

SUBMITTED BY:

Barbara Blenheim McKovic

APPROVED BY:

Suma L. Begg 12/23/82
Thesis Advisor Date

Frances Mowrey 12/23/82
Second Faculty Reader Date

Robert S. Fable 12/29/82
Chair, Graduate Policies Committee Date

THE USE OF CONTEXT AS A WORD RECOGNITION
STRATEGY BY EDUCABLE MENTALLY
RETARDED CHILDREN

THESIS

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Barbara Blossom-McRorie

State University College at Brockport
Brockport, New York

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Abstract

The purpose of this study was to compare the performance of educable mentally retarded children with that of children of average or above average intelligence in the ability to use context as a word recognition strategy. An additional purpose was to determine if a significant difference exists in the performance of language-impaired and non-language-impaired retarded subjects in this ability. Eleven second graders of average or above average intelligence and seventeen educable mentally retarded students from intermediate and junior high school classes participated in the study. Six of the retarded subjects were language-impaired; the other 11 had language development commensurate with their mental ages. All of the subjects scored within the 2.1 to 3.7 grade level range, as tested by two subtests of the Woodcock Reading Mastery Tests. The ability to use context was measured by a series of syntagmatically related word pairs in which the second word contained only minimal orthographic information. Single-factored analyses of variance were run on the data with respect to targeted responses, acceptable responses and total (targeted plus acceptable) responses. Analyses of the data failed to reveal any significant differences in the abilities of the three groups to use context. The language-impaired retarded sample did appear to perform slightly lower than the other two groups in targeted plus acceptable response category, but this difference was not statistically significant. These findings suggest that educable mentally retarded students can use context for word recognition as

effectively as nonretarded students reading at the same grade level, and that language-impaired EMR students may be slightly less proficient in this skill. Further research could continue to explore context utilization by the retarded, especially with respect to differences within the EMR population.

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Chapter 1

Statement of the Problem

Purpose

The primary purpose of this study was to compare educable mentally retarded (EMR) children's performance in using context as a word recognition strategy with that of children of average or above average intelligence. A second purpose of this study was to determine if there is a significant difference in the performance of language-impaired and non-language-impaired EMR subjects in using context as a word recognition strategy.

Need for the Study

Utilization of context clues has long been regarded as an important reading skill. Recently there has been renewed interest in readers' use of context as a word recognition technique. Smith (1973) states that the efficient reader's preferred strategy for recognizing unfamiliar words is to guess with the aid of semantic and syntactic information from the passage. Goodman (1976) contends that proficient readers rely mostly on semantic and syntactic cues, using graphophonic cues only when the former are not sufficient. The efficient reader instinctively learns to use these cuing systems, despite the method of reading instruction.

What about the mentally retarded reader? Does he instinctively learn to use syntactic and semantic cuing systems for word recognition? Jordan (1969) contends that most teachers of retarded emphasize either

phonics or sight word recognition, placing only minor emphasis on comprehension. As a result, retarded children, who often tend to use only those strategies directly taught, may not perceive of reading as obtaining meaning from print. It would follow, therefore, that mentally retarded students might be less likely to use context clues.

Research in this area has yielded mixed results. Studies by Ramanauskas (1972) and Allington (1980) have shown that educable mentally retarded (EMR) pupils do use some context while reading. Samuels, Dahl, and Archwamety (1974) demonstrated that EMR students can be trained to use context to decode unfamiliar words. Research, therefore, does indicate that retarded children can make use of at least some context for word recognition purposes. However, when EMR students are compared with pupils of average intelligence in their ability to use context, the research is inconsistent.

It appears that EMR students are less efficient users of context than nonretarded students of the same chronological age (Hargis, 1972; Semmell, Barritt, & Bennett, 1970). However, research in which EMR pupils are compared with average-IQ pupils of similar mental or reading age (but lower chronological age) has yielded conflicting results. A number of studies (Dunn, 1954; Goodstein, 1970; Semmell, Barritt, & Bennett, 1970; Shotick, 1960; & Smith, 1978) have demonstrated that low-IQ readers use context clues less effectively than average-IQ readers. On the other hand, studies by Levitt (1970) and Streib (1977) found no significant difference between retarded and nonretarded children on context utilization.

Several factors may be operating to produce these varying results. One is that several measures of context utilization have been employed by researchers, each of which may, in actuality, test a slightly different skill (Streib, 1976-77). Another is that researchers have tended to classify educable mentally retarded children as a homogeneous group, when in reality, they are a very diverse population. Research by Sheperd (1967) demonstrated that differences in reading ability exist within an EMR sample and that reading adequacy (based on mental age) is correlated with the ability to use context clues. It is the contention of this writer, based on observation, that EMR students who have an additional language impairment have much more difficulty using context to decode words than those whose language ability is commensurate with their mental age.

Further research is needed to determine if EMR students are able to use context as a word recognition strategy as effectively as nonretarded students of similar reading ability. In addition, research needs to take a closer look at the differences within the EMR population, and at how such differences may affect retarded students' ability to use context. The following study was conducted not only to add to the research comparing EMR readers with those of average intelligence in the use of context clues, but also to study the effect the variable of language facility might have on EMR students' ability to use context.

Questions to be Answered

1. Given a set of syntagmatically-related word pairs of high associative strength, the target nouns having only partial orthographic

information, will there be a statistically significant difference between the educable mentally retarded (EMR) children's ability to generate the targeted or acceptable word as compared with the ability of children of average or above average intelligence ($\bar{X}_1 > \bar{X}_2$)?

2. Within the educable mentally retarded sample (EMR), is there a statistically significant difference between those with language impairment (EMR-LI) and those without language impairment (EMR-NLI) in the ability to generate the targeted or acceptable word?

3. Is there a statistically significant difference between the performance of the educable mentally retarded children who are not language impaired (EMR-NLI) and the performance of the children of average or above average intelligence ($\bar{X}_1 > \bar{X}_2$) in the ability to generate the targeted or acceptable word?

Definition of Terms

Educable mentally retarded: "Mental retardation refers to significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behavior and manifested during the developmental period" (Grossman, 1973, p. 5). In New York State, children within the intelligence quotient (IQ) range of 50 to 75 are generally regarded educationally, as educable mentally retarded (New York State Education Department, 1978).

Language impaired: For the purpose of this study, language impairment will refer to verbal functioning significantly below the expectancy level as determined by the child's mental age, as judged by

a speech/language therapist. Students classified as language impaired will be those receiving language therapy under the direction of a speech/language therapist.

The use of context for word recognition: The use of semantic and syntactic information in the reading of a target word. The student may or may not be able to read the target word in isolation. However, it is a word in the pupil's oral receptive vocabulary.

Syntagmatically-related word pairs: Word pairs in which the association is sequential. For example: black cat; red light.

Paradigmatically-related word pairs: Word pairs in which the words are of the same grammatical form class. For example: black, white; on, off.

Summary

The use of context clues as an aid in word recognition has been identified as a strategy used frequently by the most efficient readers. Educable mentally retarded children have been found to be able to use some context for word recognition purposes, but the research is equivocal as to whether EMR students can use context as well as nonretarded children of similar mental and/or reading ages. In addition, some research indicates that there may be differences within the EMR population with regard to the use of context clues. It was the purpose of this study not only to investigate differences between EMR and average to above average children with respect to ability to use context clues, but also to study differences within the EMR sample.

Chapter II

Review of the Literature

Purpose

The purpose of this investigation was to compare the performance of educable mentally retarded (EMR) children with that of children of average or above average intelligence ($\bar{X}_1 > \bar{X}_2$) in the ability to use context as a word recognition strategy. A second purpose was to determine if a significant difference exists in the performance of language-impaired (EMR-LI) and non-language-impaired (EMR-NLI) retarded subjects in this ability.

Introduction

Word recognition is a skill which is essential to the reading process. Hours of instruction are devoted to developing this skill in the primary grades. Even at the intermediate level, students are still learning to develop various word recognition strategies. Among the methods available to readers for identifying unknown words is the use of context clues.

Context utilization not only aids in the identification of unfamiliar words, it also speeds the recognition of words which are in the reader's sight vocabulary, thereby increasing reading rate. Readers who are unable to use context to anticipate words and/or phrases often read in a methodical word-by-word fashion. Although word-by-word reading is common during the early stages of reading instruction

(Ekwall, 1977), as the reader matures he learns to process written material more efficiently.

Soloman and Postman (1952), as cited in Samuels, Begy, and Chen (1975-76), proposed the partial model of word recognition used by the efficient reader. This model, also known as the "hypothesis/test" model, consists of four stages:

Stage 1) Information Use: In this stage the reader receives information from the passage preceding the target word.

Stage 2) Hypothesis Formation: The reader uses his knowledge of the language along with the information from the material read in Stage 1 to form one or more hypotheses as to the probable identification of the target word.

Stage 3) Test: The hypotheses are tested, using visual information from the target word.

Stage 4) Accept/Reject: Hypotheses are either accepted or rejected, depending on whether the visual information received matches the predicted word.

A number of investigations have been conducted to determine how effectively the educable mentally retarded are employing the hypothesis/test model of word recognition. Because this process draws primarily on semantic and syntactic information, thus requiring a certain amount of language proficiency on the part of the reader, the first section of the literature review is devoted to language difficulties of the retarded. The second section reviews the studies conducted on context utilization by EMR children. It is divided into three parts. The first part describes the various designs employed by researchers. It is

followed by a report of the research comparing retarded and nonretarded students in the use of context clues. The last of the second section describes investigations conducted solely on the EMR population. The value of these studies is that they add to our understanding of how EMR readers use context or how they may be helped to use it more effectively. Finally, the summary attempts to draw some generalizations from the diverse data presented.

Language Difficulties of EMR Children

A number of studies indicate that the mentally retarded have deficient language skills when compared with both chronological age (CA) matched and mental age (MA) matched peers. In a review of the research, Keane (1972) states that there is a higher incidence of speech and language problems among the retarded and that, in general, the degree of language difficulties rises as IQ drops. Gallagher and Lucito (1961) found that the mentally retarded, as a group, scored highest on WISC subtests requiring perceptual organization, and lowest on those requiring verbal comprehension. Comparing intra-individual differences of subtest performance on the Illinois Test of Psycholinguistic Abilities (ITPA), Bateman and Wetherell (1965) concluded that EMR children as a group suffer a deficit in the entire automatic sequential level, which included such abilities as sequential memory (both auditory and visual), and grammatic closure. These studies indicate that the retardate's general language ability is not as developed as mental age might indicate.

Goodman (1976) states that readers employ three cuing systems while reading: graphophonic, syntactic, and semantic. When utilizing context clues, the semantic and syntactic systems are called upon heavily, whereas the graphophonic system is employed to provide the initial sound and/or confirm possible choices. A brief discussion follows which explores three aspects of language development which relate to the use of context clue strategy.

Syntax

The student's level of syntactic development relates to his ability to use the syntactic cuing system while reading. Reading materials which possess complex structures beyond the reader's level of syntactic development will interfere with his ability to derive meaning from the passage. Using context to determine an unfamiliar word becomes difficult if the grammatic structures of the selection are more complex than the reader's own language ability. Moderate to severe syntax deficits will restrict the reader's ability to use the syntactic cuing system.

Semmel, Barritt, Bennett, and Perfetti (1968) analyzed the responses of two groups of EMR children (public school and institutionalized) to a word association task as compared to CA-matched and MA-matched normals. As a child develops, his responses to a word association task shift from being syntagmatic, which employs a sequential strategy (e.g., black cat) to paradigmatic, in which the child responds with a word of the same form class (e.g., black white). In the Semmel study, the CA-matched normals had made the shift to paradigmatic responses. The public school retardates and the MA-matched

normals performed similarly, giving some paradigmatic responses, although lagging in development as compared with the CA-matched normals. The institutionalized retardates responded with the greatest number of syntagmatic answers. The investigators concluded that the EMR child goes through the same syntactic stages as the child of average intelligence, but more slowly. (The institutionalized EMR's further lagged in development due to restricted language learning opportunities.)

Vocabulary

Vocabulary development is related to the use of the semantic cuing system described by Goodman. If the pupil's vocabulary level is significantly lower than that of the reading selection, he will have difficulty comprehending the material. Also, the more limited the child's vocabulary, the smaller will be the fund of words upon which to draw when encountering an unknown word, or a blank space on a cloze exercise. Research reviewed later in this paper (Smith, 1978) indicates that retarded students employ semantic cues less than any other cuing system. Vocabulary deficits, therefore, may interfere greatly with the EMR student's ability to use context clues.

Retarded individuals display vocabulary deficits when compared with CA-matched peers (Gillespie & Johnson, 1974). However, Laycock and Clark (1942) concluded that retardates possess larger vocabularies than MA-matched peers. They attributed this to the older chronological ages of the retarded subjects, as most vocabulary words are learned through experience. Conversely, in the Bateman and Wetherell study,

the retarded children scored below their mental age expectancy on the auditory-vocal subtest. Although the findings of these two studies do seem contradictory, Bateman and Wetherell believed the poor performance on the association subtest might be due to deficits in retrieval and not necessarily due to limited vocabulary.

This explanation is supported by the findings of Harrison, Greenberg, and Budoff (1972). Comparing junior high age educable mentally retarded pupils with CA-matched normals, on a word association task in which the subjects were asked to deliver up to twenty-five responses per stimulus word, they concluded that both groups utilized similar processes in making associations, but that the EMR's were hampered not only by a smaller vocabulary, but also by a much slower response rate, and also, that they employed fewer logical associations. It may be that while retardates' listening vocabularies are superior to those of their MA-matched peers, performance is limited and slower due to memory problems.

It is quite possible that for EMR students, determining an unknown word from context utilizes speaking vocabulary rather than listening vocabulary, and retrieval must be fairly quick so that the train of thought is not lost. It appears that, at least at the performance level of vocabulary development, EMR individuals do possess vocabularies which are more limited than mental age would indicate.

Memory

As stated in the section on vocabulary, an inefficient retrieval system would impede the student's ability to supply a missing word or possible alternatives for an unfamiliar word. Bateman and Wetherell

(1965), and Harrison et al. (1972) ascribed the poor performance on word associations to deficient retrieval strategies. Short-term memory is also employed in the use of context clues as the reader must retain the passage surrounding an unfamiliar word long enough to benefit from its syntactic and semantic cues.

Bateman and Wetherell concluded that the EMR child has auditory and visual sequential memory deficits below mental age expectancy. Upon reviewing the research, Gillespie and Johnson (1974) concluded that while the long-term memory of EMR individuals may be similar to that of their MA-matched peers, their short-term memory is deficient in comparison to MA-matched normals, and that all memory processes are deficient in comparison to those of CA-matched normals.

The major focus of language studies of the educable mentally retarded has been to compare them with nonretarded subjects. Perhaps equally important, however, is the research that investigates language differences within the EMR population. Semmell et al. (1968) found that the syntactic development of institutionalized retardates is slower than that of noninstitutionalized retardates. Ragland (1964) also found language differences within the EMR population. In an investigation similar to that conducted by Bateman and Wetherell, he compared the ITPA profiles of EMR pupils reading at mental age expectancy with those of EMR pupils reading below expectancy. The below-reading-expectancy group scored lower on the total ITPA. Scores were especially low on the auditory vocal subtest and the entire automatic sequential level, indicating lower syntactic ability. It appears,

therefore, that within the EMR population, reading ability does correlate with language development.

Investigations of the Use of Context by EMR Children

Methodology

Several experimental designs have been employed by previous researchers to test retarded pupils' ability to use context. One method is the in-context/out-of-context procedure in which subjects are asked to read a word list and then read a passage containing those same words (or in reverse order, to avoid a practice effect). Analysis of oral reading substitutions has also been used by researchers. One difficulty with both of these methods is that they test the strategies used in oral reading but do not allow the investigator to see the processes that are employed in silent reading. A third method used to test the use of context by both oral and silent readers is the cloze method, or one of its variations.

However, Streib (1976-77) warns that these three measures of context, i.e., in-context/out-of-context, analysis of oral reading miscues, and the cloze procedure, may not, in fact, measure the same skill. This warning is supported by the results of Streib's investigation (1977) in which these methods were analyzed to determine their correlation. The three procedures were not related except that, for students at the primary level, there was a significant correlation between the percentage of acceptable word substitutions on the oral reading task and the percentage of verbatim plus synonymous responses for the cloze task. Therefore, in reviewing the research, it should

be recognized that the results of each investigation may in part be determined by the method used to test context usage.

Another type of methodology is the type of comparison group used. One study (Hargis, 1972) compares EMR students with chronological age (CA) matched normals, whereas others (Crossland, 1981; Dunn, 1954; Goodstein, 1970; Semmell, Barritt, & Bennett, 1970) compare them with mental age (MA) matched normals, or with both types of comparison groups. However, because the EMR child's reading level often lags behind his mental age, several researchers (Levitt, 1970; Shotick, 1960; Smith, 1978; Streib, 1977) have utilized a reading age (RA) matched comparison group.

Studies Comparing EMR Children with Nonretarded Children

Most studies comparing retardates and normals on the use of context required subjects to read offering little or no help on the task. However, two investigations tested context usage primarily as an oral language task, using the written text as a visual prompt. These two studies will be reported first.

Oral Language Tasks

Semmell, Barritt, and Bennett (1970) used the same subjects that were used for the Semmell et al. (1968) word association study to test performance on oral cloze tasks. The subjects consisted of four groups: institutionalized retardates, public school retardates, CA-matched normals, and MA-matched normals. Subjects were given four word sentences, printed on index cards but read orally by the examiner as they were displayed visually; each sentence had one word deleted. The

experiment was controlled so that an equal number of sentences had the deletion in each position, and in each position the sentences were divided equally among five sentence types, each having a different order of form classes.

Significant differences were found between the EMR subjects and both comparison groups, indicating that EMR students are less likely to use context clues on oral tasks, even when compared with children of the same mental age. In one case, the effect of the position of the deletion was significant: EMR children performed better when the deletion was in the final position, suggesting that they were relying on sequential associations rather than on grammatic cues. However, it appears that the comparison group also found the final position the easiest to complete but that the difference was not significant due to a ceiling effect.

In order to eliminate the possible ceiling effect in the Semmell, Barritt, and Bennett study, Goodstein (1970) repeated the study, adding a recognition cloze (maze) task. The sentences were constructed in the same manner as in the previously discussed study, but half of the sentences were used in the recognition task. Distractors for the multiple choice recognition exercise consisted of the following three types for each item: 1) grammatic/nonmeaningful; 2) non-grammatical/meaningful; and 3) non-grammatical/nonmeaningful. Both tasks were administered to 22 EMR students and 22 normal students who were matched for mental age and reading age.

The errors made by both groups were predominantly non-grammatical/meaningful. The average-IQ group made significantly more grammatical/

meaningful responses. Both samples performed significantly higher on the recognition task than on the production task; however, for the EMR sample this difference was much greater, supporting the theory that retardates have retrieval deficits. For both groups, the fourth position deletion was the easiest, verb deletions were more difficult than noun or noun modifier deletions, and noun modifier deletions were the least difficult.

Reading Tasks

Of the many studies using a reading task to compare students and those of average or above average ability, the results were necessarily influenced by the kind of comparison group used (CA-, MA-, or RA-matched). Therefore the following discussion has been organized to group studies according to the type of comparison group used.

Hargis (1972) compared 15 EMR pupils with CA-matched nonretarded children on a standard cloze exercise. Hargis attempted to control for differing ability by providing each subject with a passage at his particular reading level, as determined by an informal reading survey. Scoring procedures included 1) verbatim responses, 2) verbatim plus grammatical/meaningful responses, and 3) grammatical/meaningful responses alone.

Although there were no significant differences between the two samples on their ability to supply verbatim responses, there did exist a significant difference in the ability of retardates and normals to respond with synonyms, the retarded pupils being less able to perform this task. Hargis concluded that both low and average IQ groups were

able to complete cloze tasks when the context is sufficiently constrained, EMR students perform poorly due to poor "creative (language) performance" (p. 728).

Crossland (1981) used an experimental design patterned after that of Hargis, with the exception that subjects were matched for mental age (10-0 to 12-0) rather than chronological age. As in the Hargis study, informal reading surveys were administered to each student to determine individual reading levels. A cloze test was then given at the appropriate level. Data were tabulated for the following three categories: 1) exact responses; 2) synonymous, grammatically correct responses; and 3) exact plus synonymous, grammatically correct responses. Crossland concluded that retarded children were deficient in their ability to supply exact responses and synonymous, grammatically correct responses, but not deficient in the "total" category. However, it is difficult to determine how she arrived at this conclusion as, upon reviewing the statistics, it is obvious there has been an error in the reporting of the data. In fact, even taking the error into account, the data appear to suggest that while the retarded are less able to supply synonymous, grammatically correct responses they are more able to supply exact responses than their MA-matched nonretarded peers.

Dunn (1954) also used an MA-matched design, comparing EMR and nonretarded boys with mental ages of 8.0 to 10.0 on several reading skills. His findings indicate that EMR pupils read below their mental age reading expectancy. The low IQ boys made significantly less use of context, as tested by an oral reading cloze task, and fewer repetitions. The low repetition rate may be due to lack of self-correction

strategies. However, it should be noted that both samples were given the same cloze task, and although all pupils were given as much help as needed in reading it orally, it would seem that the average IQ group had the advantage of the more advanced reading level.

Shotick (1960) used an MA- and RA-matched comparison group to investigate the differences between low and average IQ boys in reading comprehension and performance tasks. The mean mental age of the subjects was 8.8. Although the testing populations did not differ on performance scores, the EMR students scored significantly lower on all reading comprehension tasks, including utilization of context clues.

Levitt (1970) also matched subjects for mental age and reading age, the mean reading level being 1.8. Her study employed an in-context/out-of-context design. As expected, both groups scored significantly higher on the in-context presentation; but the data failed to support the hypothesis that there would be a significant difference between the performance of the two samples in the use of context. However, Levitt cast some doubt on the validity of the results by explaining that several of the children in the EMR placement appeared to be emotionally disturbed or learning disabled rather than retarded, plus, several of the regular class pupils might have been slow learners who would eventually be placed in EMR classes.

Streib (1977) attempted to avoid some of design problems encountered by previous researchers: 32 subjects were matched for reading level (2.5 or above) plus all were selected from low-income neighborhoods. Three measures were employed: 1) in-context/out-of-context; 2) analysis of oral reading miscues; and 3) a reading cloze task. There were no

significant differences in the performances of the two testing populations, nor among children of various reading levels. Also, as previously mentioned, a correlation study did not reveal the three measures to be related, with the exception of analysis of oral reading miscues and the reading cloze task at the primary level.

The analysis of oral reading miscues technique was used by Smith (1978), who administered the Reading Miscue Inventory to 52 subjects. The two samples (EMR and nonretarded) were matched for reading level (range 2.0 to 3.9) and were selected from various classrooms from throughout a large metropolitan area, so that each sample represented several socioeconomic levels and had been taught by a variety of instructional approaches. Among the findings were that the low IQ group made significantly more total miscues. When intragroup percentages were used to control this factor, the following characteristics were revealed: Although both groups employed sound and graphic cues to a similar extent, and substituted words of the same grammatical class in a similar manner, the EMR subjects were less likely to make grammatically acceptable miscues. They also made less use of semantic cues, making many miscues that did change meaning, although only partially. The mentally retarded were less likely to correct sense-damaging miscues. Because the majority of their miscues fell into the Partial Strength category, Smith concluded that while the retardates were using some context, they were not reading for meaning as effectively as the non-retardates. She suggested that they might be taught to do so.

Studies on the EMR Population Alone

The following studies have been conducted solely on EMR samples. Rather than to compare the retarded and nonretarded pupil, these studies have dealt with various aspects of context utilization by the retarded. Knowledge of the nature of context utilization by the retarded is certainly as valuable as information regarding the frequency of context usage; therefore a report of these studies has been included in this review of the literature.

Ramanauskas (1972) tested the ability of 58 EMR junior high school students to utilize context beyond sentence constraints. Two versions of a standard cloze task at the second grade level were administered. One exercise was in the natural sentence order (NAT) whereas the second consisted of the same selection in a modified arrangement (MOD). In this way, Ramanauskas could determine if EMR children utilize context beyond the immediate sentence. The two tasks were administered a week apart, half receiving the NAT exercise first, and the other half receiving the MOD exercise first. The findings indicated that the pupils would score higher on the NAT task, regardless of order of presentation. Ramanauskas concluded that the subjects must have been using clues available in the paragraph in order to have performed better on the natural order task.

Contextual richness within a sentence will affect EMR students' performance on a cloze task, as demonstrated by Allington (1980). The experimental materials consisted of an equal number of sentences of either high, moderate, or low contextual richness. Each sentence had a deleted target word of either high or low frequency. For example,

for the set of target words "stop" (high frequency) and "halt" (low frequency), the contextually rich, moderate, and low sentences were, respectively: "You had better _____ for that red light."; "The men were ordered to _____."; and "We decided to _____ for awhile." (p. 119). The experimenter exposed letters of the target word one at a time until it was correctly identified. High frequency target words required less graphic information to be exposed in sentences of high rather than low contextual richness. Also, high frequency words were identified with less graphic information than low frequency words. Allington's study also supports the theory that EMR pupils regard the reading process as one of sound/symbol association; despite training on several practice items, many of the subjects called out letter sounds as the letters were exposed, rather than to attempt to identify the missing word.

Samuels, Dahl, and Archwamety (1974) demonstrated that it is possible to train the retarded child to use context clues. Thirty EMR subjects were enrolled in a program which guided the pupils through the following steps: 1) producing a word with a specified initial sound; 2) identifying the initial letter of a word presented orally; 3) visually recognizing the letter of a word presented orally; 4) using auditory context to predict a missing word; 5) using auditory context and an initial letter sound clue to predict a missing word; 6) using visual context to predict a missing word; and 7) using visual context and an initial letter clue to predict a missing word. After 14 weeks the subjects were compared with the EMR control group which had been exposed to a nonrelated task. The experimental group scored significantly higher

on the following tasks: 1) completing a modified cloze test with initial consonant clues; 2) determining unfamiliar words in context; and 3) speed of recognition of known words.

Finally, Sheperd's investigation (1967) focused on differences within the EMR population, comparing boys reading at or above reading expectancy (adequate readers) with those reading below expectancy (inadequate readers). The adequate readers exceeded the inadequate readers on measures of both oral and silent reading. They were better able to use context clues and made significantly more repetitions. Sheperd noted that the adequate readers concentrated on the association of words whereas the inadequate readers did not concern themselves with meaning but rather with pronunciation.

Summary

The results of the studies reported do not easily lend themselves to generalizations regarding the use of context by EMR children. The discrepancy in results may be attributed, in part, to specific problems of individual studies and general differences in experimental design. Briefly, these are:

1. Three methods have been used to test retarded children's ability to use context. Streib's study (1977) indicates that these may not be as related as has been assumed.

2. Various matching methods have been used for establishing a comparison group (for those studies which compared EMR pupils with students of average or above average intelligence). These are:
 - a) chronological age matched; b) mental age matched; and c) reading level matched. This has made comparisons of studies difficult.

3. In at least one study (Levitt, 1970), the samples may have overlapped in terms of intelligence.

4. The data in the Crossland study (1981) appeared to be erroneously reported.

These difficulties may explain some of the variance, however, it certainly cannot account for it all.

Some of the investigations reviewed revealed the manner in which retardates utilize context. Much of the research dealt with the effects of various types of context. Ramanauskas (1972) demonstrated that retarded pupils are not bound to the cues in a sentence, but rather use paragraph cues also. Allington (1980) reported that context usage is facilitated in sentences of high contextual richness containing commonly used vocabulary. The works of Semmell et al (1970) and Goodstein (1970) indicate that deleting a word in the final position of a sentence has a greater facilitating effect than any other position for both retarded and nonretarded students. They attribute this finding to the high sequential and contextual constraints that act upon the final position in the sentence. Noun modifiers were the least difficult to complete. Nouns were of moderate difficulty, and verbs were the most difficult. Again, these findings held true for both populations. The recognition task was also significantly easier for the low and average IQ groups; however, the discrepancy between recognition and production was much greater for the EMR children. This finding supports the theory that retarded children are slower in their ability to produce words in associative tasks. Hargis's study (1972) also lends support to the theory that EMR children have difficulty with production. When the

context was highly constrained, the EMR subjects had little difficulty completing the exercise, but when it was not as constrained, they encountered a great deal of difficulty.

It appears, then, that low and average IQ students perform similarly on tasks requiring context usage. Any differences in performance may be more quantitative than qualitative. However, the results of studies which compared retarded and nonretarded subjects are not consistent.

In both oral cloze tasks reported in this paper (Goodstein, 1970; Semmell et al., 1970), the EMR subjects performed at significantly lower levels than did their mental age peers of average intelligence. In fact, these authors used their findings to support their position that EMR pupils' language development lags behind their mental ages.

However, when comparing retardates' and nonretardates' performance on reading cloze tasks, the results vary. For example, Crossland (1981), Dunn (1954), and Hargis (1972) found that retardates could not complete the task as well as normals, whereas Streib's study (1977) did not reveal this difference. One possible reason for this difference is the sampling procedures used by each investigator. Hargis used CA-matched subjects, giving each student material at his own level. However, this approach made no provision for the possibility that children develop in their ability to use context as they progress through reading levels (Goodman, 1965; Pastor, 1977; Samuels, 1970). Dunn and Crossland both matched the samples by mental age but the retarded groups lagged in reading level, thus putting them at a disadvantage. In addition, the apparent error in the reporting of Crossland statistics makes it

difficult to confirm her conclusions. Streib's subjects were matched for reading level and performed similarly on all three measures of context usage. Yet Shotick (1960) and Smith (1978) also matched for reading level, with the results that the EMR pupils did not use context clues as well as their younger peers of average intelligence. Levitt (1970), who did not use the cloze procedure, did not find a significant difference between EMR and nonretarded subjects. However, due to the sampling difficulties encountered in her investigation, this finding must be viewed cautiously.

A cause for these discrepant findings is not immediately apparent. The EMR subjects used by both Levitt and Streib were within the same chronological, mental, and reading age range as the subjects in most of the other studies, so these factors do not seem to be the cause. Sheperd's investigation indicates that EMR's as a group vary in their ability to use context. He concluded that retardates reading at mental age expectancy were more proficient in this skill than those reading below expectancy. It is possible that differences existed among (and within) the EMR samples selected for the various studies reviewed.

Another factor which may account for the discrepancy which has received little attention from investigators is the effects of particular methods of reading instruction on retarded pupils' ability to use context. Although normal students may develop this ability regardless of the instructional method used, this assumption may not hold true for retarded children, who tend to use only those strategies which have been directly taught. Smith did report that both retarded and nonretarded

subjects were selected so that a variety of reading series and techniques were represented in the study. However, information regarding the instructional methods employed by teachers of the subjects of other studies is not available. Jordan (1969) contends that most teachers of the retarded emphasize either phonics or sight word recognition. It may be that many retarded children, as a result of this type of instruction, do not perceive reading as an activity that should make sense, and therefore would be less likely to use context clues. However, research by Samuels, Dahl, and Archwamety (1974) reassures the teacher of the retarded that training in the use of context clues can be effective.

Chapter III

Design of the Study

Purpose

The purpose of this study was to compare educable mentally retarded (EMR) children's performance in using context as a word recognition strategy with that of children of average or above average intelligence ($\bar{X}_1 > \bar{X}_2$). A second purpose was to determine if a significant difference exists in the performance of language-impaired (EMR-LI) and non-language-impaired (EMR-NLI) EMR subjects in using context as a word recognition strategy. The ability to use context was measured by a series of syntagmatically related word pairs in which the second word contained only minimal orthographic information.

Hypotheses

Three null hypotheses were proposed to compare the performance of EMR and nonretarded students in using context as a word recognition strategy:

1. There is no significant difference between the mean scores on the word association task for the educable mentally retarded group and the group of average or above average intelligence ($\mu_{EMR} = \mu_{\bar{X}_1 > \bar{X}_2}$).
2. There is no significant difference between the mean scores on the word association task for the language-impaired and non-language-repaired retarded groups ($\mu_{EMR-LI} = \mu_{EMR-NLI}$).

3. There is no significant difference between the mean scores on the word association task for the non-language-impaired retarded group and the group of average or above average intelligence ($\mu_{EMR-NLI} = \mu_{\bar{x}}, > \bar{x}$).

Methodology

Subjects

Seventeen educable mentally retarded students and eleven students of average or above average intelligence were selected for participation in this study. Students reading in the 2.1 to 3.7 grade level range, as measured by two subtests of the Woodcock Reading Mastery Tests, were selected from both the retarded and nonretarded groups so that the two groups would be similar in reading ability.

Subjects for this study were selected in the following manner. Students from four special education classes and one second grade class were tested on the Word Identification and Passage Comprehension subtests of the Woodcock Reading Mastery Tests, Form B. Those students whose scores fell within the 2.1 to 3.7 grade level range for both subtests were selected as subjects for this investigation. The subjects were then screened for knowledge of the letter/sound relationships of the nine initial consonants used in the syntagmatically related word pair task. One EMR student was eliminated from the study as he demonstrated much difficulty with letter/sound relationships.

Of the seventeen retarded subjects selected, three attended junior high level special education, the others attended one of three intermediate level special education classes. All of the classes were

located in suburban and semi-rural public schools. Ages of the EMR subjects ranged from 10 years, 2 months to 13 years, 4 months, with a mean age of 11 years, 11 months. Intelligence quotients, as measured by an individually administered intelligence test (WISC-R), ranged from 55 to 76, with a mean IQ of 68. Eleven of the retarded subjects were girls, five were boys.

The educable mentally retarded subjects were further divided into two groups: language-impaired and non-language-impaired. Each retarded student had been thoroughly screened by a speech/language therapist and was classified as having or not having a language impairment based upon New York State guidelines. It should be noted that students who had a speech impediment but no language difficulty were not considered to be language-impaired.

The language-impaired and non-language-impaired groups were similar in age, IQ, and male/female breakdown. The language-impaired group was composed of four girls and two boys, with a mean age of 11-7 and a mean IQ of 67. The non-language-impaired group consisted of seven girls and four boys, with a mean age of 12-1 and mean IQ of 69.

The nonretarded subjects were selected from a second grade class in a semi-rural public elementary school. Six of the second grade subjects were girls, five were boys. IQ scores were not available for this group, but all subjects were reported to be progressing adequately in school. None of the nonretarded subjects had language difficulties.

Instruments and Procedures

The following instruments were used to screen the students for suitability for participation in the study:

1. The Word Identification and Passage Comprehension subtests from the Woodcock Reading Mastery Tests, Form B, were used to obtain a reading level for students being considered for participation in the study. It was determined that the combined use of these two subtests would be superior to the use of a graded word list since a measure of reading comprehension would be included. Students who scored within the instructional grade level range of 2.1 to 3.7 on both subtests were selected as participants. In this way the two populations were approximated for reading level.

2. Students who were selected as subjects based on Woodcock scores were further screened for knowledge of initial consonant sounds. Each student was shown a list of nine consonant letters which would appear as initial letters on the syntagmatically related word pair task. The examiner pointed to each letter and asked, "What sound does this letter make?" Although letters do not represent discrete sounds in isolation, the question was worded in this manner as it best approximated the task the student would be asked to undertake for the word pair exercise. If the student responded with a soft sound for the letters "c" or "g" he was asked if he knew of another sound that letter could represent. Several students had some minor difficulty with this task but were retained as subjects because their difficulty was not deemed serious enough to interfere with the word pair task. One student did experience sufficient difficulty with the consonant letter exercise to be eliminated as a subject for the study.

Subjects were then (individually) administered the syntagmatically related word pair task. The purpose of this task was to determine if subjects were able to use context and minimal visual cues to recognize a word. The task consisted of 12 adjective-noun word pairs of high associative strength as determined by Palermo and Jenkins (1964) (See Appendix A). Each pair was printed on a card in lower-case letters. The adjective was written in full, whereas only the initial consonant and spaces for the remaining letters were written for the targeted noun. For example:

black c _ _ loud n _ _ _ _

Four samples preceded the task to ensure that the subjects truly understood the directions. Subjects were told that they would have to determine some words that had some missing letters, and that each blank space stood for one letter. The directions explained that the words in each pair "go together" and that the second word would always be a noun. Subjects were given help on the samples and did not proceed to the actual task until the examiner was certain that they understood the directions. As needed, subjects were also given help reading the adjective on the actual task item.

Statistical Analyses

A single-factored analysis of variance was used to determine if there were any significant differences in the performances of the three groups (EMR-NLI, EMR-LI, and $\bar{X}_1 > \bar{X}_2$). Analyses were conducted for the following categories of responses to the word-pair exercise: 1) targeted words only; 2) words which were not the targeted word but were determined

to be acceptable; and 3) the total of targeted and acceptable words. An acceptable word was judged to be any word which was not the targeted word but was a noun starting with the initial consonant displayed and having the correct number of letters.

Summary

This study was conducted to determine if there are any significant differences in the ability of retarded and nonretarded students to use context as tested by a word association task. The difference in the performance of language-impaired EMR students and non-language-impaired EMR students was also investigated. The sample consisted of 11 second graders of average or above average intelligence and 17 educable mentally retarded students. Of the retarded subjects, six were language-impaired and 11 were not language-impaired. Criteria for selection as a subject was a reading grade level score in the range of 2.1 to 3.7 (as tested by two subtests of the Woodcock Reading Mastery Tests) and the ability to identify the sound of nine consonant letters. Subjects were then administered a word association exercise consisting of syntagmatically related word pairs in which the targeted word contained only minimal visual cues. Single-factored analyses of variance were employed to determine if there were any differences between the three samples with respect to the ability to supply the targeted words, acceptable words, and the total of targeted plus acceptable words.

Chapter IV

Analysis of Data

Purpose

The primary purpose of this investigation was to compare the performance of educable mentally retarded (EMR) children with that of children of average or above average ability ($\bar{X}_1 > \bar{X}_2$) in the ability to use context as a word recognition strategy. An additional purpose was to determine if there is a significant difference in the performance of language-impaired (EMR-LI) and non-language-impaired (EMR-NLI) EMR subjects in using context as a word recognition strategy.

Findings and Interpretations

Three null hypotheses were formulated to compare the language-impaired retarded sample (EMR-LI), non-language-impaired retarded sample (EMR-NLI), and nonretarded sample ($\bar{X}_1 > \bar{X}_2$) with respect to ability to use context clues.

1. There is no significant difference between the mean scores on the word association task for the educable mentally retarded group and the group of average or above average intelligence ($\mu_{EMR} = \mu_{\bar{X}_1} > \bar{X}_2$).

2. There is no significant difference between the mean scores on the word association task for the language-impaired and non-language impaired retarded groups ($\mu_{EMR-LI} = \mu_{EMR-NLI}$).

3. There is no significant difference between the mean scores on the word association task for the non-language-impaired retarded group and the group of average or above average intelligence ($\mu_{EMR-NLI} = \mu_{\bar{x}}, > \bar{x}$).

In this investigation the ability to use context as a word recognition strategy was measured by a word association exercise. This instrument consisted of 12 sets of syntagmatically related word pairs of which the second word contained only the initial consonant. Raw scores were tabulated for each sample for two types of responses: 1) "targeted" responses in which the subject responded with the exact word used to design the exercise; and 2) "acceptable" responses in which any noun, other than the targeted word, which contained the correct initial consonant and number of letters was accepted. Raw scores for the total of targeted plus acceptable responses were also tabulated (See Appendices). Single factored analyses of variance were conducted comparing the performance of the three samples for each of the response categories (targeted, acceptable, and total). These analyses are reported in Tables 1, 3, and 5; raw scores and standard deviations are reported in Tables 2, 4, and 6.

Table 1
 Analysis of Variance for Differences Among
 the Groups in Targeted Responses

Source of Variation	SS	df	MS	F
Between Samples	3.10	2	1.55	0.57
Within Samples	68.61	25	2.74	
Total	71.71	27		

Critical F ($\alpha = .05$) = 4.29

Table 2
 Mean and Standard Deviation for the
 Groups in Targeted Responses

	$\bar{X}, > \bar{X}$	EMR-NLI	EMR-LI
Mean	5.36	5.55	4.67
S.D.	1.44	1.97	1.63

The differences among the three groups for the exact targeted responses are analyzed in Table 1. The critical F ratio at the .05 level of significance is 4.29. The calculated F ratio for targeted responses is 0.57. There is no significant difference among the three groups in their ability to supply targeted responses for the word association exercise. Therefore none of the three null hypotheses are rejected with respect to targeted responses. Retarded students (both language-impaired and non-language-impaired) and non-retarded

students reading at a second to third grade level are equally able to supply the expected response to a syntagmatically related word pair task.

Table 3

Analysis of Variance for Differences Among
the Groups in Acceptable Responses

Source of Variation	SS	df	MS	F
Between Samples	4.85	2	2.43	0.80
Within Samples	76.11	25	3.04	
Total	80.96	27		

Critical F ($\alpha = .05$) = 4.29

Table 4

Mean and Standard Deviation for the
Groups in Acceptable Responses

	$\bar{X}_1 > \bar{X}_2$	EMR-NLI	EMR-LI
Mean	2.18	2.18	1.17
S.D.	1.94	1.60	1.60

These tables tabulated the number of responses which were acceptable according to the criteria presented to the students but were not the actual word targeted in the exercise. Acceptable responses had to be nouns of the prescribed number of letters and beginning with

the initial consonant displayed. "Making sense" was not one of the criteria because such a judgment would be too subjective. Therefore, acceptable responses often were low frequency word pairs (such as "sour mice").

The calculated F ratio for acceptable responses is 0.80 whereas the critical F ratio is 4.29. There appears to be no significant responses to the word association exercise. The data failed to reject the three null hypotheses in the acceptable response category. Retarded students at this age level are as able to supply acceptable substitutes for the missing word as are their younger, nonretarded peers of similar reading ability. Contrary to what might be expected, retarded students whose language abilities are commensurate with their mental ages did not perform significantly better than those with a lag in their language development.

Table 5

Analysis of Variance for Differences Among
the Groups in Total Responses

Source of Variation	SS	df	MS	F
Between Samples	15.51	2	7.76	1.98
Within Samples	97.74	25	3.91	
Total	113.25	27		

Critical F ($\alpha = .05$) = 4.29

Table 6
Mean and Standard Deviation for the
Groups in Total Responses

	$\bar{X}_1 > \bar{X}_2$	EMR-NLI	EMR-LI
Mean	7.55	7.73	5.83
S.D.	1.51	2.00	2.64

Tables 5 and 6 show the differences among the three groups for total number of correct responses (targeted plus acceptable). In examining the mean raw scores of the three groups, it appears as if there may be a difference in the performance of the language-impaired retarded group as compared with the non-language-impaired retarded group and the nonretarded group. However, statistical analysis of the data does not support this assumption, the F ratio of 1.98 being less than the critical F ratio of 4.29. The variation among the groups is insufficient to reject the null hypotheses, including the second hypothesis which proposes that there is no difference between the language-impaired and non-language-impaired retardates. Therefore there are no significant differences among any of the three groups in their ability to supply targeted plus acceptable responses to the word association exercise. However, the data suggest that language-impaired EMR students may be slightly less efficient users of this skill, and at that, as a group, they vary more in their ability than the other two groups.

Summary

Single-factored analyses of variance were conducted to test the three null hypotheses. The data failed to reject any of the hypotheses. However, the data did show a difference in the ability of language-impaired EMR students to supply targeted plus acceptable responses as compared with the other two groups, although this difference was not statistically significant. It can be concluded, therefore, that educable mentally retarded students can use context for word recognition as effectively as nonretarded students reading at the same grade level.

Chapter V

Conclusions and Implications

Purpose

The primary purpose of this study was to compare the ability of educable mentally retarded (EMR) students and students of average or above average intelligence (\bar{X} , $>$ \bar{X}) to use context clues as a word recognition strategy. The secondary purpose was to compare the performance of language-impaired (EMR-LI) and non-language-impaired (EMR-NLI) retarded students in this ability. The measure employed was a series of syntagmatically related word pairs in which the second word contained only minimal orthographic cues.

Conclusions

The findings of this investigation confirmed those of Streib (1977) and Levitt (1970), in contrast to the majority of studies conducted in this field. Educable mentally retarded students reading in the second to third grade range were as proficient in the use of context clues for word recognition as were normal second graders reading in the same range. Language-impaired EMR pupils appeared to make less use of context than the other two groups, but this difference was not statistically significant. The language-impaired sample was rather small, six subjects, which may account for the lack of significance. A paramount difficulty encountered in obtaining the language-impaired sample was that the majority of the language-impaired retardates were reading

below the requisite grade level. In fact, it may be that including a language-impaired EMR group was self-defeating in that students had to have sufficient language competence to obtain the prerequisite score on the Woodcock subtests.

Indeed, the screening procedures may account for the results for all three groups. The Woodcock Reading Mastery Tests were selected because they were the reading component of the end-of-the-year testing battery for the EMR classes. Not only was it felt that both the retarded and nonretarded groups should be screened by the same instrument, but also, the latest test data available for the nonretarded group were standardized test data available for the nonretarded group were standardized test scores from the beginning of the academic year which no longer accurately reflected the students' grade levels. Therefore the Word Identification and Passage Comprehension subtests of the Woodcock were administered to the nonretarded group so that the same instrument would be used to screen all the subjects for participation in the study. However, the very nature of the Passage Comprehension subtest, a modified cloze exercise, may have skewed the results by selecting students who were within a similar range on this skill--a skill which is similar to the word pair task employed in this study.

The word pair task may also be responsible for the inconsistency between the results of this study and those of other investigations. Measures of context employed by past researchers were: 1) in-context/out-of-context presentation; 2) analysis of oral reading miscues; and/or 3) sentence or paragraph length cloze passages. Streib's research (1977) demonstrated that these measures are not necessarily related,

with the exception of analysis of miscues and the cloze technique at the primary level. Although the word pair task is similar to the cloze passages, it cannot be assumed that the two procedures test exactly the same skill.

Finally, instructional approaches may have influenced the outcome of this investigation. With the exception of Smith (1978), who deliberately sought a sample representing a variety of instructional techniques, investigators did not report the instructional history of their subjects. The retarded subjects employed in this investigation were enrolled in classes which had been using the MacMillan R series for several years. MacMillan R is considered by its publishers to be a language based program. The three junior high school subjects, who had used MacMillan R in their elementary years, were using the Amidon Developmental Reading program in addition to content area reading, mostly in Career Education. The second grade class from which the nonretarded subjects were selected had been using the Language Experience Approach along with the American Book Company basal program. Supplemental instruction in phonics was being provided in both the regular and special education classes. Since comprehension was a major goal in all of the classes, it follows that the EMR subjects as well as the nonretarded subjects might have viewed reading as an activity which should make sense.

Implications for Future Research

The results of this study, along with those of Levitt (1970), Sheperd (1967), and Streib (1977) indicate that at least some EMR

students are as able to use context as are nonretarded students. Future research might concentrate on identifying those factors which might be responsible for the discrepancy in the results of studies done in this field. In this way educators might learn how to help retarded students develop this skill.

In this investigation, language-impaired retarded students tended to perform below the other two groups, although this difference was not significant. Additional research might pursue this trend using a larger language-impaired sample. A different measure of context utilization might also be used to determine its effect. For example, analysis of oral reading miscues might be used instead of word pairs to determine if language-impaired retardates make the same percentage of meaningful miscues as do non-language-impaired retardates.

As discussed previously, the screening procedures used for sample selection may have ultimately influenced the outcome of the study. Future researchers who wish to match for reading level might be advised to use a reading comprehension test which does not include the cloze technique or a similar procedure which also measures context utilization. An Informal Reading Inventory may be more appropriate.

In addition, the method used to test context usage may have affected the results. Research by Streib (1977) indicates that the three methods commonly used to test context usage (in-context/out-of-context, analysis of oral reading substitutions, and the cloze procedure) may not actually test the same skill. Additionally, although the word pair task is similar to the cloze technique, it cannot be assumed that the two procedures are identical. Further research is needed to

determine if these four techniques are assessing the same variable, the use of context.

Finally, the effect of instructional technique is an area which has yet to be investigated. Students taught by differing approaches might be compared to determine if instructional method influences retarded children's ability to use context.

Implications for Classroom Practice

This study and previous research indicate that teachers should expect and encourage retarded pupils to use context clues for word recognition strategies when appropriate. Educators should realize that the retarded are as varied a population as normal students; some EMR children, perhaps those that have additional language deficits, may find context utilization more difficult than others. These students might benefit from specific training in the use of context clues. On a general level, all students should be taught through a program that, while not neglecting necessary sight word and phonic drills, does emphasize reading as a meaningful activity.

Summary

Educable mentally retarded and nonretarded students reading within the 2.1 to 3.7 grade level range were found to utilize context clues for word recognition purposes to a similar degree. Retarded pupils with an additional language deficit tended to perform slightly, but not significantly, lower. Although two other studies have not found retarded students to be less effective users of context than nonretarded

students, the majority of studies have. The discrepancy between the outcome of this investigation and that of many others may be the result of a number of factors. These would include the type of screening procedure used to select subjects, the measure of context usage employed, and the instructional background of the subjects. Special educators would benefit from additional research in the area of context utilization by the retarded, especially with respect to differences within the EMR population.

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Appendices

Appendix A

Word Pair Task

Samples:

- a. loud n _ _ _ _
(noise)
- b. black c _ _
(cat)
- c. high m _ _ _ _ _ _ _ _
(mountain)
- d. slow t _ _ _ _ _
(turtle)

Exercises:

- | | |
|-------------------------------|----------------------------------|
| 1. blue s _ _
(sky) | 7. yellow s _ _
(sun) |
| 2. white s _ _ _
(snow) | 8. deep w _ _ _ _
(water) |
| 3. dark n _ _ _ _
(night) | 9. soft b _ _
(bed) |
| 4. green g _ _ _ _
(grass) | 10. cold w _ _ _ _ _
(winter) |
| 5. sweet c _ _ _ _
(candy) | 11. beautiful g _ _ _
(girl) |
| 6. hard r _ _ _
(rock) | 12. sour m _ _ _
(milk) |

Appendix B

Data for Students of Average or Above Average Ability

Subject	Number of Correct Responses		
	Targeted	Acceptable	Total
AA ₁	8	1	9
AA ₂	5	4	9
AA ₃	6	2	8
AA ₄	4	4	8
AA ₅	5	0	5
AA ₆	5	3	8
AA ₇	4	2	6
AA ₈	4	6	10
AA ₉	6	0	6
AA ₁₀	5	2	7
AA ₁₁	7	0	7
Mean	5.36	2.18	7.55
S.D.	1.44	1.94	1.51

Appendix C

Data for Non-Language-Impaired EMR Students

Subject	Number of Correct Responses		
	Targeted	Acceptable	Total
RN ₁	5	4	9
RN ₂	6	4	10
RN ₃	8	1	9
RN ₄	3	1	4
RN ₅	4	4	8
RN ₆	7	3	10
RN ₇	5	0	5
RN ₈	8	0	8
RN ₉	8	1	9
RN ₁₀	4	3	7
RN ₁₁	3	3	6
Mean	5.55	2.18	7.73
S.D.	1.97	1.60	2.00

Appendix D

Data for Language-Impaired EMR Students

Subject	Number of Correct Responses		
	Targeted	Acceptable	Total
RI ₁	3	0	3
RI ₂	5	4	9
RI ₃	7	2	9
RI ₄	6	0	6
RI ₅	3	1	4
RI ₆	4	0	4
Mean	4.67	1.17	5.83
S.D.	1.63	1.60	2.64