AN INVESTIGATION INTO CONTEXTUAL FACILITATION EFFECTS FROM A VERBAL-VISUAL FORMAT.

by

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ABSTRACT

This study investigated the use of contextual facilitation in children's beginning reading. A verbal-visual format was utilised to examine the way context influences children's ability to identify irregular words (words which do not follow normal spelling to sound relationships). The study also determined whether poor or good readers in each grade utilised context more or less according to a proposed stage pattern of word identification.

The sample, comprised 113 children drawn from three grades from a Primary School in New Plymouth. Children were individually tested with the Peabody Picture Vocabulary Test-Revised, BURT Word Reading Test, Isolated Word Test and Contextual Facilitation Test. The BURT, Isolated Word Test and Context Facilitation Test were modified for easier presentation and active participation of the children to reduce confounding variables of earlier research.

Two ANOVA's were applied to analyse data in this study. The first was used to assess the difference that exists in contextual facilitation across the grades tested. The second ANOVA assessed the interaction between grade by reading ability by word block difficulty for context facilitation and for movement through the proposed stage pattern in word recognition. A correlation and

stepwise regression assessed the link between context facilitation and BURT scores for reading ability differences between the children in relation to contextual facilitation use.

The first ANOVA revealed that utilisation of context with childrens' increasing age decreases for simple words, but increases with increasing word difficulty. The second ANOVA indicated a divergence in reading ability and contextual facilitation beginning at about Junior 2 grade, which possibly delayed childrens' development of automatic word decoding skills. The correlation and stepwise regression between contextual facilitation and BURT scores provides the range of the children's word identification ability. This showed a considerable range in ability from poor word decoding where context cannot be utilised, through an alliance between decoding and context to identify words; to highly efficient word decoding without the need for context.

Evidence from this study indicates the existence of a stage pattern of sight word acquisition similar to that proposed by Adams and Huggins (1985). This consists of three stages: 1) non-recognition, 2) intermediate and 3) automatic word recognition. Results of this study provide evidence that an alliance exists between children's decoding and context for words in the intermediate stage before automatic word recognition occurs. As a result, increasing word

identification ability into the child's non-recognition stage from intermediate stage expansion. Divergence in the stage pattern proposed begins in Junior 2 grade, where low ability readers lag behind in automatic word decoding and rely more on context. Further research beyond the generalised results from this study should include a longitudinal study to follow the reading development of individual students.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION AND OVERVIEW

The specific aim of this study is to determine whether contextual facilitation increases the reading potential of good and poor readers. Two opposing views exist regarding children's reading potential and the issue of contextual facilitation. The first view put forward by Goodman (1967) and Smith (1971) proposes that skilled reading is an activity of relying on the syntactic and semantic redundancies of language to make predictions about text yet to be encountered. The process of learning to read, according to this "psycholinguistic" view, is one of picking up contextual cues. The second view put forward by Stanovich (1980, 1986) proposes that skilled reading relies on the rapid and accurate decoding of words, and is not a context reliant process. These views are briefly outlined below along with a description of the perspective adopted in this study.

According to the psycholinguistic method of reading instruction, teachers should allow the child to make mistakes as the context will soon put them right. There must be no specific help with words; when a child finds difficulty with reading, the teacher's role is to encourage them to work out words in their own way. The children learn to read because the teachers prevent reading programmes from standing in the children's way.

Therefore, this psycholinguistic view considers reading acquisition to be a natural process in which exposure to reading materials is all that is necessary for acquisition. Interfering with the natural state of affairs may lead to failure, "because children will have to deal with concepts and structures that make little sense to them" (Calfee and Drum, 1986 p. 809). As a result, reading failure arises from efforts to "teach" about reading when children could easily learn about reading on their own.

One apparent weakness in this view is that children can learn to read by relying on sentence context alone without phonic decoding. In this regard, it should be noted that even the most obvious contexts generate a number of alternative views. For example, take the sentence: "The boy climbs the fence." The choice for the target word fence is not only limited to climbable objects (e.g., ladder, wall, rope, bars, hill), but could also include adverbs like fastest or slowest. The delay generated by the child trying to work out the meaning of the target word from sentence context alone could be considerable.

Advocates of the psycholinguistic method recommend that children be taught to skip unknown words, until the words are met repeatedly in various contexts to induce meaning. This method allows fluent readers to enlarge their vocabulary, but it presupposes only

occasional unknown words. The method is ineffective for the beginning reader who may be stumped by more than one word in the sentence. In the above sentence, a child who cannot read _fence_ may also fail to read _climbs_. The contextual clues in the sentence now become uninformative: "The boy _____ the _____ ." Not having the means to progress further than this could lead to frustration and the avoidance of the area of reading.

The alternative view, known as Phonological Decoding, states that reading by skilled readers is a process of rapid decoding of words. Stanovich (1980, 1986) suggests that the use of context is negligible by skilled readers but context usage by poor readers is significant. Reading according to Stanovich is not a top-down context driven process, but rather a bottom-up automatic decoding process. This view encompasses fast automatic bottom-up processing, where spelling-to-sound mapping determines a child's ability to identify unknown words.

When children have developed their knowledge about spelling-to-sound correspondences, it is also important to develop their automaticity at word identification. Words must be recognised quickly to ensure that sufficient cognitive resources are available for comprehension processes to operate on the information in children's short-term memory. Stanovich (1986) suggests that

unrewarding early reading experiences will lead to less involvement in reading by the child. As a result, the poor reader's lack of practice prevents the development of speed and automaticity in word recognition.

Research reviewed by Stanovich (1986) indicates that good readers use context less because of their good decoding skills in reading whereas poor readers utilise context more in reading because they have poor decoding skills. Stanovich (1986) also indicates that context facilitation is inversely related to a child's word recognition skill. Therefore, a child's word recognition skill determines the extent to which contextual information will be relied upon to complete lexical access. Although poor readers rely on context more than good readers for word identification in ongoing reading, research reviewed by Stanovich (1986) also suggests that good readers are better at producing missing words in visually or orally presented text.

The view put forward in this study is that a cooperative mechanism exists between children's decoding and context usage while reading. It is proposed that children are at different levels of ability in terms of their utilisation of context to read words in text. Generally speaking there are three groups or levels. The first is the poor reading ability group who are both poor decoders and context users.

In this group the children's language prediction skills do not aid the decoding of words. At the opposite end of the scale, the good readers decoding skills are so good that context does not significantly increase their language prediction skills. The good readers use context only as a back-up system to check difficult or irregular words while reading.

The majority of beginning readers fall between these two other groups, and utilise context and word decoding in a cooperative manner while reading. In this group language prediction ability by the use of context helps children become better at word decoding. The result is that they engage in more automatic processing of words, and are therefore, less reliant on language prediction for word identification. This intermediate group of children are, as Stanovich (1982) suggests, poor readers who are not deficient in their utilisation of context to facilitate reading. However, the slower and less accurate decoding by the poorer readers in this intermediate group may deteriorate if the reading materials are too far beyond the child's reading ability. The consequence of this gap between the child's reading ability and the materials they read would increase each school year, and may as Stanovich (1986) suggests generate "Matthew effects".

However, total reliance on either decoding or context for reading is

ineffective for the child. Relying on only context to read can limit the beginning reader's word specific knowledge. For instance, they will not be able to pronounce irregular words correctly, such as "stomach" which does not follow conventional letter-sound rules. Consequently, the beginning reader will also be restricted in their awareness of polyphonic letter sequences in words, such as, own, or ear. Total reliance by a child on context to identify unfamiliar words will also result in little progress. The words that can be predicted from context are typically high frequency words, and not meaningful content words.

With these alternative views in mind, the aim of this study is to examine more closely the relationship between contextual facilitation effects and the development of word identification ability, with particular focus on irregular words. The view proposed in this study is that a child's ability to reflect on sentence context combined with emerging phonological recoding ability, influences reading by helping children develop further their decoding skills. That is, the ability to combine knowledge of the constraints of sentence context with incomplete graphophonemic information may help children identify unfamiliar words (including irregular ones), and thus, increase both their word specific knowledge and their knowledge of grapheme-phoneme correspondences. This suggests that beginning readers who are better able to use sentence

context will more rapidly progress to a point at which the ability to use context decreases in importance as a consequence of more automatic cognitive processes in decoding taking over. Consequently, context usage in poor readers may lag behind good readers but reach a similar point a few years later.

Intent of the Present Study

This study examines the development of contextual facilitation effects as a function of grade level and decoding ability. Previous research to investigate this issue was carried out by Adams and Huggins (1985) by using irregular words in a visual context for identification by the children. They found that accuracy of recognising irregular words of "intermediate familiarity" (which varied with age and ability) improved markedly with context for every age and ability group.

Several important modifications were made in this study to overcome some shortcomings of the Adams and Huggins (1985) study regarding word presentation. The major alteration was the use of context in a verbal-visual format for the children to identify target words. This was aimed at reducing possible memory overload resulting from decoding the words preceding the target word. The words were also presented in a random order to the child, to avoid

possible order effects. The results from the context test for contextual facilitation provided by the children were compared to their isolated irregular word scores. The other modifications made to the Adams and Huggins (1985) method in this study are discussed in chapter three, (the method).

The next chapter (chapter two) reviews the literature relating to the views put forward about context effect and decoding reliance. A case is then made based on a review of research to adopt a combined perspective involving elements from both the contextual and decoding approaches. Chapter three explains the procedures and tests used, and also modifications carried out on the materials used by Adams and Huggins (1985). The aim of the modifications is to focus more on contextual facilitation between ability groups and reduce the confounding variables of previous experiments. Chapter Four presents the results of the study and Chapter Five presents a discussion of the results. Finally, Chapter Six presents the conclusions of this study, and implications for teaching and further research about contextual facilitation.

CHAPTER TWO

CONTEXTUAL FACILITATION: A REVIEW OF THE LITERATURE

This chapter contains an examination of each of the views about contextual facilitation introduced in Chapter One. The first view, which primarily involves children using context to read by means of semantic and syntactic redundancy. The second view, primarily involving the utilisation of fast and accurate word decoding to read is referred to here as phonological recoding reliance. The third view put forward in this study proposes a cooperative mechanism between context use and word decoding. This view will be referred to in this study as the decoding-context alliance. Finally, in this chapter preliminary work into contextual facilitation, methodological issues and implications for the research methodology in children's beginning reading will be covered.

SEMANTIC AND SYNTACTIC REDUNDANCY

Goodman (1973) suggests that reading is a "psycholinguistic guessing game," where children utilise context for semantic and syntactic cues to predict forthcoming words. The main proposition of this view is that children who are efficient readers pay little attention to the majority of words in a text because the flow of language follows a predictable pattern.

Smith (1971) believes that there is a limit to the amount of printed information that can be processed by the readers eyes while reading. As a result, the reader must rely on semantic and syntactic information to predict upcoming words and comprehend the text being read. Both Goodman (1967, 1973) and Smith (1971) argued that higher levels of reading ability arise from children using more contextual information during word recognition. This implies that children who are poor readers rely more on graphic information while reading to recognise words, which in turn increases their comprehension of a text.

The reading process Goodman and Smith describe is a top-down approach, where "an idea or concept generates perceptual hypotheses which are then checked against perceptual data" (Snowling, 1987 p. 62). For example, a child reading a book may expect the word table to be present on a page. This expectancy about the word table will decrease the perceptual processing required by the child. All that is required by the child is that the particular hypothesis about the word table is confirmed. For instance, if the word presented on the page began with a "t" and had an ascender "b", this may be adequate to confirm the child's hypothesis about the word table .

Goodman and Smith argue that phonological, visual and orthographic

information only confirm or disconfirm the child's predictions about words in the text about to be read. The good readers are thought to pay little attention to the bulk of words in a text because the flow of language incorporated in the text follows a particular pattern. This would suggest that for good readers the reading process is only incidentally visual, and the flow of language is characterised by a series of guesses. Since adults can access word meanings directly without first deriving a phonological representation, there is no reason to teach children to read by a phonological method. Smith argues further that the fast reading speed of skilled readers proves that they cannot be attending to every letter in a word. Instead, they make use of syntactic, semantic and pragmatic information in recognising words. Therefore, beginning readers should be taught to utilise context to read in the same way as adults.

The poor readers lower level of reading ability is thought to result from "readers using increasing amounts of graphic information during word recognition" (Leu, DeGroff and Simons, 1986 p. 348). The result of an overdependence on graphic information according to Goodman and Smith is an obstruction in the poor reader's comprehension. Goodman and Smith propose that decoding words is difficult, unnatural and a harmful method of learning to read for children. Therefore, children should learn to read by reading, by

deriving hypotheses from the context and prior knowledge of what the text is about.

Smith is not explicit, however, about what methods should be used to teach children to read. Flaws appear in Smith's argument that guessing words from context is the all important factor in skilled reading. This was based on previous research experiments with adults reading words from difficult texts. Under the conditions of reading difficult texts, adult readers will make informed guesses to help them decipher words. However, there is no evidence to suggest that adults use guesswork to help them identify words in normal reading. The guesswork used by adults may help them identify a visually unfamiliar word or work out the meaning of a new word. But usually, contextual information is available too late to aid in word identification by adult readers. Normally adult readers have identified a word from its appearance before they have had time to decide what words are likely to appear in context.

The assumption put forward by Goodman and Smith that less skilled readers cannot use context has little support in research on word recognition. Generally, the use of context will not be a problem for less skilled readers provided the text does not exceed their coding abilities. The view Goodman and Smith propose is that reading is a process of guesswork used by adults which can be applied to

children. However, "reading cannot be simply a guessing game" (Oakhill and Garnham, 1988 p. 97) for children. There must also be an element of decoding of the printed text to either confirm or disconfirm guesses. Further, children should also be taught to decode text while reading. A child's decoding processes cannot be expected to arise as an offshoot of reading guesswork; word decoding instruction is necessary. However, some high ability children will be able to work out the rules for word decoding themselves without instruction.

The most important point made by Goodman and Smith, is that success will only occur with reading when a child considers the materials are "worth" reading. Otherwise, if a child is only made to concentrate on visual information while reading, difficulty will be encountered, and therefore, inability to make meaning for comprehension.

It is not claimed here that abilities such as predicting words from context are unimportant in children's reading. This is not meant to discount the importance of such top-down reading skills. Rather, the view advanced here is that teaching only such top-down context skills is not enough for children to proceed in reading. Both decoding and context should have a place in a child's reading instruction and one should not be sacrificed for the other. The view presented next--

Phonological Recoding Reliance--favours decoding over context to facilitate children's skilled reading. Within this view, context is only minimally used to facilitate children's skilled reading.

PHONOLOGICAL RECODING RELIANCE

The phonological recoding view put forward by Stanovich (1980, 1986) assumes that reading operates in a bottom-up fashion, "where sensory input is analysed initially at the level of perceptual features" (Snowling, 1987 p. 61). Word perception for a child begins with detecting each letter's basic features, such as the ascenders "b" and descenders "p." When the letters in a word have been identified by the child letter combinations corresponding to sound units can be identified, for example "ch." Next, these sound units are synthesised and those which match stored representations in the child's memory will be accepted, signalling word perception. Therefore, perception for the reader in this decoding process moves from low level feature information, to high level conceptual information in word identification.

A prerequisite for bottom-up processing is phonological awareness. This is the ability to reflect on and manipulate the phonemic segments of speech. This involves, for example, the ability to segment the spoken word bat into it's corresponding phonemes |b|,

|a|, and |t|. Both phonological awareness and spelling-to-sound mapping should develop symbiotically for a beginning reader, with phonological awareness giving rise and causing the growth of spelling-to-sound mapping. As a result, the child learns that a phoneme relates to a lexical visual representation in a particular manner. Therefore, phonological awareness and spelling-to-sound mapping should be in place "early" in children's reading development, as they affect " the ease and accuracy with which we can pronounce English words" (Parkin and Ilett, 1986 p. 23). As Stanovich (1986) has noted, the absence of these prereading skills can set up a chain of escalating negative educational side effects. Stanovich (1986) calls these negative educational side effects "Matthew Effects," where small deficits in a child's reading ability at the beginning of school can become large deficits after a few years.

Research Investigations: Phonological Recoding

A great deal of research has been carried out on phonological awareness as a result of claims about the primary importance of automatic word decoding in reading. Many investigations have also been carried out by researchers into: (1) children's short-term memory and reading comprehension; (2) children's short-term memory and the variable of context in word identification; and

(3) children's automaticity and attentional deficits. More recently reading-level match designs have been used to investigate children's utilisation of context and visual word identification.

Several theories and models about children's phonological recoding have evolved from the research, for example, Perfetti's Verbal Efficiency Theory and Stanovich's Interactive Compensatory Model. Many researchers agree with Tunmer (1990a) that children's phonological awareness significantly influences reading development in the early stages where focus is primarily on the acquisition of decoding skills. The level of a child's phonological awareness, however, does not decrease in the later stages of learning to read when the emphasis shifts towards text level processes for example, comprehension monitoring while reading. Phonological awareness still exists within the reader but moving through the stages of phonological recoding and automatic word recognition reduces the beginning reader's reliance on phonological awareness.

1) Memory: Short-Term Memory (STM)

Research performed by Stanovich, Cunningham and Feeman (1984a) tested first grade children's general intelligence, decoding speed, listening comprehension and phonological awareness in relation to

early reading acquisition. They found as previous researchers have discovered that phonological awareness partially determines the child's success at breaking the spelling-to-sound code, and therefore, the child's ability to identify unknown words. The decoding speed variables of how quickly and accurately children could name pseudowords explained an additional amount of variance beyond that for phonological awareness. This supports previous research carried out on children's speed of decoding in reading, which in addition to accuracy, is also important, due to short-term memory limitations. That is, slow and inefficient decoding would adversely affect comprehension processes in working memory.

In the case of children's reading "word coding and sentence comprehension processes must be fast enough to avoid desynchronization because of memory deactivation" (Lesgold and Perfetti, 1978 p. 326). Lesgold and Perfetti hypothesised that a major source of individual differences in children's reading performance is slow inefficient decoding resulting in reduced execution of higher level comprehension. Therefore, for poor readers less short-term memory is available because of problems with word decoding.

2) Memory: STM and Context

Later research by Perfetti, Goldman and Hogaboam (1979) added the variable of context in word identification for good and poor readers. Perfetti et al. (1979) presented their test words in isolation, unrelated word lists and a story context for the children to identify. In the isolated word condition each word was presented to the children by a slide projector. In the list condition, a list of unrelated words was presented through headphones to the children prior to each target word. In the story context, the words were presented through headphones and the target words were presented at intervals visually for identification by the children.

The results of Perfetti et al. (1979) research indicated that the story context facilitated word identification for both good and poor readers. A two-way interaction for reading skill by context indicated that context had a greater effect for poor readers' latencies, compared to good readers' vocalisation latencies. In the research by Perfetti et al. (1979) it seemed unlikely that the children's anticipation of specific words is the context mechanism that generates skilled reading. While context supports and aids word recognition, this decreases with increasing reading ability depending on the beginning reader's skill. However, if a beginning reader can make anticipations about words to come in a text, word

preactivation will occur. As a result, word identification reduces to word verification for the beginning reader in the context situation. Sometimes, a different word may be anticipated by the beginning reader and the verification procedure fails, which means that the word must be retrieved from memory.

As a consequence, the subsequent drain on short-term memory capacity can cause a loss of comprehension for the poor reader. If the good readers are good at context-free word decoding as Perfetti et al. suggests, they should not be adversely affected by the misanticipation. Poor readers on the other hand should be affected by misanticipation because it is their "basic" word decoding processes which are not developed, and therefore, short-term memory becomes overloaded with word decoding and not used for comprehension. The good readers, according to Perfetti et al (1979) are so good at word identification while reading that context is of little consequence. The word recognition processes of the good readers are relatively "attention free," and executed more rapidly than contextual processes to eliminate lexical alternatives. Therefore, poor readers may fail to read well because too much attention is devoted to decoding words, which exceeds short-term memory limitations.

3) Automaticity and Attentional deficits

Curtis (1980) builds upon Lesgold et al's. (1978), and Perfetti et al's. (1979) research, by proposing that children who are poor readers may fail in part, due to a failure to develop automaticity in word recognition. The consequence of this lack of automaticity is a deficit in the amount of attention available by the poor reader for comprehension. In most word identification models, children's access to word meaning is achieved from graphemic encoding or via phonological coding. When a child's access to the word codes occurs automatically there is no competition with other reading processes for processing capacity. Instead, these word code sequences can be integrated into the child's memory. However, when decoding is not automatic, "competition among reading processes may result, and the probability that there will be enough capacity to complete all necessary processing decreases" (Curtis, 1980 p. 657).

Mutual facilitation exists between children's word decoding and phonological awareness and spelling-to-sound code breaking, as indicated by Stanovich, Cunningham and Feeman (1984) to develop automaticity. Even with children as young as 5 to 6 years of age evidence exists for the importance of verbal comprehension ability, a general ability that will increase in importance as the

child's reading skill develops. It is likely that phonological awareness underlies a child's ability to segment and analyse speech, and this determines early success at decoding unknown words from breaking the spelling-to-sound code. It is important for children to develop automaticity in their reading ability because inefficient word decoding absorbs too much cognitive capacity and reduces reading comprehension.

Research by Stanovich et al. (1984) supports Lesgold and Perfetti (1978) and Stanovich's (1980) reading theories, all of which place emphasis on the limited capacity of a child's short-term memory. Children must be able to recognise words rapidly, "in order to provide sufficient word meanings for comprehension processes operating on activated information in short-term memory" (Stanovich et al, 1984 p. 296). The child, as a result, has more cognitive capacity for reading comprehension processes, as automaticity develops in word recognition. The poor reader, unfortunately, allocates more cognitive capacity to word decoding, because of inadequate low level word decoding.

The inadequate word decoding skills of poor readers according to Stanovich et al. (1984) and Stanovich (1986) generate "Matthew effects," leading to unrewarding early reading experiences. As a result, the poor reader becomes less involved in reading related

activities, and therefore, fail to fully develop their vocabulary. The lack of reading exposure and practice by the poor reader leads to a failure to develop automaticity and speed at the word recognition level. Slow and capacity draining word recognition processes ensue for the poor reader, requiring cognitive capacity which should have been allocated to comprehension.

As a result, the poor readers reading for meaning is thwarted, unrewarding reading experiences multiply, and reading practice is avoided or tolerated without cognitive involvement. Therefore, according to Stanovich (1986), the poor reader becomes one of the reading "poor getting poorer" because of negative reading experiences, and consequently move into a downward literary spiral.

To summarise so far, it has been documented previously that the speed and accuracy of a reader's word decoding and recognition is related to reading comprehension. The result is that the good readers have more cognitive capacity available for the higher level comprehension processes, due to automaticity in word recognition. The problem, as Stanovich et al (1984) suggests is ascertaining how context-free word decoding and contextual facilitation interact to provide rapid word recognition associated with skilled reading. Perfetti et al (1979), and West, Stanovich, Feeman and Cunningham (1983) found that when the reading contexts are understood by good

younger and poor older readers, the poor older readers showed as much context facilitation as the good readers. However, the poor readers may be compensating for their poor automatic word decoding skills by their longer experiences with reading. In order to reduce this confounding reading experience variable between children of different age groups, reading level match designs were applied.

4) Reading Level Match Designs for Contextual Effects

Stanovich et al. (1984a) proposed that there is a level of difficulty reached in a text where poor readers cannot identify enough words to sustain contextual facilitation. Good readers on the other hand continue to display facilitation effects, on account of their more efficient context-free word recognition processes. In a difficult text the poor readers contextual mechanisms have been rendered inoperative because of inadequate decoding processes for word identification. The question put forward by Stanovich was "when less skilled readers reach a certain level of context-free decoding efficiency, do they display as much contextual facilitation as skilled readers did when the latter were at the same level?" (Stanovich et al, 1984a p. 669). To answer this question a reading level match design was applied, where children from the middle school grades of 3 to 6 were selected for context effect in word recognition. In the reading level match design the older poor readers

were matched with good younger readers who were reading at the same developmental level.

Stanovich et al's. (1984a) results indicated that when both age groups were at the same reading level, the poor readers derived just as large context facilitation effects on word recognition as the good readers. The results were derived from both good and poor readers use of coherent paragraphs, and when their decoding skills were similar for words out of context.

Stanovich et al (1984a) suggests that a developmental lag exists between the good and poor readers developing subskills of reading. And that at a given point in time, a child is using contextual information to a degree commensurate with their decoding skills. The context use deficiencies, which occur for some poor readers is due to, inadequate context-free word decoding. The result is that poor word decoding degrades the proceeding contextual information available to the poor reader, and therefore, reading comprehension suffers.

Further research by Stanovich, Nathan and Vala-Rossi (1985) applied a reading level match design to measure children's ability to use context to speed word recognition. Stanovich et al. (1985) examined the developmental lag model between third and fifth grade

children's individual differences in reading skill. The third grade children's data, and the scores for the fifth grade children on word naming in related and neutral contexts were highly correlated.

However, unlike the data from the younger group, the fifth grade reading ability data was negatively correlated with contextual facilitation. The results indicated that the better readers displayed smaller context effects than the poor readers. This converges with other findings from Curtis (1980), and Stanovich et al (1984), where Stanovich suggests that a compensatory pattern exists for context use for the reading skill groups in each grade. Within the fifth grade group, the readers with poorer decoding ability were probably relying more on context to compensate for their less efficient bottom-up decoding skills. This compensation breaks down for poor third grade readers as their processing of contextual information is relatively inefficient and cannot compensate for poor decoding.

The above evidence indicates that children's decoding skills are essential for skilled reading comes back to the point of phonemic awareness. Indirectly, if a child's phonemic awareness is low, their decoding skills for words in a text will also be low, and as a result, their reading is slow and laborious.

To summarise, research evidence is accumulating that phonemic

awareness "aids" children's early reading successes by enabling the child to discover how phonemes are related to graphemes (Stanovich et al., 1984, 1984a; Tunmer and Nesdale 1985). Unfortunately, for children who have poor phonemic awareness, they will have difficulty breaking the spelling-to-sound code and this delay may cause less exposure to text. The delay in spelling-to-sound code breaking may exacerbate the children's reading problems as they move into more difficult reading materials. The lack of exposure and practice with materials poor readers can read delays their attainment of automatic word-recognition. As a result, slow cognitive capacity draining processes are used by the poor reader to utilise context which should have gone to gaining comprehension from the text.

According to Stanovich (1986), the good reader more rapidly attains a stage of proficiency where decoding skill no longer determines their reading level. The good readers word recognition becomes more automatic and less resource demanding. The only limiting factor for these children is their general language skills. As a result, good readers expend less cognitive capacity, not because they rely on context, but because their automatic word decoding processes are more efficient and powerful. This has been referred to by Perfetti (1985) as Verbal Efficiency Theory, which gives speed and automaticity of decoding and semantic access central roles in

comprehension failure for poor readers.

5) Perfetti's (1985) Verbal Efficiency Theory

Perfetti (1985) argues that individual differences in comprehension between readers' ability arise because of differences in the efficiency of low level processes. The Verbal Efficiency Theory assumes that the processes of decoding and comprehension compete for a limited amount of processing capacity in a reader's short-term memory. Therefore, the less efficient a reader's decoding process is, the smaller the amount of information it can work on. The result is that fewer other comprehension processes can occur. One way a reader's word decoding and comprehension processes can be made more efficient is by being faster. Fast processes only need to remain briefly in short-term memory. Slow processes incur another disadvantage because the contents of short-term memory has a limited time-span. The information that a slow process is working on may decay before the process has analysed it fully, and therefore reading comprehension suffers.

The essential point here is that processing and storage in short-term memory have to compete against one another. These two functions are a likely source of difference in reading comprehension. The more automatic decoding and semantic access processes of good

readers allows greater efficiency of short-term memory use. This in turn leaves more processing capacity for comprehension processes."The fact that processing and storage in short-term memory have to be traded-off against each other is a potential source of difference in reading comprehension" (Oakhill and Garnham, 1988 p. 122).

If poor readers fail to develop automatic word decoding skills to read efficiently, they will have less short-term memory capacity for reading comprehension processes. As a result, when more cognitive capacity is required for decoding by the poor reader, less memory space is available for comprehension processes. Furthermore, the slow decoding processes of poor readers may mean that words identified at the beginning of a sentence may be lost because of more reliance on context absorbing more short-term memory capacity. Therefore, the meaning of the sentence is lost before the child completes the sentence. This has been found by Stanovich (1986), where context facilitation is inversely related to the automatic word recognition skill of the reader. Stanovich (1986) has referred to this as the Interactive Compensatory Model.

6) Interactive Compensatory Model

Stanovich's (1986) Interactive Compensatory Model proposes that

when the bottom-up decoding processes for word recognition are deficient, the reader compensates by relying on context. As a result, "Reading skill is not determined by skill at contextual prediction but rather that the level of word-recognition skill determines the extent to which contextual information will be relied on to complete the process of lexical access" (Stanovich, 1986 p. 370).

When poor readers encounter difficult materials, their slow and inaccurate word decoding processes may in fact degrade the contextual information they receive. Thus, comprehension fails not because of the readers over-reliance on decoding, but because their decoding skill is not developed enough. The child's word decoding skill weakness may "intensify" as they progress through each school year, with the reading materials becoming more difficult each year.

If the development of a child's vocabulary knowledge facilitates reading comprehension and if reading itself leads to vocabulary growth, which in turn, allows more efficient reading, then a reciprocal relationship exists. This reciprocal relationship between vocabulary growth and reading should continue to develop further growth in reading throughout a reader's development. Unfortunately, the problem for the poor reader is that a good deal of knowledge acquisition occurs in the vocabulary development process. As a result, the poor readers vocabulary knowledge base would be less

developed because of less reading experience. Conversely, the effect for good readers who are reading well and have good vocabularies will read more, learn more word meanings, and as a result read even better. The growth in vocabulary from increased reading volume by the good readers, plus their skill differences in reading could mean that they are the "rich-getting-richer" which Stanovich (1986) describes.

The skill difference indicated by Stanovich (1986) could arise from a cumulative advantage cycle embedded in the course of the reading process for the good readers. Unfortunately, the reverse process applies to poor readers with poor vocabularies who read slowly and without enjoyment leading to the child reading less. As a result, inhibition occurs on the poor reader's vocabulary growth, generating a cumulative disadvantage cycle. Ellis and Large (1988) link together the utilisation of short-term memory and the acquisition of reading skills and provide a time scale with which to observe positive or negative cycles of achievement as Stanovich (1986) suggests exist.

7) Short-term memory and the Acquisition of Reading

Ellis and Large's (1988) research tested forty children from the age of five to seven years old, as they learned to read. Each year the children were tested for ability on 44 variables measuring: reading,

spelling, vocabulary, short-term memory, visual perception and discrimination, auditory-visual integration, language knowledge, phonological awareness, grammatical knowledge, rote knowledge, ordering ability and performance on the Weschler intelligence scale. Over the first three years of a child's reading acquisition a blending of knowledge occurs. The child's acquisition process begins with a blend of knowledge about the visual characteristics of letters of the alphabet, phonological awareness and visual short-term memory processes. Thereafter, the child's reading acquisition develops in association with knowledge of the sounds of language, the correspondences between sounds and visual patterns, skills for the analysis of visual patterns and syntactic skills.

The correlational analyses performed by Ellis and Large for the early stages of children's letter acquisition found that the predictors are phonological skills, such as, phoneme segmentation, sound blending, and the part-whole relationship; and that these previous skills in letter recognition predict later levels. However, phonological skills predict children's letter recognition, and not the reverse. As a result, phonological awareness facilitates the child's acquisition of letter-recognition and breaking the spelling-to-sound code. This view by Ellis and Large supports Stanovich's (1986) claims concerning children's progress in acquiring the basic skills for beginning reading.

Ellis and Large found that reading ability is related to children's short-term memory span. From the ages of five to six years, the child's short-term memory skills of word and sentence spans develop symbiotically with reading. From six to seven years the interdependence has increased, and reading is a better predictor of children's short-term memory skills. The development of basic reading skills allows the child to attend to, manipulate and remember the sounds of words and sentences. The child continues to build up the ability of making sense out of sentences by the age of seven, "where word order and syntax are paramount" (Ellis and Large, 1988 p. 67). Ellis and Large propose that phonological coding and short-term memory are important components when children begin to learn to read.

Summary

The Phonological Recoding View of children's beginning reading includes several important facets of reading. The first, is that the development of phonological awareness is important in helping children break the spelling-to-sound code. Without this basic ability the child will not be able to advance in reading and thus acquire the spin-off skills of reading, which aid in the effective utilisation of short-term memory skills in reading. Without the basic word recognition skills in place early, automaticity in children's reading

is not possible.

As a result, the child's lack of automaticity may overload short-term memory capacity in trying to decipher words. This takes up greater cognitive capacity that should be applied to comprehension. The poor readers, according to the Phonological Recoding View, use context to identify words. If the poor reader is slow at word decoding, the reader loses cognitive capacity in word recognition, which in effect causes the child to lose the first words of the sentence from memory, and therefore, comprehension. As a result of a lack of automaticity in word recognition, a negative cycle of achievement effects can occur for the poor reader, called "Matthew effects."

However, context can facilitate both good and poor readers, when the materials being read are within the readers experience level. The view put forward next is that a cooperative mechanism exists between contextual use and phonological decoding in children's beginning reading.

DECODING-CONTEXT ALLIANCE

The essential view of this alliance is that both context and decoding are required for a child's success in reading, but context use

decreases as decoding becomes more automatic for the child. As a consequence of the development of word automaticity from context use to derive words of intermediate familiarity, comprehension of text increases for the child.

Reading, whether by good or poor readers, is a combination of ongoing decoding and context usage. However, the ongoing development of a child's reading ability to become a proficient reader is a "complex process involving the integration of grammatical, phonological and short-term memory skills" (Siegel and Ryan, 1988 p. 28). Fluid and rapid reading involves, not necessarily at a conscious level by the reader, the identification of the class of word that is likely to appear in the text. The beginning reader needs to understand the basic letter-sound correspondences for decoding words effectively. Memory capacity is also required by the reader to gain comprehension from the words and sentences which have been read.

The total reliance on either decoding or context for efficient reading will be ineffective for the beginning reader. Teaching children to only phonologically recode words may restrict their progress in reading. As a result of an over reliance on decoding, the child may be restricted to pronouncing homographic spelling patterns (patterns that have different pronunciations in different words) in the same

way, for example, the words hose like lose and done like bone. If this is left unchecked incorrect word pronunciations will result, which will retard the reading development of the beginning reader. Unlike beginning reader's who possess knowledge that some letter sequences have different pronunciations by using sentence context, depending on the word in which the sequence exists. The poor reader will persist in pronouncing polyphonic letter sequences in the same way, for example, own in the words flown and clown.

Likewise, the total reliance on context by children to identify unfamiliar words will also result in little progress. "The words which can be predicted from context by a reader are typically high frequency function words, e.g. on, the, to (Tunmer, 1990b p.199) and not meaningful content words. Also, the "over-stressing of context as a cueing system for reading is, in fact, unhelpful for beginning readers who do not have the wide background understanding and word knowledge of fluent readers" (Wray, 1989 p. 5). The poor beginning reader who is made to rely on context to identify words will make little progress, as the words they can predict from context will be words they already recognise. Another problem suggested by Konopak (1981), especially for poor readers, is the failure of some beginning reader texts to provide sufficient clues for meaning.

The view put forward by this study is that children who are in the process of acquiring grapheme-phoneme correspondences cannot recode all of the unfamiliar words they encounter completely. Contextual facilitation may influence children's phonological recoding development by combining the knowledge of the constraints of sentential context with incomplete phonological knowledge which aids in the identification of unfamiliar irregular words and polyphonic sequences. As a result, each new word correctly identified by a beginning reader would increase their knowledge of letter-sound correspondences.

Tunmer, Nesdale and Wright (1987) follow a similar line of reasoning by applying syntactical awareness tasks, specifically oral cloze to help beginning reader's identify unfamiliar words. It is important, however, at this point to distinguish syntactical awareness from contextual facilitation. Contextual facilitation has the target word present in the text for the reader to identify. In syntactical awareness, the reader produces the word that fits the text. In applying syntactical awareness tasks, such as oral cloze to words with homographic spelling patterns can aid the reader in word identification. For example, in the identification of polyphonic sounding words like cough (which can be pronounced like bough, rough or dough) by the beginning reader in a sentence, such as: "The man had a bad . . . . ." "When beginning readers apply their limited

knowledge of the letter-sound correspondences to such words, the result may often be close enough to the correct form that context can be used to arrive at a correct identification" (Tunmer, Nesdale and Wright, 1987 p. 26). But also, when arriving either syntactically or contextually to pronounce a target word the beginning reader may learn that some spelling patterns have two or more pronunciations.

Children should also be encouraged to use a combination of strategies to identify new words they do not know when reading. For example, in the sentence "He put the cake on the . . . ." (Garton and Pratt, 1990 p. 207). In this sentence the context does not provide enough information for the child to be sure of the correct word to complete the sentence. The sentence context may suggest to the child that the word "table" is a possibility. The child may then look at the word for clues to see if it starts with a "t", and as a result, decide that the word is table. The use of this letter-clue technique may be useful when children encounter irregular words in context. Usually, irregular words, such as "stomach" do contain some clues to their phonetic representation for the reader.

Tunmer (1990's) provides the example of the word "yacht" as an irregular spelling. The first and last letters of "yacht" provide clues to the phonemic representation of the word for the reader. When confronted with an irregular word, if the "beginning readers

apply their knowledge of grapheme-phoneme correspondences to such words, the result will be close enough to the correct form that sentence context can be used to arrive at a correct identification" (Tunmer, 1990a p. 101). If a child has difficulty identifying the word "yacht" in isolation, a context provided by other words in a sentence, such as "The man was sailing his . . . . ." (Garton and Pratt, 1990 p. 208) will enable the child to decode it. The child could then put together his or her knowledge about the world (people sail boats that are often called yachts), with their knowledge of grapheme-phoneme correspondences, for example, knowing what the first letter in the irregular word "yacht" corresponds to.

Therefore, learning to read is a two-way process for children, in which sentence context and word decoding apply. The child should be able to combine the rules of grapheme-phoneme correspondence to extract sound cues, and using their knowledge of language and the world to find words that match these cues. This two-way process between context and decoding cannot occur for the child if the words are encountered in isolation. Accordingly, reading materials provided for children must be contextualised and meaningful, while at the same time generating opportunities to learn grapheme-phoneme correspondence rules.

As a consequence of a child's learning to read process, decoding

helps access meaning, but equally, consideration of meaning assists the decoding process. This two-way interaction is consistent with Tunmer's (1990b) hypothesis in the learning to read process, where syntactic awareness plays an important role for children in learning to recode words. To illustrate this point, for example, consider again the sentence "The man sailed his yacht." The process of decoding the last word "yacht" may proceed two ways. One child may know the correspondence rule for the letter "y" and utilise the sound this letter makes to search through words that the child knows to find one that fits the sentence context. In carrying out this lexical process the child finds the word yacht. A second child having difficulty with the rules of letter correspondence may use the context of the sentence to look for a word that fits. The child may come up with the word "boat," but realises this does not start with a "y," as "y" does not sound like "b." This may trigger another search in the child's memory, until the child finds the word "yacht."

Yet, even this process will not yield correct answers every time as children will invariably make mistakes. Usually, mistakes occur from a child's over-reliance on the use of contextual strategies and a lack of consideration for the grapheme-phoneme structure of the word for identification. In other instances, it may be that combinations of phonological recoding skills and contextual cues will still lead to an incorrect word identification by

the child. For example, in the sentence "After school Steven went back to David's house," a child could read the final word as "home," from using context cues and their knowledge of the sound corresponding to the letter h or letters ho. It is important to distinguish that this type of contextual facilitation and letter-sound knowledge differs in this study to that proposed by Goodman and Smith.

Goodman and Smith argue that the use of context to predict words is the primary factor in "ongoing" sentence processing for children. In contrast, the view proposed in this study is that the ability to reflect on sentence context combined with ongoing phonological recoding is essential for children to acquire word recognition skills and extend their automatic word recognition range. This decoding-context alliance is supported by Tunmer (1990a) who stresses that total reliance on context to identify unfamiliar words by children will result in little progress in reading. As noted earlier, words that can be correctly predicted from context are high frequency function words, which can be easily recognised by children.

The errors children make when reading can also provide useful information about context or decoding strategies used for word identification. Consistent error patterns may indicate that a child is relying too much on one type of reading strategy. On the

one hand, the child who frequently reads words which fit the context but have no relationship to the graphemic structure will only be using context. On the other hand, a child who "reads" words that contain a sound that relates to one of the graphemes, usually the first, but has no relationship to the context, may be relying on limited-knowledge of correspondence rules, basing word identification on the initial sound, and ignoring the context.

It is advanced in this study that total reliance on either phonological recoding or context strategies to identify words for a child will result in little progress. As a consequence of this over reliance on a particular strategy, the child who is a poor reader may be greatly disadvantaged in further education. Stanovich (1986) suggests that good readers recognise unfamiliar words through more efficient bottom-up word decoding processes in order to comprehend text, and not by using top-down context. Poor readers according to Stanovich (1986) take longer to read, due to poor decoding skills, and rely more on context for help. Consequently, the poor reader who does rely on context to read will require more cognitive effort, and as a result, comprehension of the text will decrease. Stanovich (1986) stresses that reading skill is not determined by skill at contextual prediction, "but rather the level of word recognition skill determines the extent to which contextual information will be relied on" (Stanovich, 1986 p. 370), and complete the process of

lexical access.

The view proposed in this study is that the use of both context and decoding by children facilitates children's beginning reading. As a consequence, good readers may use context to improve their decoding and recognition of words of intermediate familiarity. These intermediate words then move into the category of automatic recognition, and as a result, leaves more cognitive processing capacity for comprehension. For good readers, the use of context to aid reading should decrease as more automatic cognitive processes take over. In contrast, poor readers who can use context less efficiently to recognise words of intermediate familiarity, may lag behind the good readers. However, eventually the poor readers may reach a similar point of context use to identify words, perhaps two or three years later.

Preliminary Research with Irregular Word Testing

The research design used in this study is an experimental type, modifying contextual facilitation research performed by Adams and Huggins (1985) in the following ways:

(1) The order of words from the Adams and Huggins Isolated Word Test were randomised in order to break up the easy to difficult order

and thus hold the child's attention. (2) Cards were used with only six words per card, instead of a list of fifty words in the presentation to the children. Also, the children actively participated by moving a blank card down each test card to reveal one word at a time to focus their attention. (3) High Frequency words words were included in the Isolated Word Test, in order to provide the children with words they could readily identify, and thus hold their attention. (4) The contextual Facilitation Test was presented in a similar fashion to that of the Isolated Word Test except that sentences were used.

Adams and Huggins compared the abilities of good and poor readers to read a frequency-graduated series of irregularly spelled words. Two word identification test format presentations were used to test the children's sight vocabularies. The first test format consisted of irregular words presented to the children in isolation while the second test format consisted of the same irregular words presented in a sentence context to the children.

Adams and Huggins assumed that a reader's knowledge is organised hierarchically such that the output of any level of processing is input for the next. In this way the reader extracts information from the written page. For the mature readers information is moved progressively upwards from a words visual detail through comprehensive levels of interpretation which

corresponds to the information flow in bottom-up word processing. Top-down word processing occurs as the readers processing system searches for information to satisfy partially activated higher level word knowledge complexes. In the case of the mature reader this top-down word processing generates automatic priming of lower level word identification complexes.

In order to manage these automatic word processing complexes, schema-theory models have adopted the concept of a central limited-capacity processor from human information processing theories. The central processor is responsible for setting the interpretive goals of the system, and "the proportion of attentional capacity allocated to higher order dimensions determines whether and how text will be understood. The proportion allocated to problem areas in the system determines whether and how they will be overcome." (Adams and Huggins, 1985 p. 263).

However, this view of attentional capacity by Adams and Huggins (1985), depends on how one imagines the interplay between the reader's relevant contextual knowledge and decoding skills occurs. This interplay between contextual and word decoding skills in turn determines how much attention the reader allocates to these sub-tasks of reading. The prediction arises that either good readers profit more from context to read text or poor readers profit more

from context to read text.

The first prediction arises from the good readers having more elaborate ingrained knowledge and skills compared to those of the poor readers. Specifically, it is suggested that because the good readers have higher levels of sophistication in the syntactic and semantic relationships of the text they should have greater sensitivity to contextual cues in texts than the poor readers. In addition, the good readers should be more adept at letter and word recognition, and as a result, more cognitive processing capacity should be available for context clues for text comprehension.

The second prediction is that poor readers should gain more from context to comprehend text. This arises from the premise that poor readers are such poor decoders they should gain more from context while reading. The poor readers, however, can use top-down syntactic and semantic support for their uncertain bottom-up encoding of a text's visual dimensions. As a result, this type of context use by the poor reader may compensate for their decoding difficulties. Conversely, it may also be argued that the automatic word recognition skills of the good readers are so efficient in reading without context, there is little room for improvement with context.

Adams and Huggins (1985) research design used children from grade two to grade five to test the two predictions about context facilitation. All of the children were native speakers of English, and none were classified as dyslexic by the schools. Adams and Huggins (1985) found it impossible to equate IQ scores across reading abilities, they therefore, excluded children whose IQ scores were below 100, or above 125 to improve the matching of good and poor readers. To verify the IQ score Adams and Huggins (1985) administered the information, vocabulary, picture arrangement of the WISC to each child. If the WISC fell below 80 or above 130, the child was dropped from the sample. Stanford and Gates-McGinnitie reading comprehension scores were also obtained for each child. Children who scored below the 4th Stanine on both tests were classified as poor readers. Those who scored within or above the 5th stanine on both tests were classified as good readers.

In the study by Adams and Huggins (1985), using the frequency graduated list of 50 irregular words (formatted from easy to difficult in Appendix A.), it was found that the children's performance declined with increasing word difficulty. The older good readers penetrated further into the isolated irregular word test than the younger and poorer readers. An ANOVA for the main effects of both grade and children's reading ability was highly significant and the interaction between grade and reading ability was also

significant.

The identification of the isolated irregular words in a sentence context specific for that word was the next test for the children. The sentences were designed to provide moderate priming for the children, but not deterministic priming for the target word. The principle difference between the isolated irregular word test and the context facilitation test was quantitative. The children were, as a rule, able to read more of the list of irregular words with context. An ANOVA was performed on the children's results for grade by ability by test for the context condition. The effects of the test or, equivalently context, were significant, as were those of grade and children's reading ability.

The results of the tests performed by Adams and Huggins (1985) indicate that: (a) There are large differences in the depth of children's sight vocabularies associated with age, or amount of schooling and with reading ability. (b) The presence of meaningful context is a potent aid to word recognition regardless of age and ability.

The data Adams and Huggins obtained would support the latter part of the prediction, in which, poor reader's should profit more from context to read text. This suggests congruous context facilitates

word recognition and that word recognition is inversely related to children's reading ability. One must take into account that the irregular words were chosen by Adams and Huggins (1985) to be within the expected familiarity range of the poorest readers in the sample. Consequently, the results obtained for the good readers would suggest that more of the irregular words would be more familiar and easier to identify without context. As a result, the good readers' results may be interpreted as a decrease in sensitivity to context with increasing reading ability. This may in fact, reflect an ability-related increase in subjective familiarity with the target words. The data reported by Adams and Huggins (1985) does not permit the conclusion that either good readers should gain more from context or the converse. This is possibly due to, contextual facilitation test presentation biases which may have facilitated the good readers' performance because of their better word decoding skills to identify the target irregular word.

However, Adams and Huggins (1985) do propose that a stage of sight word acquisition exists where three stages occur for a word to attain sight word status for children. The first stage is where the words observed lacked any useful internal representation of their orthography for the child even when context was supplied. The second stage is transitional, where children cannot recognise the target irregular words in isolation but do so when context is

supplied. The most sophisticated stage occurs last, when the child can recognise the isolated words without the aid of context. In this stage word recognition is automatic and it can be assumed that the word is securely represented in the child's visual lexicon.

Overall, the results Adams and Huggins obtained would tend to support the Lesgold and Perfetti (1978) view, which emphasises that the processes involved in word recognition are the most troublesome for beginning readers. Specifically, Lesgold and Perfetti argue that the processes involved in word recognition are slow and effortful, and may themselves, place limits on a child's short-term memory. The possible short-term memory overload for a child may result in the disruption and displacement of context for identifying target words. The short-term memory overload factor is an important confounding variable which the present study hopes to reduce, by using a verbal-visual context test format for presenting the sentences (context facilitation test) to the children.

Methodological Issues

Several important methodological issues arise from previous experimentation in contextual facilitation and syntactical awareness. However, an important distinction must be made between both research area's: (1) Contextual facilitation deals with the

actual target words being present in the texts the subject reads. (2) Syntactical awareness requires the subject "to reflect upon and manipulate aspects of the internal grammatical structure of sentences" (Tunmer, Nesdale and Wright, 1987 p. 25). Although, syntactical awareness follows a different aim to the one followed in this study, research into syntactical awareness provides important guidelines.

An important confounding test factor of the Adams and Huggins (1985) research which also applies to syntactical awareness tests, has arisen from the presentation of materials to the subjects in a written mode rather than an oral mode. As a result, "differences in measures of syntactic awareness presented in a written mode maybe due to decoding abilities of good and poor reader's" (Tunmer, Nesdale and Wright, 1987 p. 180). Therefore, beginning reader's who are already having trouble identifying words in a text for a contextual facilitation or syntactical awareness test, will also have trouble organising these words into larger structural units.

Another confounding factor is the use of sentences in contextual facilitation tests which are too long for the beginning reader's to retain in memory. This procedure would potentially reduce the poor reader's ability to segment and decode words in order to reach the target word. As Tunmer, Bowey and Grieve (1983)

suggest in their research into young children's awareness of the word as a unit of spoken language (which also applies to this study) where the use of long sentences may confound some children's memory ability to identify words. In effect, the poor readers efforts to decode preceding words to the target word would degrade the overall context effect from short-term memory overload. As a result, "the magnitude of semantic priming effects in visual word recognition may be a rather poor indicator of real ability to use contextual information" (Bentin, Deutsch and Liberman, 1990 p. 148).

A relatively unbiased method for comparing good and poor readers' contextual facilitation is to reduce biased context effects, for example, eliminating the need to decode print, as in verbal presentation, and forcing all readers regardless of skill to use context to the same extent. Therefore, it was decided in this present study that all the readers would have the context test presented in a verbal-visual fashion. The purpose for this context test modification is to help reduce the children's decoding deficits and short-term memory overload.

Summary

The review began by considering the two opposing views regarding

contextual facilitation and children's successful reading: Semantic and Syntactic Redundancy; and Phonological Recoding Reliance. A third view was proposed from a synthesis of the two preceding views. This was referred to as the Decoding-Context Alliance in children's successful beginning reading.

According to the psycholinguistic view, children skilled in reading mainly utilise context and rely less on the phonological, visual or orthographic cues provided by a text. Children read by a process which, according to Goodman and Smith, is interactive between language and thought. The good readers are thought to pay little attention to the bulk of words of a text because the flow of language follows a predictable pattern. Therefore, reading is a natural process for children which is incidental and characterised by a series of guesses. Goodman and Smith indicate that too great a dependence on graphic information by children when reading can impede their comprehension in reading. As a result, the primary goal of making meaning from the words in context while the child reads is defeated.

The alternative view proposed by Stanovich (1980, 1986) suggests that the processes of reading for children operate in a "bottom-up" fashion, instead of a "top-down" fashion as in the "psycholinguistic guessing game." In the "bottom-up" process,

sensory input is analysed by the reader at the level of a word's perceptual features.

The necessary prerequisites for children's reading according to "bottom-up" processing are: (a) phonological awareness, and (b) spelling-to-sound mapping. Both of these factors provide the basis with which beginning readers can accurately pronounce words.

This literature review outlined the extensive research that has been carried out regarding good and poor readers automatic word decoding in reading. This research indicates that it is important to develop children's word automaticity according to the phonological recoding view, for two reasons: (1) Speed in decoding words is important because of the notion of limited capacity of a reader's short-term memory; (2) the result of automatic decoding is that cognitive capacity becomes free for allocation to comprehension processes in a child's reading.

Inadequate word decoding skills can lead to unrewarding reading experiences for children and a lack of attainment in reading according to Stanovich (1986). The lack of reading practice which can occur for poor readers can lead to failure to develop automaticity and speed of word recognition. Instead, the poor reader uses slow context processes for word identification, thus draining

cognitive capacity which should have been allocated to comprehension in reading.

Stanovich (1986) suggests that a developmental lag may exist for poor readers, whereby they do reach a similar level of context free word decoding but are delayed by two to three years. These poor readers however, would have some basic word decoding skills and would not necessarily fall into the negative cycle of achievement where "Matthew effects" occur in reading.

The view put forward by this study represents an alliance of both the decoding and context views of reading. Good and poor readers use a combination of ongoing context and word decoding in reading depending on the children's reading ability. Total reliance on either phonological recoding or context will be ineffective for the beginning reader. (a) Total reliance on phonological recoding to read would restrict children to pronouncing polyphonic words in the same way causing incorrect word pronunciations and a restriction in the beginning reader's development. (b) Total reliance on context to identify words will also restrict children's progress in reading as the words that can be predicted from context are high frequency words, and not content words.

The alliance view suggests that children who are in the process of

acquiring   grapheme-phoneme correspondences in reading will not be able to recode all unfamiliar words completely. Contextual facilitation may influence the children's phonological recoding development by allowing them to combine knowledge of the constraints of sentential context with incomplete phonological knowledge, to identify words of intermediate familiarity. Words of automatic familiarity can be identified without context because the child's automatic word decoding is so good. Words which are beyond the stage of intermediate familiarity are not represented in the child's memory for automatic recognition, and context will not aid the words identification.

When a beginning reader applies their limited knowledge of letter-sound correspondences, the result may be close enough for context to provide the correct word identification for words of intermediate familiarity. As a result, the intermediate word moves into the child's automatic recognition stage which leaves more cognitive capacity to go to comprehension and the identification of difficult words beyond the intermediate stage.

The consideration of whether children rely more on the context strategy or the word decoding strategy in beginning reading is problematic. These problems have been indicated in Adams and Huggins (1985) research study, where irregular word identification

was used to test whether good readers used context more than poor readers (Irregular words were used because they do not conform to normal spelling-to-sound patterns, and their correct reading in isolation would indicate that they were represented in the readers' memory.) Adams and Huggins results suggest that the reverse may apply, where poor readers derive more context effect to identify irregular words than good readers. At this point, the important methodological issue of only using the context in a visual format for children to identify irregular words applies. The confounding element of preceding word decoding overload in children's short-term memory capacity to identify target irregular words in sentences applies in only the visual context.

Overall, the intent of this study is to reduce: (1) Children's short-term memory overload by applying context in a verbal-visual format to identify irregular words. (2) Preceding decoding of sentence words before the target irregular word from the verbal-visual format, with the aim of providing a more accurate context facilitation measure between good and poor readers. The other modifications to the Adams and Huggins (1985) research method by this study will be discussed in chapter three (method).

Research Questions

The following research questions arise from the review of the literature: (1) What is the relationship between contextual facilitation effects and word decoding ability?

(2) How does accuracy of recognising irregular words of varying difficulty change as a function of age and ability when the words are presented in isolation and when they are preceded by context presented in a verbal-visual format?

Tentative Hypothesis

It was hypothesised that prior context can increase children's word recognition accuracy but only under certain circumstances. The level of context usage decreases from a high degree in children's beginning reading to a lower level as more automatic word recognition processes take over. In effect, the good reader's vocabulary moves through a stage pattern of word recognition, specifically in the intermediate word difficulty range. As these intermediate words move into the automatic word recognition stage of the child's vocabulary, context is relied on less. The lower reliance on context for word recognition allows cognitive capacity to become available for comprehension.

On the other hand poor reader's appear to use context less to read because of their poorer decoding skills in word identification. The poor readers context use may increase at a slower rate to a peak similar to that achieved by the good readers for words of intermediate difficulty and then decrease in a developmental lag two to three years later.

CHAPTER THREE

METHOD

SUBJECTS

The study was carried out on a urban Primary school with a role of approximately 250 children, consisting primarily of middle class Caucasians. The total number of children in the study was 113 (mean age= 7.56 years, S.D= .83 years). Three grades were selected from the school, and as many children tested as possible from each grade complement consisting of: 38 children from Junior 2 (mean age= 6.65 years, S.D= .29 years); 39 children from Standard 1 (mean age= 7.35 years, S.D= .36 years); and 36 children from Standard 2 (mean age= 8.54 years, S.D= .35 years). The overall sample of children included only those who had permission from their parents, and did not include any children who did not choose to participate. As a result, the children who took part in the study were selected in a non-random fashion. All of the children who participated in the study took part in all of the tests for word recognition.

MATERIALS

(a) Peabody Picture Vocabulary Test-Revised (PPVT-R)

Form M of the PPVT-R by Dunn and Dunn (1981) was used to

measure the children's "receptive vocabulary," and provides a verbal estimate of their overall intelligence. The child's date of birth determines the starting position on the PPVT-R test. The test consists of 175 pictorial plates, each containing four pictures. As each plate is presented the examiner verbally provides a stimulus word, and the child responds by indicating the picture that best illustrates the meaning of the word. The PPVT-R test is designed for any individual who can hear stimulus words, see drawings and communicate a response.

(b) BURT Word Reading Test

The BURT Word Reading Test, New Zealand revision by Gilmore, Croft and Reid (1981) was the first word test administered to the children. The BURT test is an individually administered measure of an aspect of a child's word recognition skills. In its original form the BURT test consists of 110 words printed in differing sizes of type, and graded in difficulty from easy to difficult. The child is asked to read as many words from the test as possible, until 10 consecutive words are read incorrectly. At this point, the child is given the opportunity to look at the remaining words to see if they can identify any others. Consequently, the test provides a broad estimate of the child's reading achievement. A copy of the BURT test sheet in its original form is provided in Appendix C.

The BURT test was modified in this study from its original format for testing the children in the following ways. The presentation format was altered from all the words being presented at one time to the child, to five words at a time on separate cards. The test cards were presented to the child one at a time, beginning with the easy words and finishing with the difficult words. An example of one of the modified test cards is provided in Appendix D. Each test card had all of the words presented in the same type and size of print. The reason for this modification was to prevent a drop off in the child's attention to the words in the test. The child's lack of attention to the test words can arise from being confronted with words of increasing difficulty and decreasing size.

(c) Isolated Word Test

The original form of the Adams and Huggins (1985) Isolated Word Test, consisted of a list of 50 words with irregular spelling-to-sound correspondences. The test provides a measure of a child's knowledge of irregular words of decreasing frequency. The 50 words were grouped in blocks of 10 words each of decreasing frequency (and therefore increasing difficulty).

The format of the original Isolated Word Test was modified in several subtle ways. First, 26 high frequency words from the

"Clay Test" (Clay, 1979 p. 33) were randomly selected by computer and ordered for inclusion in the Isolated Word Test. (A copy of the high frequency word list is provided in Appendix F). However, unlike Adams and Huggins (1985) the order of the irregular words was randomised and interspersed at two irregular word intervals with a high frequency word. These words were included to provide words that the children could readily identify. The format for the Isolated Word Test began and finished with a high frequency word, providing a total of 76 words for the children to identify.

(d) Contextual Facilitation Test

The Adams and Huggins (1985) Contextual Facilitation Test consisted of the same 50 irregular word from the Isolated Word Test, but each was presented as the last content word of a meaningful sentence. The sentences in the Contextual Facilitation test, unlike those in the Adams and Huggins (1985) study were presented in a verbal-visual context to the children. Again, cards were used to present the test sentences to the children. Five sentences were presented on each card, with the irregular target word as the last or second to last word. The irregular word order followed the same pattern as in the Isolated Word Test.

Each sentence was presented verbally to the children by the

experimenter, who pointed to each word that was spoken. The last word, or second to last word depending on the sentence is not spoken, but only pointed to by the experimenter, with the child providing the oral response required.

PROCEDURE

Permission

Permission to carry out the study was obtained from the principal of the school, the teachers of the classes involved, and the parents of the children involved in the study. A copy of the permission letter sent to the parents, and the permission slip returned by them is provided in Appendix B.

Establishing Rapport

Before the actual testing period began, the experimenter was invited to come to the classes involved and make himself known to the children. The time period for this familiarisation of the experimenter with the children was two weeks. In this time the experimenter participated in class activities, talked and answered questions the teachers and children had about the study. This familiarisation period was an important factor, as this allowed the

children to be more at ease with the experimenter in the actual testing situation.

The child's attitude to the tests and experimenter are important factors in determining how well the child performs. Invalid or unreliable results may arise, if the child is not at ease, nervous or anxious about the tests.

Testing Situation

The tests were carried out in a quiet room away from the main school building. This precaution reduced the chances of interruption and outside noise levels which could have distracted the children during the tests. The atmosphere in which the tests were carried out was one of cooperation between the child and experimenter. During the administration of the tests, no comments were made by the experimenter that would make the child feel apprehensive. A friendly atmosphere was established and the child was given general encouragement throughout the testing situation.

Testing Sessions

Two testing sessions for the four tests were organised for the

children. The PPVT-R, BURT and Isolated Word Test were individually administered in the first session, which lasted for 15 to 20 minutes. The order of the tests was the same for all children. The Contextual Facilitation Test was individually administered in the second session. This session occurred a week later and took 5 to 10 minutes to administer. The reason for the delay in the administration of the contextual facilitation test was to minimise the possible effects of prior exposure to the irregular words in isolation.

Tests Performed

(a) Peabody Picture Vocabulary Test-Revised (PPVT-R)

The PPVT-R was administered to the children in accordance with the instructions given in the PPVT-R manual. The PPVT-R was administered first because the test consisted of pictures which attracted the child's interest. Also, the simple pointing response required of the children was thought to make them feel more at ease in the test situation.

(b) BURT Word Reading Test

The modified BURT test was administered in a similar fashion to that in the handbook for the original BURT test. Again, the child's

personal details were recorded at the beginning, in order to give some relaxation time between the modified BURT and PPVT-R tests. An example of the record sheet for the modified BURT test is provided in Appendix E.

To make the child more actively involved in the modified BURT Test, they were provided with a blank card and asked to reveal the words one at a time. This enhanced the child's attention to the individual words and overall test participation.

The modified BURT test begins with the experimenter saying:

"On these card are some words I think you can read. Let's see which ones you know. Start with this word and pull this blank card down to the next word, after you have said the first word. When you reach the end of this card we will go onto the next one."

The child was given appropriate levels of praise from the experimenter as they proceeded through the test. Some examples were, "You are doing fine," or "good," or "well done that was a difficult word." Such praise provided general encouragement for the child to continue. Without some form of praise the children might not have given their best test performances.

When the child made ten consecutive word errors during the modified BURT test, the child was told to:

"Look over the rest of the words, and see if you can read anymore of the words off the rest of the cards."

As the words were arranged in the order of increasing difficulty, it was likely that the child had reached their word recognition limit. However, it was thought that the child should be given the opportunity to look at the rest of the words to see if any other words could be pronounced. The child was given every opportunity to attempt the maximum number of words presented, as some of the more difficult words might have been recognised after the child had made 10 successive errors.

No time limit was applied to the modified BURT test, so the child was not hurried. The child was able to use any method they chose to read the words. However, the experimenter did not prompt the child in any way about how to identify the words. The words were only scored correct by the experimenter when the child's pronunciation was correct, regardless of how the child's pronunciation was arrived at.

(c) Isolated Word Test

Before proceeding with the Isolated Word Test, a break was provided for the child by again filling out their personal details. The Isolated Word Test was presented on cards, in exactly the same way as the modified BURT test. The child was again actively involved in pulling the blank card down to identify each word. The aim was to focus the child's attention on single words, rather than on a whole list of words as in the study by Adams and Huggins (1985).

Interspersing high frequency words, and randomising the order of irregular words for the children was done for two reasons. Firstly, this broke up the easy to difficult irregular word format used by Adams and Huggins (1985), a procedure which could lead to a child's loss of attention to later words that might have been identified. Secondly, the inclusion of high frequency words provided the children with words they could readily identify, and thus retained a higher level of attention and motivation to continue.

A copy of one of the cards used in the Isolated Word Test and a copy of the record sheet is provided in Appendix G. All of the high frequency words included in the Isolated Word Test were only used as foils and were not scored. Each child also started at a different

point in the Isolated Word Test to avoid order effects: Child 1 at word 1; child 2 at word 4; child 3 at word 7 etc. The position the child started at in the Isolated word test also applied to the Contextual Facilitation test.

The oral instructions presented to the child were similar to those given in the modified BURT test. Praise was again given at appropriate times, so that the child did not take the praise for granted. For example, "good," "well done," or "you are doing fine" was given at appropriate times to encourage the children during the Isolated Word Test.

(d) Contextual Facilitation Test

The presentation and instructions for the Contextual Facilitation Test were different from those used by Adams and Huggins (1985). The children were provided with a practice card that included five sentences, each of which ended in a high frequency word for identification. The reason for using the practice card was to help settle the child down and put them at ease, and to prepare them for the actual Contextual Facilitation Test.

A copy of this sentence practice card for the children is provided in Appendix H. Because of the verbal-visual presentation of the test the

children were instructed as follows:

"On these cards are some sentences with words that I
think you know. I will read these words aloud, and point
to each one. The
word that I point to and do not say, I want you to tell me
what the word is. When you have reached the end of the
card we will continue to the next one."

The child again used the blank card to reveal the sentences one by
one, in order to focus their attention on the one sentence and target
word for identification. Again, praise was given when appropriate as
the child identifies words through the test. The irregular word order
of this test was the same as the isolated word test. However, the
irregular target word was presented in a sentence. The starting
word position for the child in the Contextual Facilitation Test was
the same as that in the Isolated word test. (The reason for using the
same irregular words for the tests as Adams and Huggins was based
on the fact that the words had already been previously piloted and
rigorously tested.)

The verbal-visual format for presenting the sentences for the
children to identify the irregular words differed from the procedure
used by Adams and Huggins (1985) who only provided a visual

context. The use of the verbal-visual format was aimed at reducing the load on children's short-term memory. This can arise from the effort a child puts into decoding the preceding words in the sentence before the target irregular word, and degrading any contextual facilitation effects, as suggested by Bentin, Deutsch and Liberman (1990). A copy of the record sheet, and a copy of a Contextual Facilitation Test card is provided in Appendix I. The context facilitation score for each child was derived by taking the Context Facilitation test score and subtracting the Isolated Word Test score.

CHAPTER FOUR

RESULTS AND DISCUSSION

Raw data on which this study's results are based is presented in Appendix J. Table 1 presents the means and standard deviations for the number of words correctly identified as a function of grade level (junior 2, standard 1, standard 2), condition (no context, context) and word block (blocks 1 through 5). The data were subjected to a 3(grade level) X 2(condition) X 5(word block) ANOVA. The results of the analysis indicated that there were main effects for grade level, F (2,110) = 27.12, p <.001; condition, F (1,110) = 488.70, p <.001; and word block, F (4,440) = 396.89, p <.001.

As indicated in Table 1, children's performance increased with increasing grade level, decreased with increasing word block, and was better when words were presented in context than in isolation. As expected, the more experienced readers performed better than the less experienced readers, words of lower frequency were more difficult to identify than words of higher frequency, (as indicated earlier, the higher the word block, the lower the frequency of the word it contains) and words presented in context were easier to identify than words presented in isolation.

Table 1.

Means and (Standard Deviations) for Words Correctly Identified as a Function of Condition and Word Block for each Grade Level.

Grade	Condition	Word Block				
		1.	2.	3.	4.	5.
Junior 2. (n=38)	No Context	1.74 (2.38)	1.42 (2.19)	1.08 (1.73)	.47 (1.13)	.34 (.63)
	In Context	5.76 (2.14)	4.58 (2.73)	3.24 (2.24)	.89 (1.47)	1.05 (1.09)
Standard 1. (n=39)	No Context	5.51 (3.82)	4.28 (3.32)	3.39 (2.95)	1.41 (1.90)	1.00 (1.19)
	In Context	7.97 (2.03)	7.67 (2.63)	6.46 (2.53)	3.10 (2.72)	2.26 (1.45)
Standard 2. (n=36)	No Context	6.05 (3.18)	5.08 (2.91)	3.72 (2.64)	1.50 (1.61)	1.08 (1.05)
	In Context	8.61 (1.23)	8.61 (1.83)	7.53 (2.02)	3.89 (1.99)	2.75 (1.42)

The ANOVA also revealed a significant grade level X condition interaction, $F_{(2,110)}= 3.33$, $p <.05$, and a significant grade level X word block interaction, $F_{(8,440)}= 12.16$, $p <.001$. As shown in Figure 1. the improvement due to context appears to increase somewhat with increasing grade level. The weak but significant interaction is most likely due to a tendency toward a floor effect at the lower grade levels. The decoding skills of some children in the lower grades are so poor that context provides little help.

FIGURE 1.

Mean Number of Words Correctly Identified

as a Function of Grade Level and Condition

◊ No Context   □ In Context
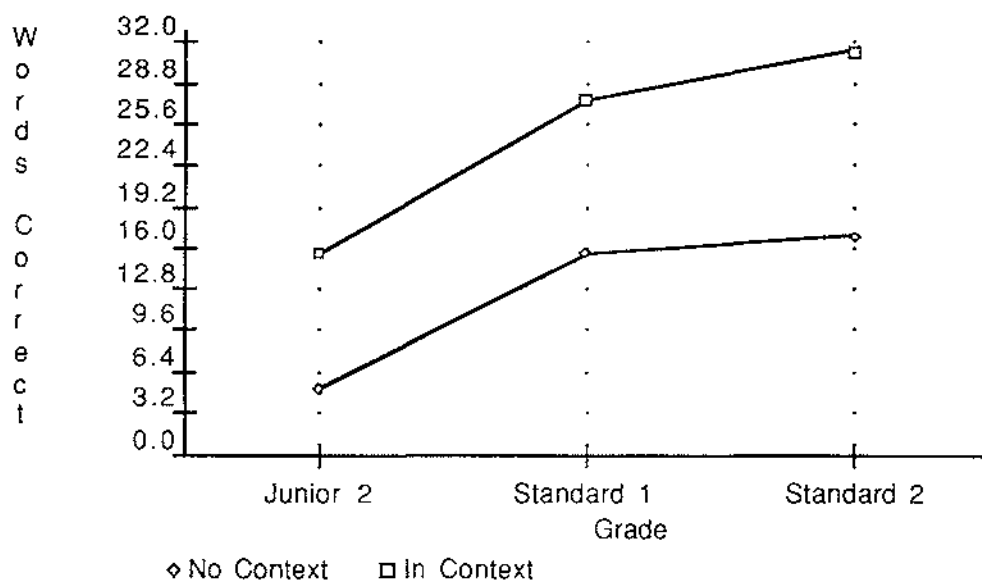
The means for the grade level X word block interaction are presented in Figure 2. Again, the interaction appears to be the result of a floor effect at the lower grade levels, especially junior 2. It is likely

that the sample of junior 2 children includes some children whose word recognition skills are so poor that they can only recognise higher frequency words.

FIGURE 2.

Mean Number of Words Correctly Identified

as a Function of Grade Level and Word Block.
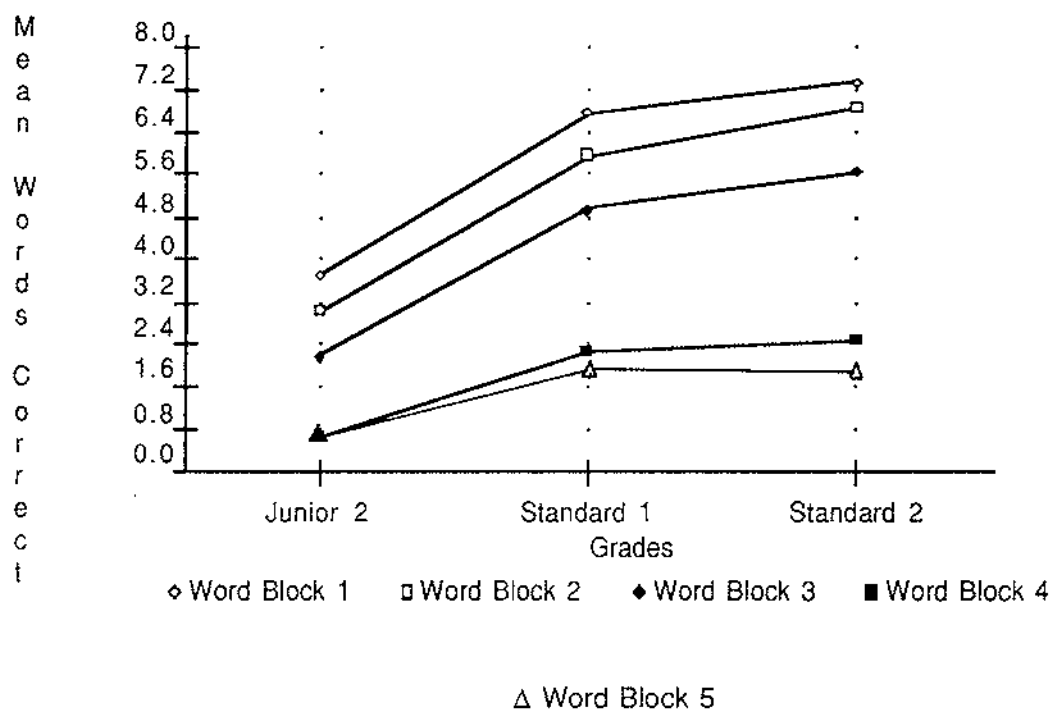
The ANOVA also indicated two further significant interactions, a condition X word block interaction, $F(4,440) = 41.92$, $p < .001$, and a grade level X condition X word block interaction, $F(8,440) = 7.53$, $p < .001$. As can be seen in Figure 3., the effects of condition decrease with increasing word block. As with the previous interactions, the

interaction most likely reflects a floor effect. Some words of lower frequency are so difficult to recognise that context provides little help. The grade level X condition X word block interaction indicates that this is especially true for junior 2 children.

FIGURE 3.

Mean Number of Words Correctly Identified

as a Function of Condition and Word Block for all Grades Combined.
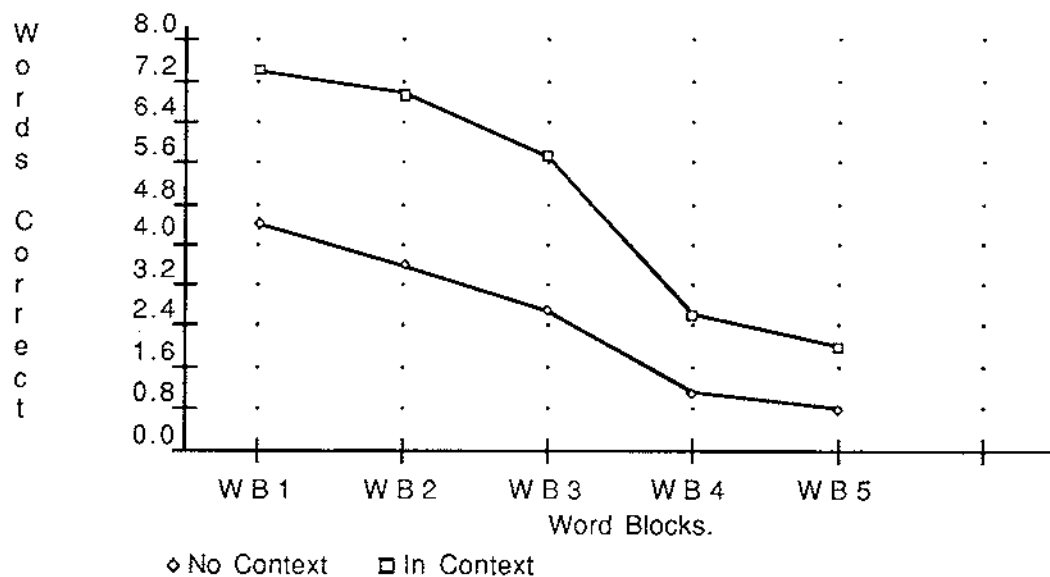
Figures 4a, 4b and 4c present the mean number of words correctly identified as a function of condition and word block for each grade level. As can be seen in Figure 4a, there is little effect of context

for words in word blocks 4 and 5. However, context effect does increase for the higher grades for these two word blocks.

FIGURE 4a, 4b and 4c.

The Mean Number of Words Correctly Identified

as a Function of Condition and Word Block for each Grade Level.

4a. Junior 2.

◇ No Context   □ In Context

4b. Standard 1.

Words Correct vs Word Blocks.

◇ No Context   □ In Context

4c. Standard 2

Words Correct vs Word Block

◇ No Context   □ In Context
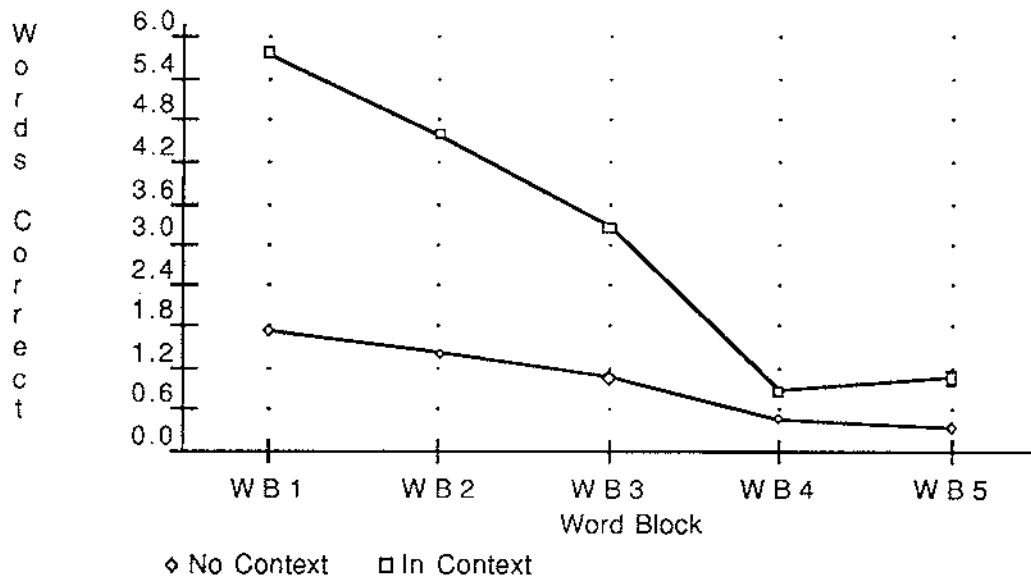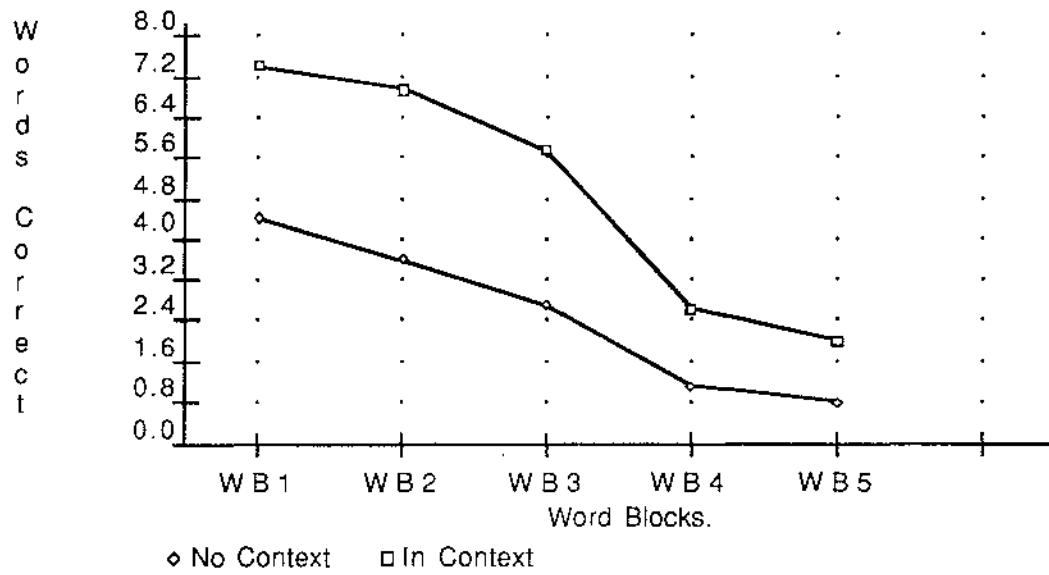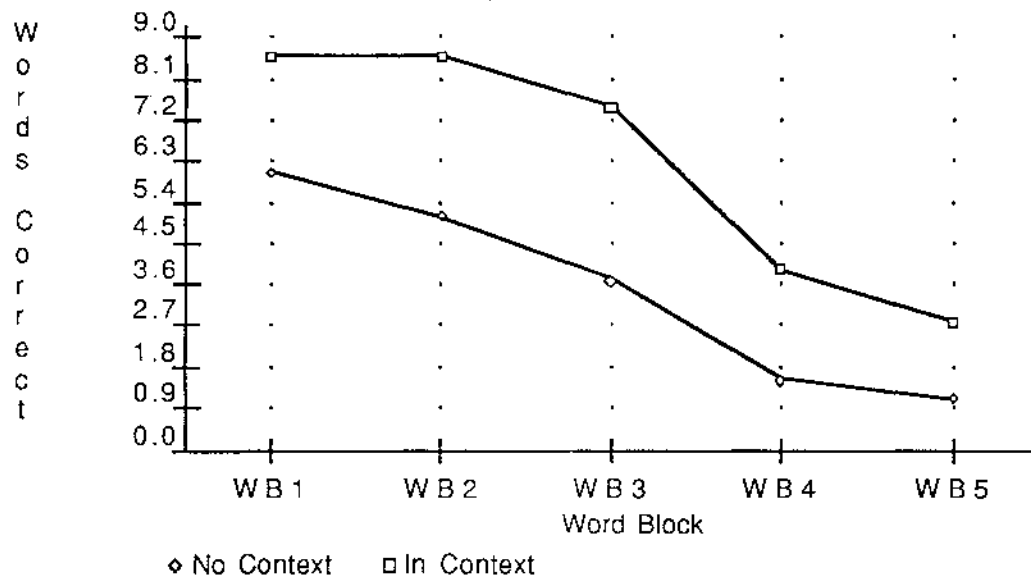
Table 2 presents the means and standard deviations for contextual facilitation as a function of grade level (junior 2, standard 1, standard 2), reading level (high, low) and word block (blocks CTIT 1 through CTIT 5). As indicated earlier, contextual facilitation is calculated from each child's context test score minus their isolated word test score.

<u>Table 2.</u>

Means and (Standard Deviations) of Contextual Facilitation for

Grade x Reading Ability (High and Low) x Word Block.

<u>Grade</u>	<u>Reading Ability</u>	<u>Word Block (CT-IT)</u>				
		<u>1.</u>	<u>2.</u>	<u>3.</u>	<u>4.</u>	<u>5.</u>
Junior 2	Low	4.30	2.85	2.15	.25	.50
	(n=20)	(1.78)	(1.98)	(1.46)	(.72)	(.89)
	High	3.72	3.50	2.17	.61	.94
	(n=18)	(2.16)	(3.50)	(1.69)	(1.15)	(1.00)
Standard 1	Low	4.05	4.43	3.67	1.19	1.33
	(n=21)	(2.01)	(2.48)	(1.53)	(1.37)	(.97)
	High	.61	2.17	2.39	2.28	1.17
	(n=18)	(1.09)	(1.86)	(1.24)	(1.78)	(1.25)
Standard 2	Low	4.27	4.67	4.72	2.50	2.06
	(n=18)	(1.87)	(2.52)	(2.02)	(1.72)	(1.43)
	High	.89	2.39	2.89	2.28	1.28
	(n=18)	(1.94)	(1.88)	(1.57)	(1.99)	(1.18)

The assignment of each child into a reading ability group, was determined from median split scores for the modified BURT test for each grade: junior 2 was 28; standard 1 was 48; and standard 2 was 44. The data were subjected to a 3(grade level) X 2(reading ability) X 5(word block) ANOVA.

The results of the analysis indicated that there were main effects for grade level, $F(2,107)= 4.47$, $p <.05$; reading ability, $F(1,107)= 22.83$, $p <.001$; and word block, $F(4,428)= 46.45$, $p <.001$. As indicated in Table 2., contextual facilitation increased somewhat with increasing grade level, decreased with increasing word block, and was higher for the low ability reader than the high ability readers.

The ANOVA also indicated a significant grade level X word block interaction, $F(8,428)= 8.89$, $p <.001$, and reading ability X word block interaction, $F(4,428)= 15.00$, $p <.001$. As shown in Figure 5., the readers in the higher grades utilise context less at the lower word blocks than the junior 2 children, but utilise context more at the higher word blocks than the junior 2 children.

FIGURE 5.

Mean Number of Words Correctly Identified from Context Effect

as a Function of Grade Level and Word Block.

◇ Junior 2   □ Standard 1   ◆ Standard 2
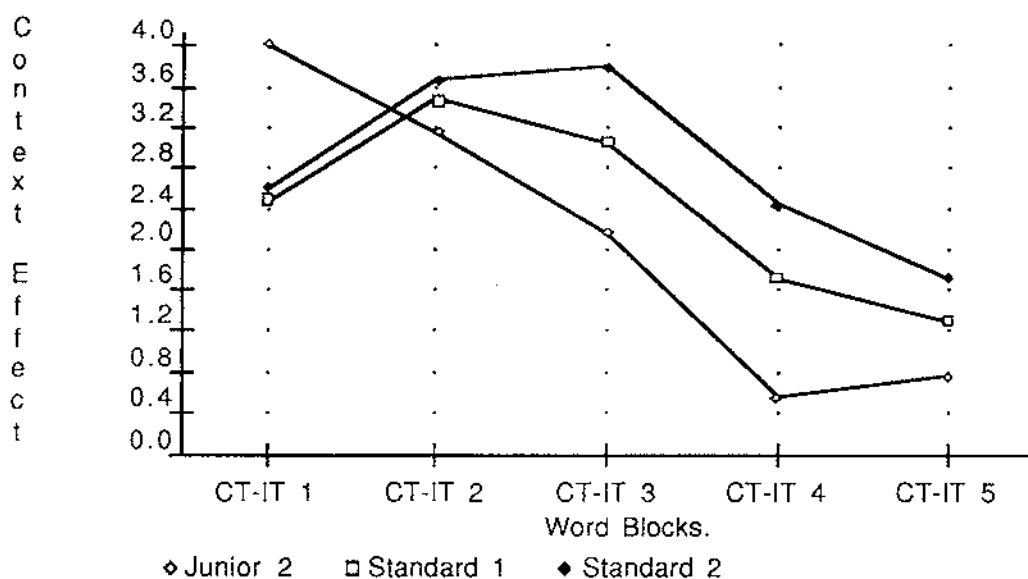
Figure 5. indicates that children in the standard 2 grade reached an intermediate point for contextual facilitation at word block 3; standard 1 reached an intermediate point at word block 2. This suggests that the easier word blocks are already recognisable to the children in these higher grades, compared to the junior 2 children who need context to recognise these easier words. The tendency towards floor effects occurs mainly for the junior 2 grade, where the decoding skills of some of the children are so poor that context provides little help in word identification.

The reading ability X word block shown in Figure 6. indicates that

the low ability group relies on context more than the high ability children up to Word block 3, after which contextual facilitation declines rapidly. Overall, the low ability children rely more on context than the high ability children because of their relatively poorer decoding skills. For very difficult words, context provides little help to either the low or high ability children.

FIGURE 6.

Mean Number of Words Correctly Identified from Context Effect as a Function of Reading Level and Word Block.

o Low Ability   □ High Ability
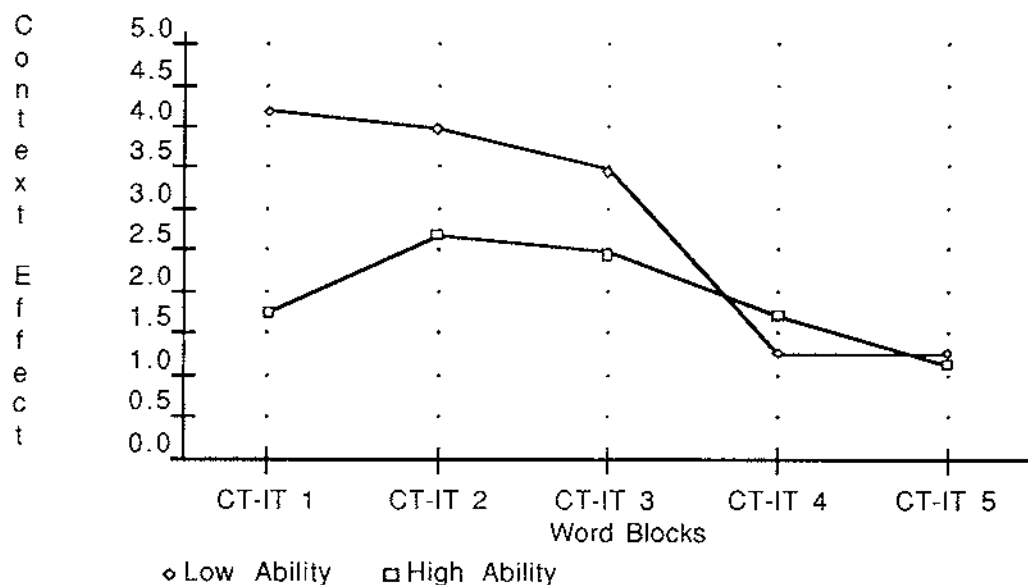
The ANOVA also indicated two further significant interactions, a grade level X reading ability interaction, $F_{(2,107)}= 8.66$, $p <.001$, and a grade level X reading ability X word block interaction, $F_{(8,428)}= 2.61$, $p <.01$. As can be seen in Figure 7. the difference in

contextual facilitation between ability groups increases with increasing grade level. The low ability children at increasing grade levels appear to rely increasingly on context to compensate for their poorer decoding skills.

FIGURE 7.

Mean Number of Words Correctly Identified from Context Effect as a Function of Grade Level and Reading ability.

◇ High Ability   □ Low Ability
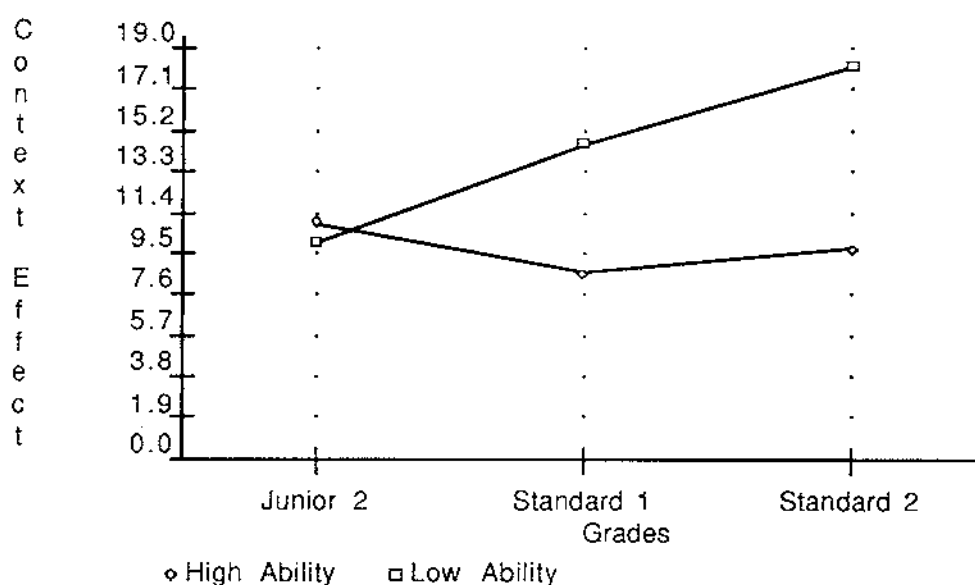
The grade level X reading ability X word block interaction indicates that the greater amount of contextual facilitation for the low ability readers in the higher grades comes from their performance on word blocks 1, 2, and 3. As noted earlier, for the most difficult words, context provides little help to either group of readers. This interaction can be seen in Figures 8a, 8b and 8c, where context effect occurs as a function of reading ability for each grade.

FIGURE 8a, 8b and 8c.

Mean Contextual Facilitation Effect as a

Function of Reading Ability and Word Block for each Grade Level.

8a. junior 2.

o Low Ability   □ High Ability

8b. standard 1.

o Low Ability   □ High Ability
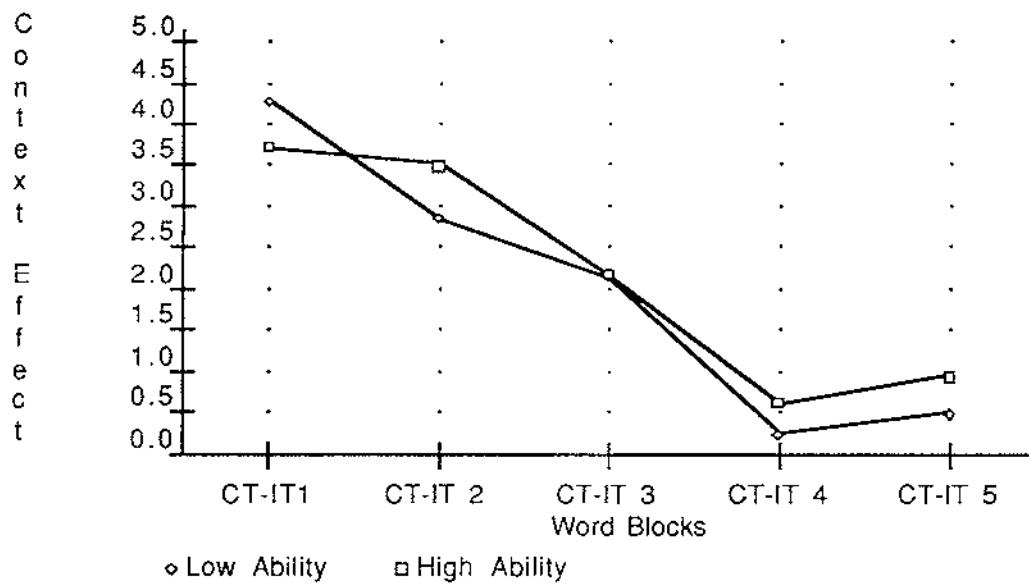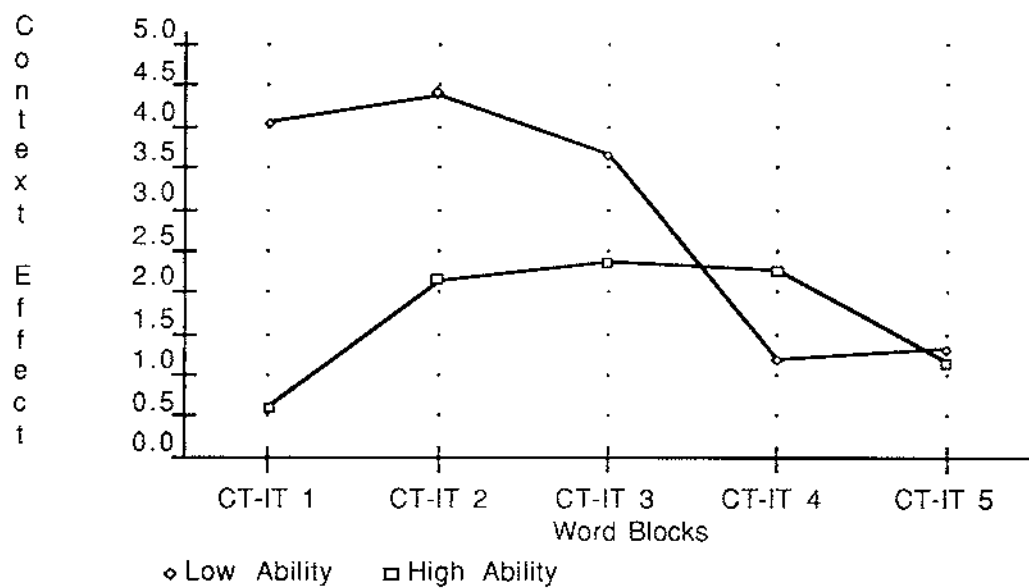
8c. standard 2.
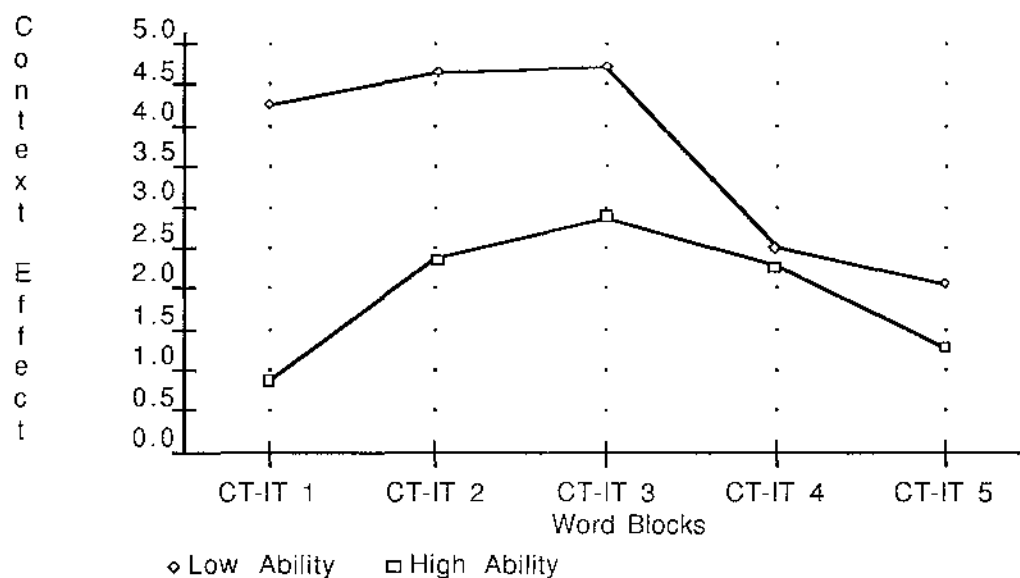
As can be seen in Figure 8a, there is little difference in context effect between the two ability groups in junior 2 which displays floor effects for word blocks 4 and 5. However, large differences exist between the two reading ability groups for standards 1 and 2 in Figures 8b and 8c respectively for context effect.

The low ability groups in these two grades utilise context more for the easier word blocks 1 to 3, but contextual facilitation drops off rapidly for word block 4 and 5. The high ability readers in these two grades exhibit a curvilinear form of word identification utilising context, moving from a low context effect in word block 1 to a low context effect in word block 5. The high ability reader's word recognition skills for high frequency words is so high that context is not needed for words in word block 1. However, context is utilised

in identifying progressively more difficult words (i.e., those in word blocks 2, 3, and 4). A decrease in word identification then occurs, where the words in blocks 4 and 5 are beyond the intermediate recognition range of the high ability reader.

Compared to the high ability readers who utilise context less for the easier words, a developmental lag in automatic word recognition occurs for the low ability readers. These readers rely on context more to identify easier words, and also for a longer period of time before automatic word recognition begins to establish itself. Overall these figures indicate a significant interaction between a child's reading ability and contextual facilitation.

Correlation between Mean Context Effect and Burt Scores.

The relationship between mean contextual facilitation and BURT scores for all grades was examined. The summary data for Mean Context Effect versus BURT score is presented in Table 3. Figure 9. presents the plot of the mean context effect with BURT scores for all the grades combined.

Table 3.

Mean Context Effect versus BURT Score for all Grades.

BURT Interval	Mean Context Effect
0-10	4.00
11-20	8.00
21-30	12.96
31-40	16.57
41-50	13.95
51-60	9.00
61-70	10.00
71-80	3.33
81-90	6.33
91-100	6.50

FIGURE 9.

Context Effect with BURT Raw Scores for all Grades.
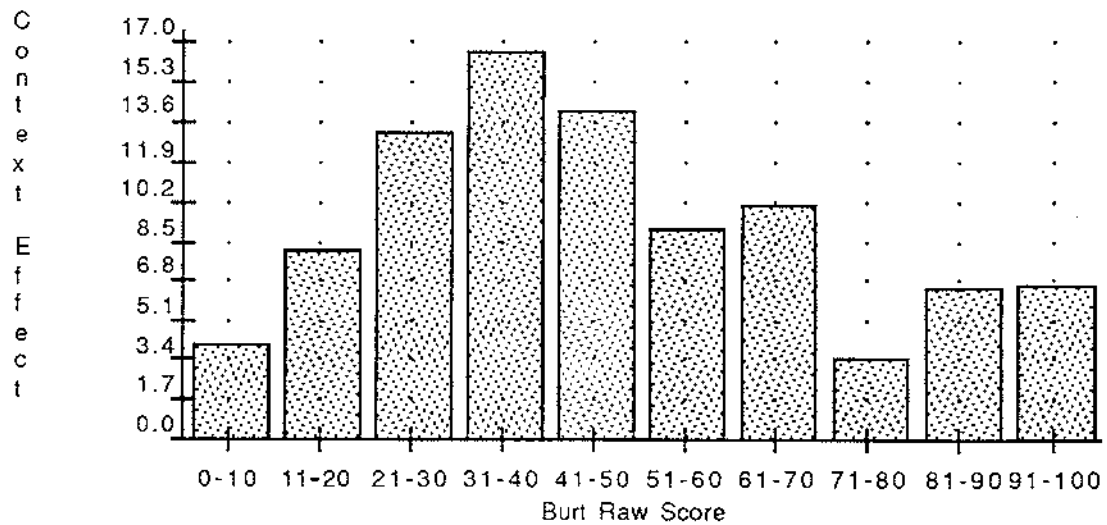
Burt Raw Score

Two series of truncated correlations were computed for context effect and BURT scores for all the grades. These correlations are presented in Table 4 below.

Table 4.

Correlations between Context Effect and BURT Raw Scores for all

Grades

at Intervals of Increasing and Decreasing Size.

BURT Interval (Raw Scores)	N	r	p	BURT Interval (Raw Scores)	N	r	p
10-100	113	-.26	.003	100-90	2	-	-
10-90	111	-.23	.008	100-80	5	.37	.270
10-80	108	-.18	.032	100-70	8	.72	.022
10-70	105	-.08	.200	100-60	22	.35	.056
10-60	91	.06	.290	100-50	34	-.27	.062
10-50	79	.33	.001	100-40	57	-.56	<.001
10-40	59	.57	<.001	100-30	84	-.56	<.001
10-30	36	.52	.001	100-20	106	-.42	<.001
10-20	8	.45	.140	100-10	113	-.26	.003

One truncation decreases by an interval of 10 BURT units from 10-100 to 10-20, while the other increases from 90-100 to 10-100. The results of the first truncation suggest an increasing movement away from poor BURT scores, due to the subjects' poor decoding skills, and hence poor context use. This reaches a significant correlation of .57 at the 10-40 interval. The correlations then steadily decrease, as the children's word decoding skills improve to a point, where context does not add more to their ability to identify words. This agrees with the view of Stanovich (1986), who argues that word decoding skills develop to a point that context is only used to a minor degree.

In the second truncation all the correlations are significant between context effect and Burt score except for the subjects with BURT scores between 100 to 80. At this end of the BURT scale the use of context by the subjects to identify more irregular words is low, because their decoding skills are so advanced that context is of little use.

The second series of truncated correlations support those of the first series, indicating that as the BURT score decreases, so does the context effect. Specifically, this would suggest that poor readers derive more contextual facilitation than good readers, which supports Stanovich's (1986) view. However, this is true only up to a

certain point, where the subject is able to use context to identify words, and not so poor in decoding that they are unable to use context to identify words. The scatterplot for mean context effect with BURT scores can be seen in Figure 10. for good and poor ability readers. This shows that poor readers who are so poor at word decoding from the BURT test also lack the ability to utilise context. When children from the poor reader group have acquired some decoding skills the use of context rises rapidly to support their weaker word decoding skills. The good readers use of context reflects the opposite situation, where context is relied on more heavily by those with weaker word decoding skills. However, the good readers who have very good word decoding skills rely on context much less, because the words are automatically recognised and identified. As a result, the good readers context effect scores drop off at the high BURT score level.

FIGURE 10.

Scatterplot: Context Effect with Raw BURT Scores for each Subject

from each Grade.

BURT Raw Score
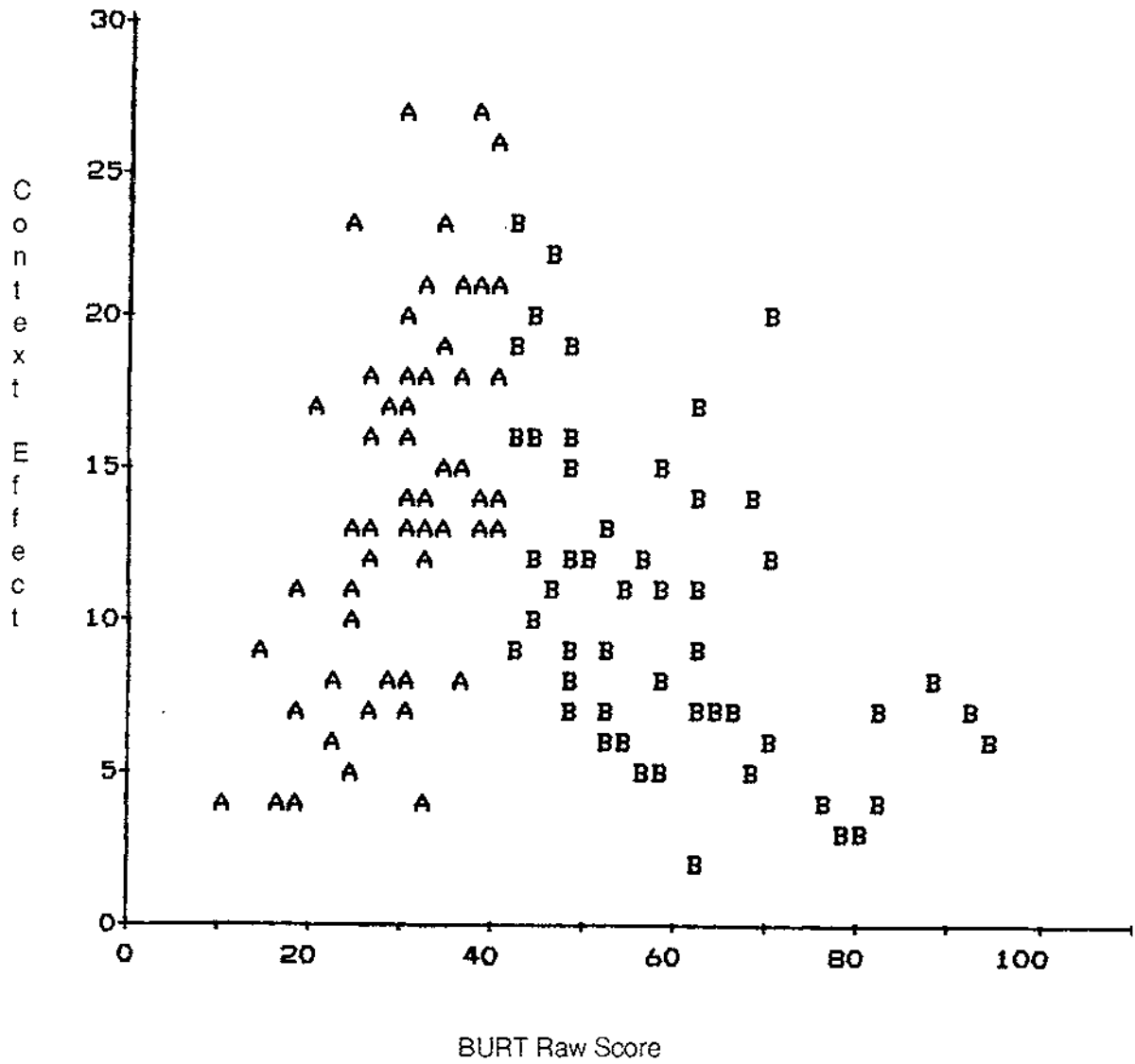
A= Low Ability Readers   B= High Ability Readers

Stepwise Regression Analysis.

To determine whether a negative curvilinear relationship exists

between the BURT score and contextual facilitation, a stepwise regression was performed. A second-degree polynomial regression equation accounted for a significantly greater amount of variance than the linear model alone, as shown in Table 5.

Table 5.

Summary of Multiple Regression Analysis Testing a Curvilinear Relationship between the BURT Raw Score and Contextual Facilitation.

Variable entered	R	Increase in R^2
1. BURT Score	.26	.07*
2. -(BURT X BURT)	.44	.12**

* $p < .01$

** $p < .001$

These results confirm those of the two series of truncated correlations. Children with very poor or very good decoding ability derive little benefit from context, whereas children with moderate levels of decoding skills appear to benefit from context.

CHAPTER FIVE

GENERAL DISCUSSION AND CONCLUSIONS

This study investigated two research questions: (1) What is the relationship between contextual facilitation effects and word decoding? and (2) How does the accuracy of recognising irregular words of varying difficulty change as a function of age and ability when the words are presented in isolation, and when they are preceded by context presented in a verbal-visual format? The specific hypothesis investigated was that prior context can increase children's word recognition, but only under certain circumstances.

Each individual section of the results will be discussed, and related to the research questions and hypothesis. It is proposed that a developmental pattern occurs in which word recognition ability progresses from non-recognition to automatic recognition. Poor readers initially utilise context less because of their poorer decoding skills. They may eventually utilise context but at a later point when compared to good readers. The results will also be compared to previous literature about contextual facilitation and word recognition. Finally, the limitations of the study and suggestions for future research will be discussed.

Initial Concerns

This study took account of several practical and research concerns. The first concern was the possibility of order effects between the Isolated Word Test and the Contextual Facilitation Test. Research by Adams and Huggins (1985), for example, used only five reading exercises between the two word tests for the children tested. In contrast, order effects were controlled for in this present study by ensuring that there was a time difference between the tests of a minimum of one week.

A second concern was the test format provided for the children by Adams and Huggins (1985) for both the Isolated Word Test and Contextual Facilitation Test. Whereas Adams and Huggins (1985) presented the items in an easy to difficult format, the present study used a randomly generated word order. The rationale for randomising word presentation was that this would help maintain children's attention as they would not encounter increasingly difficult words during the test.

A third concern was the visual format used by Adams and Huggins (1985)for their Contextual Facilitation Test. The difficulty that younger and poorer readers may have in reading the prior sentence context by only visual means may adversely affect their use of

context to identify the target words. To avoid this potential problem, the context preceding the target word was read aloud to the children.

Analyses

The results from the first analysis (Table 1) illustrated that a difference in contextual facilitation exists across the three grades tested. The Junior 2 children derive the most contextual facilitation for the simple word blocks. This is not unexpected, as the younger children's reading skills and vocabulary is in a period of rapid growth. The use of contextual facilitation by children for identifying words decreases as word decoding ability increases across grades. Therefore, context preceding the target word aids its recognition across all grades, but more so for the younger children, a finding similar to that reported by Adams and Huggins (1985). The assumption that less skilled and younger readers in general cannot use context has little support, because the utilisation of context is not a problem provided the sentence does not exceed the reader's decoding ability.

The verbal-visual presentation utilised by this study helped to avoid the problem of text demands exceeding the coding capacity of the Junior 2 children. This test presentation method reduced the level of

floor effects due to the inability to identify preceding words in the sentence, thus providing a more accurate picture of contextual facilitation within and between grades.

The floor effects that do exist are more indicative of children who have poor word decoding skills, where context does not aid word identification at all. The observed decrease in contextual facilitation across the simple word blocks for the higher grades (in Figures 4b and 4c), may reflect a word decoding ability related increase in familiarity with the target words in isolation. A similar pattern of results is reported by Adams and Huggins (1985). Apparently the improved phonological recoding skills of the older children enables them to use context to identify words in the higher word blocks.

Overall, the children in each grade utilise context to identify words. However, variance in the utilisation of context exists across grades, with less reliance on context being exhibited on the simpler words for the older grades. The utilisation of context to its maximum, shifts along the word blocks at the same time the child's phonological decoding becomes more efficient, up to the point where floor effects occur.

The use of the verbal-visual format reduces cognitive demands,

which allows the children to focus more on the target irregular word in the sentence. As a result, contextual facilitation in the higher grades is sustained further into the irregular word list. This finding is consistent with Adams and Huggins (1985), where tailing off in target word identification became more pronounced at word block 3, where floor effects began to occur.

Adams and Huggins (1985) propose a schema-theoretic model to account for the development of children's identification of words. This model consists of three stages: 1) Stage 1 is where the words do not have any useful internal representation of their orthography and cannot be identified; 2) stage 2 is transitional, where words cannot be totally identified in isolation, but require contextual support for identification; and 3) stage 3 is automatic word recognition for words in isolation. It is proposed here that a child's movement through the schema depends on the child's ability to use word decoding and context together, a view which is consistent with Adams and Huggins (1985).

Specifically, this study proposes three stages: 1) non-recognition, where words cannot be identified even with context support present; 2) intermediate, where context and decoding aid word identification, because the word may not be firmly established in the readers' memory to support automaticity; and 3) automaticity, where a word

is identified only by decoding. The use of irregular words in this study indicated more clearly where children's direct access to word identification falters. Therefore, the correct reading of irregular words in isolation indicates the the words are within the child's automaticity range and represented in memory.

The data presented in Table 1., Figures 4a, 4b, and 4c are similar to those reported by Adams and Huggins (1985), where the children in each grade progress to different positions in the irregular word list. The Junior 2 children rely heavily on context to identify the simple irregular words, but contextual facilitation rapidly drops off due to increasing word difficulty. The Standard 1 children's peak of contextual facilitation indicates a transitional shift for words of intermediate familiarity to word block 2. At this point context facilitates word identification the most, and then rapidly decreases. The point of maximum contextual facilitation shifts for Standard 2 children to word block 3 and then decreases. Therefore, as children get older a curvilinear relationship for contextual facilitation exists in word identification. This indicates that the children's ability to identify words in and out of context is important, and results in ability differences within and across grades. It appears that the bottom-up processes of automatic word decoding occurs for simple words in the automaticity stage. Words in the intermediate familiarity stage combine both top-down context processing and

bottom-up word decoding processes. Words that are beyond the child's intermediate range in the non-recognition stage cannot be recognised even with the aid of context.

Overall, the relationship that exists between contextual facilitation and word decoding appears to be symbiotic. The Junior 2 children rely on context more for simple word identification to begin with. Over time, this reliance on context to identify simple words decreases as automatic word decoding takes over. However, there are some children in the sample for whom context has no facilitating effect, apparently due their poor word decoding.

The second analysis in this study addresses the second research question concerning differences in contextual facilitation between high and low ability readers in each grade. The data (Table 2.) indicate that ability differences in the children's utilisation of contextual facilitation change with grade level. The data further indicate the point at which contextual facilitation fails to aid word identification with increasing word block difficulty. Overall, the use of contextual facilitation was higher for the lower ability readers for the easier words compared to the high ability reader's utilisation.

The significant reading ability X word block (CT-IT) interaction

(Figure 6.) indicates that the low ability group relies on contextual facilitation more up to word block 3 than the high ability group. The level of contextual facilitation then decreases rapidly after word block 3 for the low ability readers, and cannot assist their weak decoding skills, generating floor effects. However, the high ability readers exhibit a curvilinear relationship for contextual facilitation in word identification. This supports the movement of children through the stage pattern in word identification proposed by this study, from automaticity through decoding plus context for word block 3 to non-recognition for the high ability group.

The significant interaction of grade level X reading ability (Figure 7.), indicates a divergence in contextual facilitation between ability groups across grade levels. The Junior 2 grade appears to be the point where both ability groups utilise contextual facilitation to the same degree to identify words, and diverges as the groups approach Standard 1. The high ability group appears to have assimilated the simple words into the automaticity stage, while the low ability group still relies on contextual facilitation for simple word identification.

The significant interaction of grade level X reading ability X word block (CT-IT) (Figures 8a, 8b, and 8c.) indicates that the low ability readers in Standards 1 and 2 rely on context more to identify words

than the high ability readers in these grades, a finding that is consistent with Adams and Huggins (1985) results. Standard 1 low ability readers reach words of intermediate familiarity at word block 2. This intermediate contextual facilitation stage is reached by the low ability Standard 2 readers at word block 3. After both intermediate stage points for these grades are reached, the drop in contextual facilitation for word identification is large.

Both reading ability groups in the Junior 2 grade use context to a high degree to identify the simple words, which then rapidly decreases. As word identification across the word blocks is very similar for both reading ability groups in Junior 2, a starting point for ability differences to read effectively may exist, and hence a developmental lag may begin for the low ability readers.

The high ability readers in both Standards 1 and 2 exhibit similar curvilinear relationships in word identification. The stage pattern proposed for word identification exists across the word blocks, where the intermediate stage moves into the next word block with the increasing age of the children. As a result, more of the words in the simpler word blocks enter the automaticity stage as the high ability readers get older. The low ability readers in Standard 2 (Figure 8c.) utilise context to a higher degree to identify words up to word block 3, which then rapidly drops off. For the low ability

readers a developmental lag in reading ability would appear to begin from the results of this study at Junior 2, through Standards 1 and 2 and possibly into Standard 3 consistent with Stanovich's (1986) suggestion. However, the low ability readers may achieve a similar level of automatic word decoding ability, but delayed by 3 to 4 years.

The proposed developmental lag for automaticity in word identification appears to begin between the Junior 2 and Standard 1 grades. The low ability readers rely on context more to identify the simple words that the high ability readers have already assimilated into their automaticity stage of recognition. As a consequence, the low ability readers rely on context more for simple word identification for a longer time period compared to the high ability readers. Therefore, the ability to use context and basic word decoding skills together predicts children's word identification skills. By tracking the children's age and reading ability, it is then possible to measure their progress through the stage pattern in reading proposed in this study.

Correlational Analysis

To follow up the link between reading ability and contextual facilitation, a correlational analysis was performed using context

effect scores and BURT scores.

The correlation analysis combined all the children from the three grades, and two truncations were performed. The children who have low BURT scores (Figure 9.) are both poor decoders and poor context users. At the opposite end of the BURT scale the high ability readers have such good word decoding skills that they could identify most of the words without context, except for those few words in the intermediate stage of recognition. The good readers have in effect, acquired a significant sight vocabulary from more effective and automatic word decoding. This trend is consistent with Stanovich's (1986) view that good readers' decoding is so automatic and efficient that context is of little influence.

The central region of the correlation (Figure 9.) indicates that context use is associated with word decoding to assist word identification by children from all grades. The children in this central region are either advancing in their acquisition of sight vocabulary, or delayed and lag behind their age counterparts. When children move forward beyond this central region, their more efficient word decoding makes word identification more automatic, with more words entering the automaticity stage. Children lagging behind this central region in reading progressively rely on context more to identify words. This relates to how efficient the child's

word decoding actually is, and to whether the word will enter the intermediate stage, and finally to the automaticity stage of word identification.

Stepwise Regression Analysis

The stepwise regression analysis confirmed the relationship that exists between an individual's score on the BURT test and their context effect score. A second degree polynomial regression accounted for more of the variance than the linear BURT function. This provides general support for the view that a child who is poor in word decoding will be unable to utilise context to any great degree. The transient intermediate stage is characterised by children who possess word decoding skill, but use context to increase their word identification. Those children in the high end of the BURT scale have such advanced word decoding skills that context does not add much to their score. However, context is utilised to a minor degree to extend their word recognition into the non-recognition range.

Limitations of the Study

The results obtained in this study are similar to those of Adams and Huggins (1985). The minor differences which do occur between

studies may be due to different approaches to teaching reading to children, and slight vocabulary differences between the American and New Zealand dialects. The results overall, are only generalisable to the population of schools with similar population types, and similar methods of teaching reading to the children.

This study has attempted to overcome general technical problems of reading ability between groups, by presenting the context test in a verbal-visual format. This change in test format reduced the advantages the older readers may have had, in terms of memory and strategy skills over the younger readers. Therefore, the results only suggest that stage acquisition in vocabulary growth occurs, and that a developmental lag may exist for poor readers. The results would however, argue for a longitudinal study of three to four years to test for stage acquisition and developmental lag in children's reading.

Suggestions for Future Research

Results of the present study suggest that a separation between good and poor reader groups begins at the Junior 2 level. At the opposite end of the age range Standard 3` should be tested, as the difference between the good and poor readers' use of contextual facilitation may be considerably reduced. At the Standard 3 level the poor

readers may have more words in their sight vocabulary for automatic decoding, which results in less reliance on contextual facilitation for word identification. Consequently, the low ability Standard 3 readers' word identification pattern may decrease to a similar curvilinear relationship to that of the good readers.

The utilisation of a longitudinal study would allow the observation of the change in children's reading techniques across time. In this way, it would be possible to follow the actual movement of children through the different stages of reading acquisition rather than relying upon a comparison of children at different grades. The existence of the developmental lag could also be more accurately observed utilising a longitudinal study. If this approach was followed, three testing sessions would be required longitudinally for the children:1) The beginning of the school year; 2) mid-year; and 3) the end of the year. This would necessitate the development of multiple forms of the irregular word list in order to avoid re-test order effects.

Utilisation of larger samples of children is necessary to increase generalisability of findings. However, if this means different schools are used care should be taken to match them for reading methods and population types. Testing sessions for the samples should not be longer than one month overall, as too much movement

through the reading stages may occur for the children, thus confounding the results. A possible outcome could be the analysis of teaching reading techniques between school types, analysing which ones are effective and which ones are not in relation to the children's progression through the proposed stages of reading acquisition.

Conclusions

The results of this study suggests the existence of a stage pattern of sight word acquisition similar to that proposed by Adams and Huggins (1985). Apparently, however, children progress through this at different rates depending on their reading ability. The results of the correlational and regressional analyses revealed that there are some children whose word decoding skills are so poor that they cannot use context to read, while other children's decoding skills are so good that context does not add many more words, but context can be used if required. However, the intermediate range is the most important and suggests that there is an alliance between word decoding and context to assimilate new words into the child's knowledge base. As a result, progress into the automaticity stage of word acquisition can occur for the child. However, if the child's word decoding is so poor that context cannot be used, the result may be little or slow progress and a developmental lag in reading.

The use of a further longitudinal study for children's progression through the stages would confirm the existence of a developmental lag, where poor readers do rely on context more, provided their word decoding allows them to read text. The developmental lag is postulated between grades, but needs confirmation through the grades by studying individual children. It may be that these poor readers will reach a similar level of context free reading as the good readers, but only a longitudinal study will reveal this most accurately.

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Appendix A

Original Adams and Huggins Isolated Words and Sentence Context Tests.

This appendix provides the original unmodified isolated words and sentence context tests.

1.	ocean	26.	chorus
2.	iron	27.	scent
3.	island	28.	deaf
4.	break	29.	mechanic
5.	busy	30.	dough
6.	sugar	31.	rely
7.	touch	32.	ninth
8.	none	33.	react
9.	heights	34.	recipe
10.	whom	35.	pint
11.	tongue	36.	deny
12.	lose	37.	vague
13.	prove	38.	tomb
14.	rhythm	39.	drought
15.	truth	40.	trough
16.	stomach	41.	depot
17.	blind	42.	bough
18.	wounded	43.	bouquet
19.	calf	44.	aisle
20.	sweat	45.	ache
21.	sword	46.	yacht
22.	anchor	47.	chauffeur
23.	echo	48.	ukelele
24.	guitar	49.	suede
25.	veins	50.	fiance

The words were not numbered on the children's copy of the list.

The word "cookies" was changed to "biscuits," because the children would be more familiar with the English expression.

Adams and Huggins (1985).

The 50 test sentences in order of presentation.

1. The ship sailed across the ocean.
2. Mary burned her finger on the iron.
3. The girls rowed the boat to the island.
4. If you drop a cup, it might break.
5. Jane could not play because she was too busy.
6. I don't like tea without sugar.
7. The stove is hot so don't touch it.
8. Ann has two cookies, but Bill has none.
9. He stayed down because he was afraid of heights.
10. I didn't say "what," I said "whom."
11. The hot soup burned her tongue.
12. I like to play games but I hate to lose.
13. She was right but she couldn't prove it.
14. The music was loud and had a good rhythm.
15. The judge asked the man to tell the truth.
16. The football hit him in the stomach.
17. Susan read to the old man because he was blind.
18. The deer was alive but badly wounded.
19. At the farm we saw some pigs and a calf.
20. The hot sun made Joan sweat.
21. The knight killed the dragon with a sword.
22. The crew dropped the ship's anchor.
23. He shouted, and waited to hear the echo.
24. She sang while he played the guitar.
25. Your blood flows through your veins.
26. Sally loved to sing so she joined the chorus.
27. The dogs followed the rabbit's scent.
28. She didn't hear the bell because she was deaf.
29. My father took the car to a mechanic.
30. The baker made cookies with the dough.
31. A friend is someone you can rely on.
32. Jeff won the race and Tim came in ninth.
33. I shouted at him but he didn't react.
34. Father baked the cake from this recipe.

35. We both wanted ice cream so we <u>bought</u> a pint.

36. If you ask mother nicely, she won't <u>deny</u> you.

37. Her memory of what happened was <u>vague.</u>

38. The hero lay in an unmarked <u>tomb.</u>

39. The corn died during the <u>drought.</u>

40. The horse drank from a <u>trough.</u>

41. The train pulled into the <u>depot.</u>

42. The little bird perched on the <u>bough.</u>

43. The flowers were tied in a pretty <u>bouquet.</u>

44. The pretty girl sat across the <u>aisle.</u>

45. Lifting heavy boxes will make your back <u>ache.</u>

46. They sailed across the bay on their <u>yacht.</u>

47. The general's car was driven by a <u>chauffeur.</u>

48. He strummed a tune on his <u>ukelele.</u>

49. Her jacket and shoes were both made of <u>suede.</u>

50. She wrote a love letter to her <u>fiance.</u>

The test words were not underlined or numbered during the test.

The American word <u>cookies</u> was changed to <u>biscuit</u> in my study, because the children would be familiar with the English expression.

Appendix B.

Parental Permission

This appendix contains a copy of the letter sent to parents requesting permission for their child to take part in the study, and also a copy of the permission return slip.

WESTOWN SCHOOL

Dear _____

Parent Approval

* Mr. Justin Hyde has made contact with Westown School.

* He is a Master of Education student at Massey University.

* He is currently doing research into how children use context in learning to read.

* We think that this research will eventually prove useful to New Zealand teachers.

* He would like to interview _____ twice.

* This interview will check out some aspects of your sons/daughters reading. It will take about twenty minutes.

* The interviews will be conducted in Room 2 under Miss. Spurway's supervision.

Name _____ Phone _____

I approve of _____ taking part in Mr. Hyde's research as described above.

signed _____

Appendix C.

Original BURT Test Format.

This appendix contains the original form of the BURT test to assess children's word reading ability. This original format was not used in the present study but was modified (indicated in Appendixes D and E) for the children to account for confounding variables that may exist. For example, loss of the children's attention from too many words of differing difficulty being presented all at once.

to   is   up   for   big
he   at   one   my   sun

went   girl   boys   day   some
his   that   of   an   wet

love   water   no   just   pot
or   now   things   told   sad

carry   village   quickly   nurse   beware
return   scramble   twisted   journey   luncheon

Known   shelves   explorer   tongue   projecting
terror   serious   belief   events   emergency

refrigerator   steadiness   obtain   overwhelmed   universal
nourishment   encyclopaedia   commenced   circumstances   fringe

formulate   motionless   trudging   theory   destiny
scarcely   exhausted   labourers   urge   atmosphere

apprehend   binocular   domineer   melodrama   economy
ultimate   reputation   humanity   excessively   philosopher

autobiography   contemptuous   terminology   mercenary   glycerine
unique   microscopical   perpetual   efficiency   influential

perambulating   renown   physician   champagne   exorbitant
hypocritical   atrocious   constitutionally   contagion   palpable

melancholy   eccentricity   fatigue   phlegmatic   fallacious
alienate   poignancy   phthisis   ingratiating   subtlety

Appendix D

Modified BURT Test Format Example Card

In this appendix is an example of one of the cards presented to the children containing the BURT words in the modified format, which consisted of five words per card all in large print. In the modified BURT format the child held a blank card over the test card moving this card down to reveal one word at a time. The reason for this modification was to retain the child's attention on single words without other distracting words around it.

to

is

up

for

big

Appendix E

Modified BURT Test Record Sheet.

This appendix contains the record sheet for scoring the children's responses to the Modified BURT test. The children's responses to the test words are scored: correct, wrong or don't know.

RECORD SHEET (Modified BURT Test).

NAME: SCHOOL:
SEX: CLASS:
AGE: yrs.   mths.

WORD.	WORD.	WORD.	WORD.
to	carry	formulate	perambulating
is	village	motionless	renown
up	quickly	trudging	physician
for	nurse	theory	champagne
big	beware	destiny	exorbitant
he	return	scarcely	hypocritical
at	scramble	exhausted	atrocious
one	twisted	labourers	constitutionally
my	journey	urge	contagion
sun	luncheon	atmosphere	palpable
went	known	apprehend	melancholy
girl	shelves	binocular	eccentricity
boys	explorer	domineer	fatigue
day	tongue	melodrama	phlegmatic
some	projecting	economy	fallacious
his	terror	ultimate	alienate
that	serious	reputation	poignancy
of	belief	humanity	phthisis
an	events	excessively	ingratiating
wet	emergency	philosopher	subtlety
love	refrigerator	autobiography	
water	steadiness	contemptuous	
no	obtain	terminology	
just	overwhelmed	mercenary	
pot	universal	glycerine	
or	nourishment	unique	
now	encyclopaedia	microscopical	
things	commenced	perpetual	
told	circumstances	efficiency	
sad	fringe	influential	

Correct= √ Wrong = X Don't Know =   DK
Score: =   =   =

Appendix F

The Clay Test Words.

This appendix includes the list of Clay words, from which 26 were randomly selected for inclusion in the Isolated Word Test for the children.

LIST A	LIST B	LIST C
Practice Word	Practice Word	Practice Word
the	said	i s
I	and	Father
Mother	to	come
are	will	f o r
here	look	a
me	he	you
shouted	up	at
am	like	school
with	in	went
car	where	get
children	Mr.	w e
help	going	they
not	big	ready
too	go	th i s
meet	let	boys
away	on	please

Appendix G

Isolated Word Test Example Card and Record Sheet.

Appendix G includes an example card from the Isolated Word Test used in this present study to test the children's automatic word recognition. The Isolated Word Test order was modified from the Adams and Huggins (1985) format of easy to difficult words by randomisation of the words to retain the children's attention. Twenty six high frequency Clay Words were also included to retain the children's attention and allowing them to read words that would be familiar and easy to identify. The Clay words were underlined only on the record sheet and used only as foils in the test for the children.

Again, as in the modified BURT test the children were presented with one test card at a time, and revealed the words singularly with the blank card for identification. As a result, retaining the children's attention on the word in front of them, and not, as Adams and Huggins (1985) presentation, with the whole list of 50 words presented at once.

look

sweat

whom

going

wounded

ocean

with

ISOLATED WORD TEST RECORD SHEET.

NAME: SCHOOL:

SEX: CLASS:

AGE: yrs.   mths.

WORD.	WORD.	WORD.
look	deaf	pint
sweat	in	rhythm
whom	calf	boys
going	island	bouquet
wounded	car	guitar
ocean	chauffeur	please
with	blind	
touch	help	
react	vague	
he	ukelele	
ache	I	
ninth	none	
father	stomach	
scent	me	
veins	drought	
here	break	
fiance	shouted	
mechanic	recipe	
get	yacht	
bough	children	
chorus	lose	
will	prove	
tongue	up	
iron	tomb	
where	rely	
suede	and	
sugar	busy	
let	depot	
dough	to	
sword	echo	
away	trough	
anchor	meet	
heights	truth	
go	aisle	
deny	big	

IRREGULAR WORDS: Correct=√ Wrong= X Don't Know = DK.

Score: =   =   =

Appendix H

Practice Card Example for the Context Facilitation Test.

This appendix includes the practice sentence card presented to the children for the Context Facilitation Test. The sentences included on this card contain a target high frequency word from the Clay Test. This card was used before proceeding into the Context Facilitation Test to prepare the children for the Contextual facilitation Test target word identification routine. This preparation routine for the children was not carried out by Adams and Huggins (1985). The routine for the Contextual Facilitation Test for the children was also altered. In this test the experimenter pointed to and said each word that was in the sentence, except for the target word which was pointed to and not said. This was the cue for the child to say what they thought the word was. Again, retention of the children's attention was important in this test. Therefore, blank card utilisation by the children as in the BURT and Isolated Word Test occurred, with the children revealing one sentence at a time, and not all the sentences at once in the test.

On the following page is the practice card used by the children for target word identification. However, on the actual test cards the target words were not underlined.

The children bought bread and <u>milk.</u>

Mum has gone up to the <u>shop.</u>

I can see the red <u>car.</u>

I have a big dog at <u>home.</u>

The boy is riding his bike to <u>school.</u>

Appendix I

Contextual Facilitation Test Example Card and Record Sheet.

This appendix includes an example card from the Contextual Facilitation Test and the record sheet for scoring the children's responses. The procedure was the same as that for the practice sentence card, where the experimenter pointed to and said each word up to the target word for the children. At this point, the child had to provide a response to the target word and scored accordingly. The randomised word order format for the Contextual Facilitation Test was the same as the Isolated Word Test for the children.

The hot sun made Joan sweat.

I didn't say "what," I said "whom."

The deer was alive but badly wounded.

The ship sailed across the ocean.

The stove is hot, so don't touch it.

IRREGULAR WORDS IN CONTEXT TEST RECORD SHEET.

NAME: SCHOOL:
SEX: CLASS:
AGE: yrs.   mths.

TARGET WORD.   TARGET WORD.

sweat   island
whom   chauffeur
wounded   blind
ocean   vague
touch   ukelele

react   none
ache   stomach
ninth   drought
scent   break
veins   recipe

fiance   yacht
mechanic   lose
bough   prove
chorus   tomb
tongue   rely

iron   busy
suede   depot
sugar   echo
dough   trough
sword   truth

anchor   aisle
heights   pint
deny   rhythm
deaf   bouquet
calf   guitar

CORRECT=√   WRONG = X   DON'T KNOW=DK
              =   =   =

Appendix J

Children's Raw Score Data.

This appendix includes: The child's sex, either (M) male or (F) female; their age in years; and all the raw score data for the BURT Word Reading Test, the Isolated Word Test (IWT), the Contextual Facilitation Test (CXT), and the contextual facilitation score (CXT-IWT) for each child.

Grade: Junior 2.

SEX	AGE	BURT	IWT	CXT	CXT-IWT
M	6.58	13	0	9	9
M	6.58	16	0	4	4
M	6.58	17	0	4	4
M	6.25	22	0	8	8
M	6.58	23	0	5	5
M	7.17	24	0	11	11
M	7.25	28	0	17	17
M	6.50	10	1	5	4
M	6.92	18	1	5	4
M	7.08	18	1	8	7
F	6.08	23	1	24	23
F	6.25	26	1	17	16
M	6.67	28	1	9	8
M	6.75	30	2	15	13
M	7.00	17	2	13	11
M	6.92	24	2	12	10
M	6.75	25	2	14	12
M	6.83	25	2	14	12
F	7.00	26	2	9	7
M	6.92	29	2	9	7
M	6.42	30	2	15	13
F	6.83	36	2	10	8
F	6.92	25	3	21	18
M	7.08	23	3	16	13
F	6.33	31	5	9	4
F	7.00	35	5	20	15
F	6.25	41	5	21	16
M	6.67	32	6	19	13
M	6.17	33	6	19	13
F	6.67	32	8	20	12
M	6.25	39	7	20	13
M	6.42	46	8	19	11
F	6.67	43	10	20	10
F	6.33	57	14	29	15
F	6.42	43	15	27	12
M	6.50	52	19	25	6
F	6.42	62	20	29	9
F	6.50	81	35	42	7

137

Grade: Standard 1.

SEX	AGE	BURT	IWT	CXT	CXT-IWT
M	8.00	20	0	17	17
M	7.42	24	0	5	5
F	7.83	29	0	16	16
M	7.25	30	0	17	17
M	7.75	22	1	7	6
M	7.25	30	1	15	14
M	7.42	31	1	22	21
F	8.00	25	2	15	13
M	7.83	30	3	11	8
M	7.92	30	2	22	20
M	8.17	35	2	20	18
F	7.92	37	7	28	21
F	7.25	32	8	22	14
F	7.67	33	8	23	15
M	7.83	41	8	31	23
M	7.50	47	11	30	19
F	7.42	48	13	29	16
F	7.42	41	14	23	9
F	7.67	47	15	30	15
M	7.83	43	16	28	12
F	7.58	48	17	26	9
M	7.25	49	19	31	12
F	7.58	56	19	31	12
F	7.50	51	20	27	7
M	7.08	62	20	27	7
M	7.42	54	22	33	11
M	7.50	61	22	39	17
F	7.50	58	24	32	8
M	7.92	68	24	38	14
M	7.92	51	26	35	9
M	6.75	62	26	40	14
F	7.83	57	27	32	5
F	7.75	56	28	33	5
F	7.25	62	28	30	2
F	7.50	69	29	35	6
F	7.08	92	33	40	7
M	7.33	75	36	40	4
M	7.08	88	36	44	8
M	7.33	93	40	46	6

Grade: Standard 2.

SEX	AGE	BURT	IWT	CXT	CXT-IWT
F	9.00	29	0	13	13
M	8.33	31	1	19	18
M	9.17	30	3	21	18
F	8.75	38	3	30	27
F	8.75	25	4	17	13
M	8.67	29	6	33	27
M	8.67	33	5	24	19
M	8.92	36	7	28	21
M	9.17	34	9	32	23
M	8.08	39	8	34	26
M	8.58	40	8	26	18
M	8.42	40	9	30	21
M	8.58	45	9	31	22
M	8.25	43	11	27	16
M	8.50	43	13	33	20
M	9.08	37	12	28	13
F	8.08	37	16	30	14
F	8.00	40	16	30	14
F	8.83	42	16	35	19
F	8.33	46	19	30	11
M	8.33	69	20	40	20
F	8.00	51	21	34	13
F	8.42	47	23	30	7
M	8.25	62	23	34	11
F	8.50	53	24	30	6
F	8.17	48	25	37	12
F	8.83	63	25	32	7
M	8.92	57	26	37	11
M	8.92	62	26	35	9
F	8.17	68	28	33	5
M	8.42	69	28	42	12
M	9.00	48	31	39	8
F	8.17	66	31	38	7
F	8.17	77	34	37	3
M	8.25	79	35	38	3
F	8.58	81	36	40	4