	6	7

APPENDIX D

Causal Attribution Rating Scale for Success

Here are some reasons why children succeed in reading. We will mark how true each reason is for you.

When I do well in reading it's ...

	How true these reasons are for me.						
	Very true		Somewhat true			Not true	
1. Because reading is easy	1	2	3	4	5	6	7
2. Because I am lucky	1	2	3	4	5	6	7
3. Because I am a good reader	1	2	3	4	5	6	7
4. Because I usually try hard in reading	1	2	3	4	5	6	7
5. Because I enjoy reading	1	2	3	4	5	6	7
6. Because I know enough words	1	2	3	4	5	6	7
7. Because I change my reading speed	1	2	3	4	5	6	7
8. Because the teacher is usually in a good mood during reading	1	2	3	4	5	6	7
9. Because I read for the main ideas or details according to the purpose of reading	1	2	3	4	5	6	7
10. Because what I read is good/ well written	1	2	3	4	5	6	7
11. Because the teacher always helps me in reading	1	2	3	4	5	6	7
12. Because I read a lot	1	2	3	4	5	6	7
13. Because I know the special tricks and plans for reading	1	2	3	4	5	6	7
14. Because I am a careful reader	1	2	3	4	5	6	7
15. Because I know that reading has to make sense	1	2	3	4	5	6	7

	Very true		Somewhat true			Not true	
16. Because I understand what I read	1	2	3	4	5	6	7
17. Because my parents have always encouraged me to read	1	2	3	4	5	6	7
18. Because I usually care about doing well in reading	1	2	3	4	5	6	7
19. Because we have a lot of books at home	1	2	3	4	5	6	7
20. Because I like reading time at school	1	2	3	4	5	6	7

APPENDIX E

Categories and Associated Dimensions for Causal Attribution Rating Scale for Success

When I do well in reading it's.....

Ability - internal, stable, uncontrollable

- because I am a good reader
- because I understand what I read

Stable Attitude - internal, stable, controllable

- because I enjoy reading
- because I am a careful reader
- because I like reading time at school

Typical effort - internal, stable, controllable

- because I usually try hard in reading
- because I usually care about doing well in reading

Learning and strategies - internal, stable, controllable

- because I know enough words
- because I change my reading speed
- because I read for the main ideas or details according to the purpose of reading
- because I read a lot
- because I know that reading has to make sense
- because I know the special tricks and plans for reading

Task - external, stable, uncontrollable

- because reading is easy
- because what I read is good/well written

Teacher - external, unstable, uncontrollable

- because the teacher is usually in a good mood during reading
- because the teacher always helps me in reading

Family - external, stable, uncontrollable

- because my parents have always encouraged me to read
- because we have a lot of books at home

Luck - external, unstable, uncontrollable

- because I am lucky

APPENDIX F

Reading Perception and Attribution Questionnaire

Warm up Questions

Do you like to read?

What kinds of books do you like to read?

Do you read at home?

How often do you read at home?

Open ended Questions

1. Tell me about your reading compared with the others in your class.

2. If this was a line up of the children in your class where would you be in terms of reading?

3. What are some of the reasons why some of the children in your class are better readers than you are?

4. What are some of the reasons why some of the children in your class are worse readers than you are?

5. What are some of the reasons why you do well on a reading task?

6. What are some of the reasons why you do badly on a reading task?

APPENDIX G

Categorization of Oral Reading Behaviours

O.R — OBSERVED RESPONSE : What is read (miscue) which is other than what is printed in the text.

E.R — EXPECTED RESPONSE : What is printed in the text.

TALLIED — TALLIED

The question concerns the type of miscue that was involved. Tallied and untallied miscues (see below) reflect a complete range of oral reading behaviours. The possible types of tallied miscue include:

1. Substitution: The E.R. was replaced, element for element.

O.R.: The cat ran down the alley
E.R.: The rat ran down the alley
O.R.: He ran into the door
E.R.: He ran into the store

2. Insertion: An element(s) was added to the reading.

O.R.: The boy hit at the ball
E.R.: The boy hit the ball

Note: Where the interpretation could allow for the substitution of a word or the insertion of a phoneme, e.g.; O.R.: This prompt action... E.R.: His prompt action..., the substitution category is given priority (Watson, 1974).

3. Omission: A word from the E.R. was omitted. This includes refusals to attempt words.

O.R.: He worked every afternoon
E.R.: He worked at home every afternoon

Note: Where dual classification is possible, e.g., O.R.: Undaunted by his unpleasant... E.R.: Undaunted by this unpleasant..., the substitution category is given priority (Watson, 1974).

4. Reversal: A change in position occurred between two phrases in the E.R., between two words, or between two graphemes within the word.

O.R.: No the way...
E.R.: On the way...
O.R.: she said
E.R.: ...said she

5. Complex Reversal: As defined in No.4 which also involved a substitution, insertion, or omission at the phrase, word or grapheme level.

O.R.: She knew with that snowy branch around...
E.R.: She knew that with snowy branches around...
O.R.: At last his claimness and persistence...
E.R.: At last his calmness and persistence...
O.R.: ...that they would have no more trouble
E.R.: ...that they would be troubled no more

6. Complex substitution: As defined in No.1 which also included an insertion or omission at the phrase, word or grapheme level.

O.R.: Robin's horse had wandered...
E.R.: The milkman's horse had wandered...
O.R.: ...that they would be in trouble no more
E.R.: ...that they would be troubled no more

7. Partial word substitution: This category is used when a reader attempts but does not produce a complete word. The text word is replaced with part of the word, but not the complete base word.

O.R.: prem
E.R.: premature

Note: Where a base word is substituted it is regarded as a substitution e.g., O.R.: Life is full of disappoint for... E.R.: Life is full of disappointments for...

UNTALLIED

UNTALLIED

The following miscues were also marked and coded. They are coded as untallied because they are not generally included in traditional miscue taxonomies. They also were not included in the accuracy score. The possible types of untallied miscue include:

1. Repetition: This category is concerned with whether the word(s) were repeated because difficulty was anticipated with a subsequent word(s) or the reader was attempting to grasp what had just been read. The O.R. was repeated.

O.R.: Tony enjoyed...[paused and regressed in anticipation of word `chemistry' and went on to say] enjoyed doing chemistry.
E.R.: Tony enjoyed doing chemistry.

2. Sounding out: This category is used when the reader has partial attempts at sounding out the word before saying it all correctly (Pohl, 1981).

	4. prickle
	3. pr..k
	4. pr...
O.R.:	1. p...
E.R.:	prickle

3. Substitution intonation: This occurs when the reader gives a word an artificial pronounciation, often by separating the words into syllables.

O.R.:	sub & sē & quent
E.R.:	subsequent
O.R.:	sa & vāge
E.R.:	savage
O.R.:	pret & ty
E.R.:	pretty

4. Punctuation: The reader has omitted or inserted punctuation.

O.R.:	...was able to fly. The plane...
E.R.:	...was able to fly the plane...

NONWD

NONWORD: This category is used when a whole word substitution is a nonsense word.

1. The substitution was a non word.

DILCT

DIALECT: This category is concerned with whether dialect was involved in the miscue. The miscues involve sound, vocabulary or grammatical variation which is the result of a dialect difference between the investigator and the reader.

1. The miscue represented a dialect deviation.

O.R:	don't
E.R:	doesn't
O.R:	None of us never figured...
E.R:	None of us ever figured...
O.R:	rekerrence
E.R:	recurrence

Note: Sound level dialect variations are not coded as miscues. e.g., pitchur (picture), wif (with), idear (idea), amond (almond). Speech deviations such as those occurring with and in "you an' I" or "bread an' butter", which are evaluated as being common to general speech patterns are also not recorded as dialect.

WORDS	NUMBER OF WORDS IN MISCUE: The number of words involved in the miscue is counted. The largest number is used, either the E.R. or the O.R.
	0. The number involved is less than a word. This involves a submorphemic or bound morphemic miscues.
	1-8 Indicates the exact number of words involved.
	9. Used for any number 9 or over.
FINGER	FINGER-POINTING: The reader uses a finger to underline the words during reading. This is recorded once at the easy and difficult passage level.
	1. The reader used finger-pointing.
NO MEAN	NO MEANING CHANGE
	1. This category is used for an <u>uncorrected</u> miscue where no meaning change occurs.These errors involve function word deviations (e.g., preposition, word inflection, conjunction, article, verb auxiliary, verb modal), an exact synonym and proper nouns (Pflaum, 1979).

O.R: can
E.R: could
O.R: little
E.R: small
O.R: The boy who the teacher scolded...
E.R: The boy the teacher scolded...
O.R: "Come on," said Bill
E.R: "Come," said Bill
O.R: Bright in sunlight...
E.R: Bright in the sunlight...

	2. This category is used for a <u>corrected</u> miscue of a no meaning change error (i.e., these are corrections of 1 above).
	3. This category is used for an <u>unsuccessful attempt at correction</u> of a no meaning change error (i.e., these are unsuccessful attempts at correcting 1 above).
MEAN	NON SEVERE MEANING CHANGE: Read the sentence up to and including the miscue. If the sentence can be completed so that it is grammatical and makes sense, it is non severe. If there is an omission read the word following to decide (Pflaum, 1979).

1. Uncorrected non severe meaning change. This category includes miscues that disrupt sentence meaning. They do not prevent the possible grammatical completion of the sentence.

O.R: He grinned at them over the basket in the yard.
E.R: He grinned at them over the bushes in the yard.

2. Corrected non severe meaning change. These are corrections of 1 above.

3. Unsuccessful correction attempts of non severe meaning change. These are unsuccessful attempts at correcting 1 above.

SEVERE

SEVERE MEANING CHANGE: It is not possible to complete the sentence including the error sensibly. All nonsense words are included here. If an omission, read the word following. If it is a first word error, read the next word too. If there is a series of errors, with each, read the sentence preceding the erred word correctly. A skipped line or part of a line is a severe meaning change. Refusals to attempt words are included here (Pflaum, 1979).

1. Uncorrected severe meaning change. These errors prevent grammatical completion of the sentence.

O.R: The new boy sat on his back park...
E.R: The new boy sat on his back porch...

2. Corrected severe meaning change. These are corrections of 1 above.

3. Unsuccessful correction attempts of severe meaning change. These are unsuccessful attempts at correcting 1 above.

CORRECT

CORRECTION: Types of miscue analysed for correction include all the tallied errors, that is, substitution, insertion, omission, reversal, complex reversal, complex substitution and partial word substitution. In addition, substitution intonations and punctuation errors (both untallied miscues) may also be corrected, but were not included in the accuracy score.

We start examining the miscue by asking whether the reader made any attempt at correcting. We are concerned whether:

1. No attempt at correction was made.
2. A successful correction was made.
3. The correct word or phrase was abandoned for an incorrect one.
4. An unsuccessful attempt at correction was made.

Correct 1, 3, and 4 were used in the analyses to denote errors. Correct 2 was used to denote successful correction.

EACC

EASY ACCURACY: This represents the number of tallied errors not corrected on the easy passage.

HACC

DIFFICULT (HARD) ACCURACY: This represents the number of tallied errors not corrected on the difficult passage.

ECOM

EASY COMPREHENSION: The number of comprehension questions answered correctly following easy passage.

HCOM

DIFFICULT (HARD) COMPREHENSION: The number of comprehension questions answered correctly following difficult passage.

LINGUISTIC CUE SYSTEMS

Substitutions and reversals (of letters only) were coded according to their graphic, phonemic, syntactic and semantic relationships with the E.R. Insertions and omissions were only coded according to syntactic acceptability. Complex reversals and complex substitutions were not coded according to the linguistic cue system. Partial word substitutions were only coded according to their graphic and phonemic relationship with the E.R. Untallied miscues were not coded according to the linguistic cue system.

GRAPH

GRAPHIC RELATIONSHIPS: This category is concerned with whether the miscue might have involved any graphic cues.

1. <u>No proximity</u>: There is no visual similarity between E.R. and O.R.

O.R.: there
E.R.: build

Some proximity

2. First: First letter(s) the same (Clay, 1979).

O.R.: cat
E.R.: cover

3 Middle: Middle letter(s) the same (Clay, 1979).

O.R.: limbs
E.R.: climbed

4. Last: Last letter(s) the same (Clay, 1979).

O.R.: last
E.R.: sweet

High proximity

5. Single grapheme difference between E.R. and O.R. This can include a substitution of letters (hit in place of hat), an omission of a letter (my in place of may) an insertion of a letter (hate for hat). This category also includes digraphs (brother instead of mother) (Burke, 1968).

O.R.: what
E.R.: that
O.R.: there
E.R.: where

6. The E.R. and O.R. were homographs. They are words that have identical graphic symbols but different pronounciations.

read/ri:d/
read/red/
desert/dizat/
desert/dezat/

7. All the letters in E.R. were in O.R. but two or more letters were found in reversed order (Ng, 1979).

O.R.: on
E.R.: no
O.R.: burnt
E.R.: brunt

8. The O.R. had more than half of the letters of the E.R., and the beginning, middle, and end letter(s), (letter clusters) occurred in the same order.

O.R.: climbed
E.R.: clambered
O.R.: screaming
E.R.: squealing
O.R.: your
E.R.: our

PHONM

PHONEMIC RELATIONSHIPS: This category is concerned with whether the miscue might have involved any phonemic cues.

1. No similarity: No sound similarity exists between the O.R. and E.R.

O.R.: rabbit
E.R.: alligator

Some similarity

2. First: First sound(s) identical (Clay, 1979).

O.R.: hit
E.R.: him

3. Middle: Middle sound(s) identical (Clay, 1979).

O.R.: batch
E.R. rat

4. Last: Last sound(s) identical (Clay, 1979).

O.R.: lawyer
E.R.: mower

High similarity

5. A high degree of sound similarity exist between O.R. and E.R. (Goodman & Burke, 1973).

O.R.: a
E.R.: the
O.R.: walked
E.R.: walk

6. The E.R. and O.R. are homophones. These are words which have the same pronounciation but differing graphemic representation. The reader's intonation must be used to determine which of the words was used.

heard/herd
deer/dear

SYN

SYNTACTIC ACCEPTABILITY: The question is asked whether the miscue is cued by syntax.

1. No, the O.R. is totally unacceptable. All non words are included here.

O.R.: At was why he was dead.
E.R.: That was why he was dead.

2. O.R. is acceptable only with the prior portion of the sentence.

O.R.: Susie was hoping around.
E.R.: Susie was hopping around.

3. O.R. is acceptable only with the following portion of the sentence, but not the prior portion.

O.R.: ...and we'll rubbed those stripes off.
E.R.: ...and we'll rub those stripes off.

4. O.R. is syntactically acceptable within the whole sentence, but not within the total passage.

O.R.: Joe is back at the gate.
E.R.: Joe was back at the gate. (O.R. does not fit in with the structural constraints (past tense) operating in the story).

5. O.R. is syntactically acceptable within the whole story.

O.R.: But this time the boy did not wait to see...
E.R.: But this time the boy did not want to see...

High syntactic acceptability: Either coded as 4 or 5 above. Used in analyses only.

SEM

SEMANTIC ACCEPTABILITY: Did the miscue involve semantics? Within this category only substitutions or words containing letter reversals are possible. The semantic structure is dependent on grammatical structure, therefore the judgement of semantic acceptability is made only to the O.R. that results in a syntactically acceptable sentence, except in the case where the baseword is retained (e.g., O.R.: the boy peep from... E.R.: the boy peeping from...). While the O.R. was syntactically unacceptable, a close relationship between the O.R. and E.R. is evident (Ng, 1979).

1. No, O.R. is semantically totally unacceptable.

O.R.: ...give you what you day.
E.R.: ...give you what you deserve.

2. O.R. retained the base word.

O.R.: ...you own these apple.
E.R.: ...you own these apples.

3. O.R. was acceptable with prior, but not following portions of the sentence.

O.R.: They had both the best flowers.
E.R.: They had brought the best flowers.

4. O.R. was acceptable with following, but not prior portion of the sentence.

O.R.: ...kitten who belong to Judy.
E.R.: kitten who belonged to Judy.

5. O.R. acceptable within the sentence, but not within total passage.

O.R.: ...had bought the best flowers.
E.R.: ...had brought the best flowers.

6. O.R. acceptable within total passage.

O.R.: He climbed over the hedge...
E.R.: He clambered over the hedge...

High semantic acceptability: Either coded as 5 or 6 above. Used in analyses only.

SIGNALED MONITORING

SIGNALED MONITORING (BLEEP): This category indicates the location of the bleep sound on the tape of the pupil's reading. The bleeps were pupil's indications of awareness that they had erred or changed what they had first read.

1. Did not bleep.
2. Bleeped just prior to miscue occurring.
3. Bleeped as miscue occurred (during).
4. Bleeped immediately after miscue.
5. Bleeped one or more words after the miscue.
6. Bleeped when there was no miscue.

Codings 2, 3, 4, and 5 were collapsed for some of the analyses.

ETOT	EASY TOTAL: Total number of words in the easy passage.
HTOT	DIFFICULT (HARD) TOTAL: Total number of words in the difficult passage.
ECOMQ	EASY COMPREHENSION QUESTIONS: The number of questions belonging to the passage read at the easy level.
HCOMQ	DIFFICULT (HARD) COMPREHENSION QUESTIONS: The number of questions belonging to the passage read at the difficult level.

APPENDIX H

General Record and Miscue Analysis Summary

	Identification Number
	Phase
	Easy Level Passage Number
	Difficult Level Passage Number
	Line Number
	Error Number
	Expected Response (E.R)
	Observed Response (O.R)
	Type of Error (TALLIED)
	Type Not Tallied (UNTALLIED)
	Nonword (NONWORD)
	Dialect (DILCT)
	Number of Words in Miscue (WORDS)
	Finger-pointing (FINGER)
	No Meaning Change (NOMEAN)
	Non Severe Meaning Change (MEAN)
	Severe Meaning Change (SEVERE)
	Correction (CORRECT)
	Easy Accuracy (EACC)
	Difficult Accuracy (HACC)
	Easy Comprehension (ECOM)
	Difficult Comprehension (HCOM)
	Graphic Proximity (GRAPH)
	Phonemic Similarity (PHONM)
	Syntactic Acceptability (SYN)
	Semantic Acceptability (SEM)
	Bleep (BLEEP)
	Easy Total (ETOT)
	Difficult Total (HTOT)
	Easy Comprehension Questions (ECOMQ)
	Difficult Comprehension Questions (HCOMQ)

APPENDIX I

Categorization of Self Report of Oral Reading Behaviour

1. What happened here?

    1. No immediate recognition of what had occurred - response incorrect or inappropriate.

    [Tape replay]

2. What happened here?

    1. Global Description

        "made an error"
        "got muddled" (non specific response)
        "stuttered" (for repetition)

    2. Specific Description

        "missed out a word"
        "pronounced the word wrong"
        "couldn't say the word properly"
        "muddled up `the' and `those'"
        "stuttered - said `care', `care & less'"

    3. Repeated Don't Know

        still no recognition
        "don't know"
        "not sure"

3. With reference to #2, Question 2 (author coded only - not asked)

    1. Correspondence between specific description (#2 in Question 2) and actual reading behaviour
    2. No correspondence between specific description (#2 in Question 2) and actual reading behaviour

4. Why the error?

    1. Expectation of another word

        "put in my own words"
        "thought it was (going to be) `_____'"

    2. Reading on

        "reading next word"
        "reading next part of the sentence"
        "reading ahead"

    3. Phonemic cues (pronounciation)

        "got stuck"
        "stumbled" & particular example (e.g., "stumbled over care & ful")
        "didn't say the word right"
        "didn't sound right" (phonemic)

4. Lack of concentration and other

"not thinking"
"nerves"
"got lost"
"read too quick"
"words too long"
"muddled up" (non specific)
"mucked up"

5. Understanding

"didn't make sense"
"couldn't get meaning" (of word/sentence)

6. Previous Error

"mistake on word before"

7. Graphic cues (physical features of the word)

"not the right letters"
"spelling"
"didn't look at whole word/letters of word"

8. Don't know.

5. What (strategy) did you do next?

1. Reread

"stopped and changed it"
"looked back and changed it"
"looked at it longer again"
"looked back"

2. Slow down

"hesitated" (speed)
"read more carefully"

3. Read ahead

"carried on reading to try and find out what the sentence is about"
"read on and then went back"

4. Inner image

"thinking how it sounds"
"saying sounds in my head"
"saying word in my mind"

5. Syllabification

"split word into syllables"
"work out the word aloud"
"figure out the word aloud"

6. Comparison

"compared word to another known word"
"it was like _____"

7. Kept on

"kept on going" (no return)
"carried on reading"

8. Don't know.

6. Why did you do that? (that particular strategy)

1. Check it

"check it again"
"look back to see if I'd made a mistake"

2. Make it right (global)

"to make it right"
"didn't look right"
"didn't sound right"
"it was wrong, had to make it right"

3. Help with pronounciation

"didn't know the word, to help me say it"

4. Expectation (usually for repetition)

"I was reading ahead"

5. Help with understanding

"to understand it"
"didn't make sense"
"....doesn't make sense"

6. Habit

"always do it"

7. Miscellaneous

"too quick"
"got lost"

8. Don't know

7. Were you successful with that? (the strategy)

1. Yes (successful)
2. No (unsuccessful)
3. Don't know.

8. With reference to #1 and #2, Question 7 (author coded only - not asked)

    1. Correspondence between response to #1 and #2, Question 7 and actual reading behaviour
    2. No correspondence between response to #1 and #2, Question 7 and actual reading behaviour

9. How do you know it (the strategy) was successful/unsuccessful?

    1. Meaning

        "it came out right" (meaning)
        "it sounded right" (meaning)
        "it made sense"
        "sentence said......"

    2. Inner knowledge (unspecified)/self

        "I just know"
        "I know the word"/"don't know the word"
        "I read it"

    3. Graphic cues

        "spelling of the word"
        "letters of the word"
        "how it is written"

    4. Phonemic cues

        "sounded it right" - syllabification demonstrated
        "I did say..."
        "said..."
        "heard it said like that"

    5. Don't know.

10. How do you know to use that (strategy)? (Source of strategy)

    1. Inner knowledge/self

        "just know"
        "just think its right"
        "habit"/"I always do it"

    2. Outside knowledge

        "teacher told me"
        "parent told me"
        "taught it"

    3. Don't know.

APPENDIX J

Categories, Dimensions and Keywords for Reading Perception and Attribution Questionnaire

1. Liking and interest for the task - internal, stable, controllable

    emphasis on liking. "It" refers to the task
    like the book/like it (the book)
    interested in the task
    find the book interesting/boring

2. Immediate effort - internal, unstable, controllable

    careless
    completeness of assignment
    took time

3. Attention - internal, unstable, controllable

    attention
    concentration
    distractability

4. Mood - internal, unstable, uncontrollable

    mood/have this mood
    having a good day

5. Stable attitude - internal, stable, controllable

    "It" refers to reading generally
    like reading
    interested in reading
    always have this attitude

6. Typical effort - internal, stable, controllable

    motivation (long term)
    effort (typically, usually, always)
    gives up

7. Ability - internal, stable, uncontrollable

    ability/intelligence
    thinking
    understanding/comprehension

8. Previous experience - internal, stable, uncontrollable

    past experience
    previous practice/success
    repeated practice

9. Family - external, stable, uncontrollable

    parents/family
    home background
    outside-school support

10. Task ease/difficulty - external, stable, uncontrollable

    task/material
    steps too large
    hard/easy/long/short

11. Task interest - external, unstable, uncontrollable

    emphasis on task
    the task (book) was liked/boring

12. Teacher - external, unstable, uncontrollable

    individual attention
    teacher
    extra help

13. Other students - external, unstable, uncontrollable

    outside interference by pupils
    helped by pupils

14. Miscellaneous

    medical problems/physical disabilities
    number of schools

15. Don't know

APPENDIX K

Categories and Dimensions for Task-linked Perceptions and Causal Attributions

1. Task ease/difficulty - external, stable, uncontrollable

2. Task interest - external, stable, uncontrollable

3. Ability - internal, stable, uncontrollable

4. Attention - internal, unstable, controllable

5. Immediate effort - internal, unstable, controllable

6. Liking and interest for the task - internal, stable, controllable

7. Strategies - internal, unstable, controllable

   energizing and directing
   application of certain skills or strategies

8. Miscellaneous

9. Don't know