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A STUDY OF THE READING DISABILITIES OF ECONOMICALLY DISADVANTAGED STUDENTS IN ELEMENTARY GRADES

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Nita Lawson Nardo

December 1976

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This study was conducted as a service to the Title I, ESEA, staff of Chattanooga Public Schools to provide information to serve those Title I participants whose reading problems had proved most acute. The problem was identified in an examination of the results of the Title I evaluation conducted by Dr. John Ray of The University of Tennessee. The author is particularly grateful to Dr. Ray and to Ms. Frances Wilson, Title I director, for their constant support and assistance throughout the investigation, and to the members of the Title I project staff and others in the school system who contributed to the collection of data for the study.

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ABSTRACT

This investigation was designed as an *ex post facto* field study of 153 subjects from economically disadvantaged communities in an urban school district who had been unable to progress at a measurable level in a Title I remedial reading program which had been successful with large numbers of elementary school students whose environmental backgrounds were similar to those of the subjects. The study was undertaken to provide a new base of information for Title I program planning for the development of more effective instructional treatment for economically disadvantaged children with acute reading problems. Information already available in school records was consolidated with new data collected in the course of the investigation and analyzed by arithmetical techniques.

The research design was based on eight open-ended questions, three of which were addressed to the identification from available school records, of the more common characteristics of the subjects, and five of which were focused on the identification of factors of the reading disabilities related to mental ability, language functioning, auditory functioning, visual functioning, and motor functioning.

Findings about the characteristics of the subjects were in general agreement with those of others who have studied economically disadvantaged children with reading disabilities. In this study it was found that, while extreme reading difficulties occurred in all elementary grades and at all ages (seven through 12), the highest

percentages were found in grade five, and among students who were nine and 10 years old. More black than white and more male than female students have failed to progress in reading, with the most common race/sex characteristics being black male. The most common family configuration was that of parents either divorced or separated, no father in the home, and the subject living with mother or grandmother who were either unemployed or on public welfare. In all categories of race and sex, the most common position among siblings was that of middle child. Relative stability was found in the number of schools attended. Lack of preschool experience and high absenteeism were highly characteristic. Few of the reading disabled subjects had ever been referred to the school social worker, and few had ever had a psychological examination. Problems of visual and hearing acuity were not characteristic of the subjects, but few had any school record of physical examination for the determination of other health needs.

Findings related to the reading disabilities indicated that limited mental ability was an important factor, but that limited verbal ability was more prevalent than limited performance ability. Language functioning was impeded by central language disorders and environmentally affected language deficiencies. Problems of auditory discrimination were found to be highly prevalent among the subjects. Visual-motor difficulties were in somewhat lower incidence than language deficiencies, but the problems detected were severe. Many subjects were affected by both language and visual-motor disorders. Motor functioning was found to be adequate where gross motor control was required, but limited where relatively complex mental

integrations of visual and motor functions were required. It was concluded that the limited mental abilities of many of the subjects should be viewed as results of agenesis (developmental lag) incurred by deficient environmental stimulation, and therefore subject to treatment and to improvement in the levels of functioning. The conclusion was qualified with the recognition that for some of the subjects who had multiple learning disorders and/or deficiencies, either familial retardation, neurological damage, or both might be concomitant conditions to the agenesis. It was further concluded that even among subjects whose total functioning was within the dull normal to normal range, learning disorders similar to those of the retarded subjects were prevalent and sufficiently severe to warrant clinical instruction, high emphasis on language stimulation and on structured and sequential development of improved thought processes.

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CHAPTER I

INTRODUCTION

For more than a decade, the provision of compensatory education for students who are economically disadvantaged and educationally deprived has been a major concern of sociologists, legislators, and educators throughout the country. Passage of the Economic Opportunity Act of 1964 and the Elementary and Secondary Education Act (ESEA) of 1965 ushered in an unprecedented array of federal aid legislation designed to break the poverty syndrome by the weight of educational influence.

Early optimism spawned by the prospects of millions of dollars to be focused on the education of the poor was short-lived. The realities encountered in efforts directed toward the actual delivery of educational programs capable of effecting significant improvements in the achievement of disadvantaged students have proved frustrating and disillusioning. In summarizing the findings from their analyses of broad intervention programs for the disadvantaged, Averch and others concluded:

> Virtually without exception, all of the large surveys of the large national compensatory education programs have shown no beneficial results on the average. However, the evaluation reports on which the surveys are based are often poor and research designs suspect.
>
> Two or three smaller surveys tend to show modest and positive effects of compensatory education programs in the short run.[1]

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[1]Harvey A. Averch and others, *How Effective is Schooling? A Critical Review and Synthesis of Research Findings* (Santa Monica, California: The Rand Corporation, 1972), p. 125.

Evaluative research on programs for the disadvantaged has been voluminous, but findings are inconsistent, often contradictory, and of questionable value to educational planners in search of new approaches to the solution of educational problems which stem from poverty. Of such studies, Averch and others noted:

> Since any number of educational inputs are changed at the same time, it is difficult to tell precisely which program features are responsible even when there is demonstrable success. Control group perfection has naturally been sacrificed to the more pragmatic goal of educating children who need it most.[2]

In reports of compensatory education projects for groups of low-achieving students, there is little evidence to indicate that program designs have been matched to student characteristics except in terms of the broader generalities. Thelen proposed that differential instructional treatment is needed for separate groups of students:

> In other words, special grouping makes sense only when the teacher has a clear and accurate idea of what to do with the special group. From this standpoint, the chief difficulty with homogeneous ability grouping is that the guesses about how to deal with the group are often wrong.[3]

In order that educators may plan programs in which treatment for the remediation of reading problems associated with poverty can be directly linked to the specific learning needs of the students for whom the programs are designed, further investigation is needed to identify frequently recurring characteristics of those students and

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[2]Ibid., p. 100.

[3]H. A. Thelen, *Classroom Grouping for Teachability* (New York: John Wiley and Sons, 1967), p. 188.

to examine factors of their reading difficulties to which instructional treatment can be applied.

I. THE PROBLEM

Statement of the Problem

There is a growing body of evidence that in even the most successful programs for the improvement of reading achievement among economically disadvantaged and educationally deprived students, there remains a hard core of students who are not being helped by the compensatory efforts. New approaches are needed for the instruction of those students who fail to respond to treatment which has proved successful with others in like conditions of poverty and deprivation.

In serving the pragmatic purposes of program planning, there is a need to examine the characteristics of the hard core of disadvantaged students who continue to fail in reading in order to (1) provide guidelines for early identification of those students for whom special approaches may be required and (2) identify key factors of their reading disabilities which can be addressed in new programs of prevention and remediation.

Statement of Purpose

The essential purpose of this investigation has been to consolidate and extend the knowledge about a subject group of 153 core-city elementary students among whom extreme problems in reading have been identified, and to search for factors of their reading disabilities to which instructional treatment can be applied.

It has been the methodological purpose of the study to employ procedures of research which can be practically applied as tools of program planning for public school students in other categories of educational need than reading and in other settings than the core city target area from which the subjects of this study were drawn.

II. QUESTIONS TO BE ANSWERED

Given the informational purpose of extending the knowledge about a specific set of subjects and the methodological purpose of employing procedures adaptable to the continuing purpose of planning, this investigation has been built upon a set of open-ended questions rather than upon hypotheses for the prediction of outcomes. Following are the questions to which the study has been addressed:

1. Among the subjects of the study (elementary students in impoverished communities, who have extreme problems in reading), what are the more common characteristics related to personal and family history which can be identified from available school records?

2. Among the subjects of the study, what are the more common characteristics related to school history which can be identified from available school records?

3. Among the subjects of the study, what are the more common characteristics related to medical history which can be identified from available school records?

4. Among the subjects of the study, what factors of their reading disabilities related to mental ability can be identified for instructional treatment?

5. Among the subjects of the study, what factors of their reading disabilities related to language functioning can be identified for instructional treatment?

6. Among the subjects of the study, what factors of their reading disabilities related to auditory functioning can be identified for instructional treatment?

7. Among the subjects of the study, what factors of their reading disabilities related to visual functioning can be identified for instructional treatment?

8. Among the subjects of the study, what factors of their reading disabilities related to motor functioning can be identified for instructional treatment?

III. RATIONALE FOR THE APPROACH APPLIED IN THE STUDY

It has become a truism, widely voiced by educators and educational researchers alike, that a serious gap exists between the findings of research and the practices of schools and school systems.[4] Whether efforts to span the gap between research and practice have originated on the educator's side of the chasm or with the pure researcher, they have fallen far short of the desired linkage.

The disparity between what the researcher has been able to learn and what the practicing educator has been able to apply is nowhere more conspicuous than in the studies of the effects of compensatory education on the learning of low-achieving students in economically

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[4]Averch and others, op. cit., p. 1.

disadvantaged communities. Findings of evaluative research focused on programs for the disadvantaged have proved extremely difficult to apply successfully in settings other than those in which the original studies were conducted. There is little evidence that even successful approaches which have been documented in separate researches relative to the economically and educationally disadvantaged have yet been incorporated into the mill of common educational practice.

The multiplicity of variables which affect the extent to which educators can apply, in a new setting, the positive findings of evaluative research is all but overwhelming. The characteristics of students, impoverished or affluent, vary from region to region, district to district, school to school. Indeed, each student brings to the learning situation the uniqueness of his own intellectual and physiological capacities, his own motivations and values, his own catalog of previous experiences, and his own pattern of responses to the multiply-defined environment of the classroom. Each learning environment is unique in its physical characteristics; in the personal traits, competencies, attitudes, and experiences of its teachers; in the pervasive climate which derives from the administrative leadership in the school and in the district; and in the system of school operations which governs the uses of time, the organization of classes, the assignment of school personnel for direct and supportive services, and the allotment of funds which can be applied to the classroom enterprise.

In consideration of the persistent failures to link the findings of research to educational practice and of the seemingly insurmountable problem of matching variable to variable in an almost endless

array, a major task of linkage lies in an initial level of practical research which is: (1) shaped as a tool for a specific planning purpose; (2) conducted in the educational arena where application is intended; and (3) focused on the identification and analysis of variables which prevail in the immediate sphere of application. Research thus applied can provide: characteristics of major elements (human, material, and situational) which will impinge on the application of other research findings; directions for the selection of those research findings from the broader educational arena, which are most applicable to a specific problem or situation; profiles (of subjects or situations) which can contribute to the identification of like problems for future planning; and basic information on which to build experimental programs.

This investigation was undertaken to serve a specific planning need for further information about a group of economically disadvantaged students who continued to have extreme problems in reading even after a full year of participation in a compensatory reading program which was unusually successful with other disadvantaged students who had previously shown little progress. The findings of the investigation have been applied in the design of a special component of the school district's compensatory reading program for school years 1974-75 and 1975-76, and in the plan for a related teacher training program. They also have implications for program planning in relation to the provisions of the Education of the Handicapped Act for students with learning disabilities.

The planning purpose for which the investigation was conducted largely dictated the type of research which was applied. It was in no

sense experimental, but rather a preliminary study to give direction to later experimental efforts. This preliminary investigation was, therefore, conducted as an exploratory field study based on an *ex post facto* design as defined by Kerlinger:

> *Ex post facto* research may be defined as that research in which the independent variable or variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to, and effects on, the dependent variable or variables.[5]

IV. ASSUMPTIONS

The purpose and conduct of this study have been based on the following basic assumptions:

1. That public schools should provide equal educational opportunity for all students.

2. That the provision of equal educational opportunity for all students requires the provision of compensatory education for those who have lived in such conditions of poverty that they are not equally as well equipped as their more economically advantaged peers to succeed in the regular school programs without special assistance directed to their individual needs.

3. That, while the learning problems of many economically disadvantaged students are symptoms of negative conditions in their out-of-school lives, it is the responsibility of public schools to provide programs for treatment of the learning problems within the school setting,

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[5]Fred N. Kerlinger, *Foundations of Behavioral Research* (New York: Holt, Rinehart and Winston, Inc., 1967), p. 360.

regardless of their origin.

4. That, although the selected instruments of measurement used in the study restrict the interpretation which can be applied to the findings related to disadvantaged students, they will provide information valid to the purpose of instructional program planning for those students.

V. LIMITATIONS OF THE STUDY

By its nature, *ex post facto* research negates the possibility of control of independent variables and of randomization.[6] Consequently, it cannot be concluded that the factors of reading disabilities disclosed by this investigation are the only contributing factors or even the major contributing factors of the subjects' reading difficulties. There may be many other variables in both the in-school and out-of-school environments, as well as within the subjects themselves, which singly or in combination affect reading achievement. In any interpretation of findings, it should be emphasized that the purpose of the study was to examine a specified set of variables to identify factors of the reading disabilities which can be instructionally treated. It was not the intent of this investigation to imply a cause-effect relationship between the reading disability and any single variable.

This study was conducted in only one urban school district--Chattanooga Public Schools. Within the school district, the body of students from which the subjects of the investigation was drawn was

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[6]Ibid., p. 361.

limited to 2,688 student participants in a special compensatory education program for the improvement of reading skills of educationally deprived students. The program was implemented in 11 schools which served economically disadvantaged communities. The remedial reading program was restricted to students in the target schools whose reading achievement levels were measurably below those of their classmates.

The subjects of this study, selected from the population of special reading program participants, were those who had made no measurable progress in the program which was otherwise adjudged successful in the remediation of reading problems. Thus, since the subjects were self-selected on the basis of their special learning difficulties, they cannot be considered typical of students in an urban school district, or even of all urban students who are in the poverty condition.

Since the samples which were examined in this investigation were not randomly selected, some reservations should be applied in generalizing from the findings related to each sample group of subjects. The primary sample was analyzed separately from the population because the Otis-Lennon Mental Ability Test was administered in the district in primary grades only, and cost requirements would not permit inclusion of intermediate grades. Since the background and general social characteristics of intermediate grade subjects are the same as those of primary grade subjects from the same schools and communities, the findings from the primary sample can justifiably be generalized to the population of the study and to other students in similar conditions of poverty and educational deprivation. However, no generalizations can be made from the primary sample to the total school district

enrollment or to total enrollments elsewhere. Neither can the Otis-Lennon scores be considered conclusive with regard to the intelligence of disadvantaged students. The instrument was administered in the district as a screening device and for use in the formula for deriving a reading expectancy level for individual students. The pilot schools sample can be considered typical of a composite of subjects in all 11 Title I schools only if the two pilot schools are considered in composite, since one serves only primary grades and one serves only intermediate grades. Findings related to the Durrell non-responding sample can be generalized only to groups of students having the most extreme difficulties in reading since the sample was specifically selected for that purpose.

With regard to the findings of this study derived from the examination of personal history, school history, and medical history, it should not be inferred that all students known to have similar backgrounds will necessarily have severe problems in reading. It will be a more valid conclusion that a high incidence of difficulty in learning to read is likely to occur among students having similar backgrounds.

It has been the methodological purpose of this investigation to employ procedures which can be practically applied as planning tools in other settings and other categories of educational need than reading. Obviously, the replication of this approach will require some adaptations in other settings. Practices in record-keeping vary among school districts, as do resources for obtaining additional information not generally available in school records. It is reasonable, however, to expect that the procedures of this investigation can, with moderate

adaptations, be applied to the examination of many types of learning problems in school districts of comparable size which are eligible for compensatory education grants.

VI. DEFINITION OF TERMS

Auditory functioning. Auditory functioning is related to the mind's ability to receive and interpret sounds and to arrange sounds received into meaningful relationships capable of eliciting response through action, emotion, thought, or language. The term, as applied to this study, does not refer to hearing acuity or to the condition of the organs of hearing.

Compensatory education. Compensatory education generally refers to the provision, above and beyond the established level, of special instructional treatment, supportive services, and educational resources for students whose out-of-school experiences have not prepared them equally as well as their more advantaged peers to succeed in school. In the specific context of this study, the term "compensatory education" is used in reference to programs financed under the provisions of Title I, ESEA (Elementary and Secondary Education Act), and designed to benefit low-achieving students in schools having the highest incidence of poverty.

Economically disadvantaged. The term "economically disadvantaged" refers generally to the poverty condition and specifically to the Title I, ESEA, eligibility standard of $3,000 or less in annual family income or of family income derived from public welfare.

Educational deprivation. Educational deprivation is related

to basic skills achievement which is appreciably below the level normally expected for a student's age and grade. In the compensatory education program in which subjects of the study were participants, the criteria for educational deprivation were: first grade--all students who achieved a score of 63 or below on the Metropolitan Readiness Test; second grade--all students whose total reading and/or mathematics grade equivalent scores on standardized tests were one-half year below grade level; third grade--all students whose reading and/or mathematics grade equivalent scores were one full year below grade level; fourth and fifth grades--all students whose reading and/or mathematics grade equivalent scores were one-and-one-half years below grade level; and in sixth grade--all students whose reading and/or mathematics grade equivalent scores were two full years below grade level.

Language functioning. Language functioning denotes the mental ability to receive, derive, and express ideas and meanings through language. It does not refer to correctness or niceties of speech and grammar, but rather to the capacity to form and apply concepts and to arrange ideas in meaningful language patterns.

Motor functioning. Motor functioning is inclusive of the coordination of movement of various parts of the body with each other and in relation to mental perceptions of space, direction, and time, to which the term "perceptual-motor" is often applied. Motor functioning is closely associated with visual functioning and frequent references are made to visual-motor reactions. Motor functioning does not refer to muscular strength or agility.

Visual functioning. Visual functioning relates to the ability

of the mind to arrange visual images received, to derive meaning from visual stimuli, and to respond to visual messages coherently and with coordinated reactions. It is closely associated with motor responses to visual stimuli and frequent references are made to visual-motor functions. The term is not related to the presence or absence of pathology in sight organs, nor to the nature and degree of sightedness.

VII. ORGANIZATION OF THE STUDY

Chapter I of this work provides an introduction to the study, a statement of the problem to which it was addressed and of the purpose for which it was conducted, a list of eight questions to be answered by the study, the rationale for the methodology applied, a statement of underlying assumptions made by the researcher, specification of the limitations of the study, a definition of terms, and a description of the organization of the study.

Chapter II describes the setting and historical background of the study. The latter includes a section describing the compensatory education program in which the subjects of this investigation were participants and a section reporting the program evaluation results which led to the identification of the subjects and the definition of the problem for this research.

Chapter III is a review of the literature related to the economically deprived child and to various aspects of reading disability.

Chapter IV presents the procedures applied in the study. The population and samples are described and the method of their selection is reported. The research design for the field-study approach is

outlined. Instruments of data collection are described, the administration of each instrument is reviewed, and the techniques of data analysis are detailed.

Chapter V treats the analysis of data. It is organized in eight sections, in which the data related to each of the study questions are presented and discussed.

Chapter VI is a summary of findings, conclusions, and implications for planning educational programs. The findings and conclusions are presented in two sections. The first section is addressed to the characteristics of the subjects, which were identified in examination of the first three study questions. The second section is a summary of findings and conclusions related to the factors of the subjects' reading disabilities, as identified in examination of study questions four through eight. A third section addresses the implications of the findings for planning educational programs.

CHAPTER II

SETTING AND HISTORICAL BACKGROUND

I. THE SETTING

This investigation was conducted in the Chattanooga Public School System which serves the urban district of Chattanooga in Hamilton County, Tennessee.

In the 1972-73 school year when the subjects of the study were first identified, the total enrollment of Chattanooga Public Schools was 21,330.[1] At that time there were five high schools, 12 junior high schools, and 29 elementary schools in the urban district.[2] The racial ratio applicable to total enrollment was 56.7 percent black and 43.3 percent white students.[3]

In the 1973-74 school year when the study was conducted, the district enrollment had changed as a result of a combination of factors related to school desegregation, the general trend of movement of more affluent families from the core-city to the suburbs outside the city limits, and the annexation to the city of an area formerly served by

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[1]"Attendance Zone Pupil Enrollment Data, Operational Plan Enrollment," Part I, Section I (Chattanooga Public Schools: Enrollment Records of Division of Coordination, Planning, Research, and Evaluation, 1974), p. 1. (Hereafter, this collection of reports is called AZPED.)

[2]Ibid., Section III, pp. 1-9.

[3]Ibid., Section I, p. 1.

county schools. In September of the 1973-74 school year, the total district enrollment was 20,552.[4] One elementary school had been added by annexation to the 29 already in operation.[5] The racial ratio for the district had changed to 58.2 percent black and 41.8 percent white students.[6]

Major changes occurred in both the enrollment and organization of Chattanooga Public Schools in 1973-74 while this study was in process. As a result of a U.S. District Court desegregation order[7] filed on December 18, 1973, the district's elementary schools, which had formerly served grades one through six, were reorganized in January, 1974, into primary units serving grades one through three and intermediate units serving grades four through six. A system of pairing and clustering schools was applied in the reorganization and three schools were closed. Secondary school reorganization generally followed the pattern of the feeder elementary schools. Large numbers of both students and teachers were transferred and extensive busing of students was required by the mid-year organization.[8]

The economic levels of students served by Chattanooga Public

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[4]Ibid.

[5]Ibid., Part IV, Report 1a, p. 4.

[6]Ibid., Part I, Section III, p. 1.

[7]*Mapp v. Board of Education of the City of Chattanooga, Tennessee* (District Court of the U.S. for the Eastern District of Tennessee, Southern District), C.A. No. 3564 (Order filed December 18, 1973).

[8]*Emergency School Aid Act, Basic Proposal - Year II*, Part C, Index 9.1a (Chattanooga: Chattanooga Public Schools, 1974), p. 1. (Hereafter, this work is cited as ESAA.)

Schools reflect both the movement of affluent families out of the city and the prevalence of private schools in the area. In a 1972 district survey of all city schools for the determination of economic eligibility for participation in the Title I, ESEA, project, 39.2 percent of all students in grades one through six were found to be from families who were on public welfare or whose annual incomes were $3,00 or less.[9]

The subjects of this study were identified in the 11 elementary schools in Chattanooga which were participating in a compensatory education project funded under a grant from Title I, ESEA, PL 89-10.[10] The 11 target schools were located in core-city Chattanooga. The percentage of students whose families were at the poverty level of $3,00 annual income or less ranged from 42.6 percent to 78.9 percent.[11] Five of the 11 target schools served students who resided in low-rent public housing complexes.

In the 1972-73 school year, a total of 4,545 students in the 11 target schools were identified as Title I participants. Of that number, 2,688 were in the Title I reading program. (The total number of participants in the reading program was slightly larger at the beginning of the year, but 2,688 participants actually completed the program.) In 1973-74, a total of 5,242 students were Title I participants; of that number, 3,083 participants were enrolled in the Title I reading program.

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[9]*Title I, Elementary and Secondary Education Act--Compensatory Education Development Project* (Chattanooga: Chattanooga Public Schools, 1973), Appendix VIII, p. 1. (Hereafter, this work is cited as Title I, ESEA, 1972-73.)

[10]Ibid., p. 8.

[11]Ibid., p. 1.

Table I shows the district enrollment, total number of Title I participants, and number of Title I participants in the special reading program for 1972-73 (when the subjects were identified) and for 1973-74 (when the study was conducted).

TABLE I

DISTRICT ENROLLMENT, TITLE I PARTICIPANTS, AND PARTICIPANTS IN TITLE I READING PROGRAM FOR 1972-73 AND 1973-74

	1972-73	1973-74
Total District Enrollment	21,330	20,552
Total Title I Participants	4,546	5,242
Participants in Title I Reading Program	2,688	3,083

While the Title I target schools were identified on the basis of the percentage of families whose income was at poverty level, student participants in the target schools were identified on the basis of educational deprivation. As shown in Figure 1, the criteria for educational deprivation were scaled in levels of ascending conditions of remedial need from grade one through grade six. Eligible students included: in grade one, all students who achieved a score of 63 or below on the Metropolitan Readiness Test; in grade two; all students whose total reading and/or mathematics grade equivalent scores on standardized tests were one-half year below grade level; in grade three, all students whose reading and/or mathematics grade equivalent scores were one full year below grade level; in grades four and five, all students whose reading and/or mathematics grade equivalent scores were one-and-one-half years

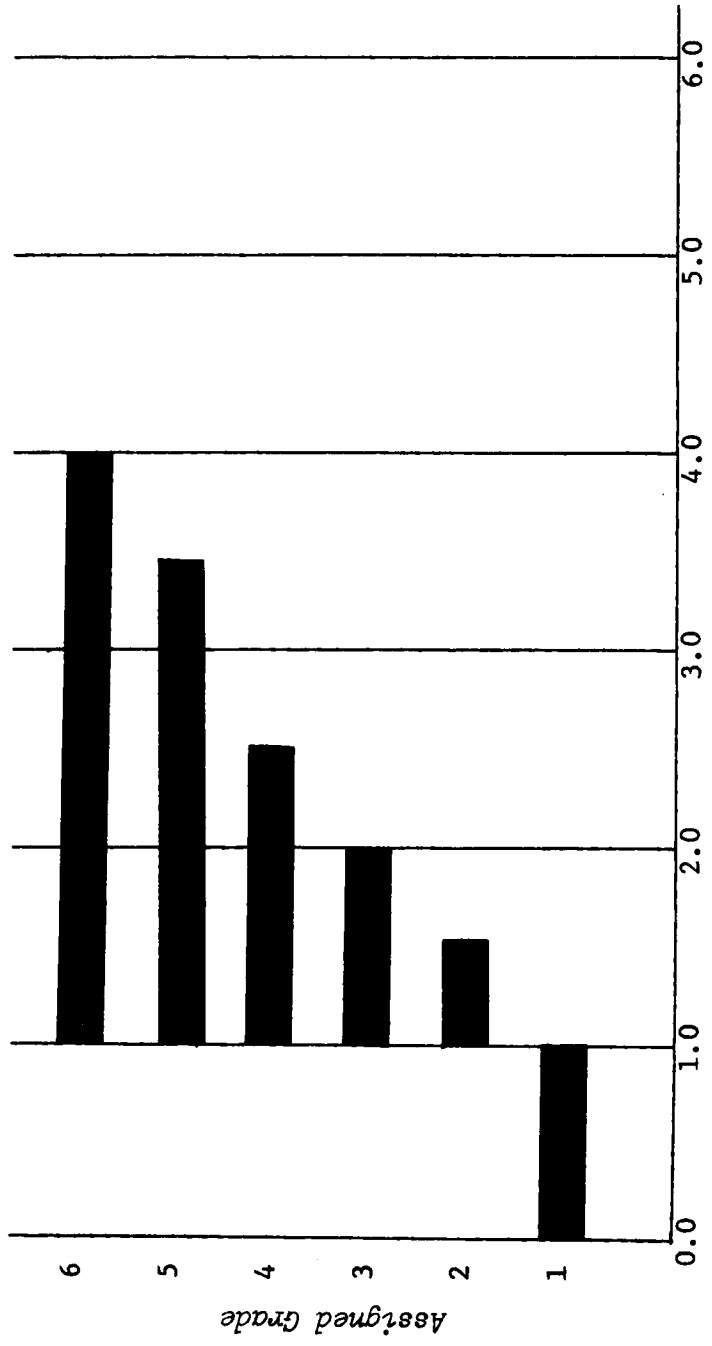


FIGURE 1. SCALE FOR IDENTIFICATION OF TITLE I PARTICIPANTS.

below grade level; and in grade six, all students whose reading and/or mathematics grade equivalent scores were two full years below grade level. Standardized tests used for the establishment of Title I eligibility were: the Metropolitan Readiness Test for grade one; the California Achievement Test for grades two, three, four, and six; and the Metropolitan Achievement Test for grade five. The last test was administered at grade five as a part of the State testing program.

II. HISTORICAL BACKGROUND

Compensatory education programs have been conducted in Chattanooga Public Schools since the enactment of ESEA, PL 89-10, in 1965; but in 1972-73, the Chattanooga project was redeveloped to concentrate a large percentage of the resources derived from federal funds on a project component for the improvement of basic skills, with primary emphasis on reading in grades one through six. The change was related to two broad administrative goals established for the school system at that time to: (1) designate reading improvement as the first priority of the district; and (2) develop and install a systematic approach to program planning and evaluation in the district.[12]

In the spring and summer of 1972, a new-continuous-progress reading curriculum was developed for the school system, to be introduced in all elementary schools in the 1972-73 school year. The curriculum was organized in 11 levels inclusive of those skills generally

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[12]"Current and Long-Range Directions for Planning," *Superintendent's Report* (A Report prepared for distribution to participants in the Community Profile Seminar conducted by the Office of Urban Affairs, The University of Tennessee at Chattanooga, April 2, 1973).

covered in kindergarten through grade six. Reading skills were arranged sequentially for each level in seven categories: language skills; vocabulary; word attack skills; comprehension skills; study skills; locational skills; and appreciation, attitude, and interest. The first two levels included two additional categories: basic behavioral and general readiness skills; and perceptual skills.[13]

Program in Which Subjects Had Been Involved

The Title I remedial program for 1972-73 was designed in accordance with a system of planning and evaluation which was being developed for installation in the district under a grant from Title III, ESEA.[14]

The Title I reading improvement program was based on a set of performance objectives which specified expected levels of proficiency after treatment in terms of number of levels gained by primary students (grades one through three) on the continuous progress reading curriculum and number of months gained by intermediate students (grades four through six) in grade equivalent scores on standardized tests. The evaluation plan required an analysis of gains from pretest to posttest levels.[15]

The program of treatment specified the use of a diagnostic-prescriptive approach to individualized instruction based on the skills identified in the *Continuous Progress Reading Curriculum for Chattanooga Public Schools* and using multimedia materials. Participants were not

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[13]*Continuous Progress Reading Curriculum for Chattanooga Public Schools* (Chattanooga: Chattanooga Public Schools, August, 1972).

[14]*Title III, ESEA, Proposal for the Development of a Comprehensive Evaluation System* (Chattanooga: Chattanooga Public Schools, 1972-1973).

[15]Title I, ESEA, 1972-73, pp. 9-10.

isolated from other students for their reading instruction; they were taught by the regular teacher within the classroom setting, but their prescribed programs were individualized according to their diagnosed needs. Paraprofessional aides were provided to assist teachers and a nonteaching reading resource teacher was assigned to each target school to provide leadership and assistance to teachers in the diagnostic-prescriptive processes. A wide variety of reading materials, teaching aids, and machine programs was supplied in the target schools.

During the first three weeks of the school term, each participant was diagnosed individually to determine his/her appropriate placement level in the continuous progress reading curriculum as a beginning point for instruction. Placement levels were determined by the use of a graded wordlist and an open-book test of reading comprehension. Following placement on the appropriate curriculum level, each student was re-diagnosed to identify specific skills which he/she had not mastered in his/her instructional level of the curriculum.

The compensatory reading program was conducted in four scheduled cycles of approximately eight weeks per cycle in the systematized approach. Each cycle was subdivided into instructional periods of two weeks length. By using paraprofessional aides to relieve teachers from classroom duty by grade groups, teachers were given a half-day planning period every two weeks.

In planning periods, the resource teachers assisted classroom teachers in diagnosing individual skills needs of the Title I students, prescribing learning activities related to diagnosed needs, selecting and/or preparing materials for the prescribed activities, and scheduling

daily classwork for a two-week period to include the prescribed activities. Responsibilities of both teachers and aides were specified for each two-week interim. At the end of each two weeks, a progress check was made to identify skills which had been mastered by individual pupils and those unmastered skills which should be carried forward into the next instructional period and retaught in fresh context. At the end of each eight-week cycle, a cycle evaluation was made of all skills taught during the preceding eight weeks. Those not firmly mastered by individual students were carried forward and new approaches and materials were applied in the succeeding cycle. Program emphasis was on mastery of reading skills in sequential order, students were advanced through curriculum levels according to their individual mastery of those skills, and materials selection was based on identified skills needs and the observable learning styles of individual students.[16]

A management system, based on the specification of process objectives and the use of self-monitoring techniques, was applied in order to maintain fidelity to the planned program. Principals were administratively responsible for the conduct of the remedial program in their respective schools and a project director had overall administrative responsibility for the program.[17]

Evaluation Results of the Program in Which Subjects Were Involved

Both the results of standardized tests and teacher judgment were analyzed in evaluation of the Title I reading program in which subjects

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[16]Ibid., pp. 13-16.

[17]Ibid., pp. 28-29.

of this investigation were engaged in school year 1972-73.

Standardized test scores were analyzed by an external evaluator and the evaluation report indicated that the reading program had been successful for a large percentage of participants.[18]

Table II shows mean gains made in grade equivalent scores on the California Achievement Test (CAT) by participants in grades four and six during the treatment period of approximately six-and-one-half months. In each grade on each subtest, the mean gain on grade equivalent scores was greater than one month for each month of instruction, and sixth grade participants showed mean gains greater than two months for each month of instruction. It should be noted that the criteria for selection of participants (as previously described) were such that no student was eligible for participation in the program who had previously averaged gaining as much as one full month for each month of instruction.

Table III compares the mean gains in grade equivalent scores on the Metropolitan Achievement Test (MAT) by fifth grade students who participated in the Title I reading program with fifth grade students in the same schools who did not participate in the program. On each subtest, the gains by participants exceeded the gains by nonparticipants.

Table IV compares the mean gains in grade equivalent scores on the CAT of fourth and sixth grade participants in the systematized Title I reading program of 1972-73, with scores of Title I participants in the less structured program of 1971-72. On both subtests for both grades the 1972-73 gains were greater than those of the preceding year.

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[18]*Title I Evaluation Report* (Chattanooga: Chattanooga Public Schools, August, 1973), pp. 6-22.

TABLE II

PRE- AND POSTTEST MEANS AND GAINS FOR TITLE I PUPILS IN GRADES FOUR AND SIX ON READING SUBTESTS OF THE CAT, SPRING, 1973

Subtests	Number of Observations	Means		Gains
		Pretest	Posttest	
Grade 4 - Vocabulary	151	1.96	2.91	0.95
Comprehension	151	2.46	3.31	0.85
Grade 5 - Vocabulary	198	2.83	4.20	1.37
Comprehension	195	3.33	4.78	1.45

Source: *Title I, ESEA, Evaluation Charts* (Chattanooga: Chattanooga Public Schools, 1972-1973).

TABLE III

PRE- AND POSTTEST MEANS AND GAINS FOR TITLE I AND NON-TITLE I PUPILS IN GRADE FIVE ON READING SUBTESTS OF THE MAT, SPRING, 1973

Subtests	Number of Observations	Means		Gains
		Pretest	Posttest	
Title I - Word Meaning	109	2.85	3.53	0.68
Reading	109	3.00	3.68	0.68
Total Reading	109	2.80	3.52	0.72
Non-Title I - Word Meaning	54	4.27	4.77	0.50
Reading	54	4.35	4.64	0.29
Total Reading	54	4.29	4.69	0.40

Source: *Title I, ESEA, Evaluation Charts* (Chattanooga: Chattanoogs Public Schools, 1972-1973).

TABLE IV

COMPARISON OF PRE- AND POSTTEST MEANS AND GAINS FOR TITLE I PUPILS IN GRADES FOUR AND SIX ON READING SUBTESTS OF CAT IN SCHOOL YEARS 1971-72 AND 1972-73

Subtest	Grade	Year	Means		
			Pretest	Posttest	Gains
Reading Vocabulary	4	1971-72	1.24	1.82	0.28
	4	1972-73	1.96	2.91	0.95
	6	1971-72	2.50	3.07	0.57
	6	1972-73	2.83	4.20	1.37
Reading Comprehension	4	1971-72	1.64	2.10	0.46
	4	1972-73	2.46	3.31	0.85
	6	1971-72	2.82	3.31	0.49
	6	1972-73	3.33	4.78	1.49

Source: *Title I, ESEA, Evaluation Charts* (Chattanooga: Chattanooga Public Schools, 1972-1973).

The results of teacher judgment of pupil progress in the remedial reading program are shown on the Title I evaluation chart in Table V. The Roman numerals in the first column indicate the 11 levels of the continuous progress reading curriculum. The figures in the last column indicate the total number of students remaining in the program at the end of the last program cycle who were placed on each level in the first program cycle. Each horizontal line of figures indicates, in relation to their starting levels, the distribution of students in the various curriculum levels at the end of the last program cycle. (It should be noted, in interpretation of this table, that valid comparison cannot be made between higher and lower levels of the curriculum since the intervals per level are not equal. Levels I, II, III, and IV are generally equated with the skills taught in the first grade; Levels V and VI with skills taught in the second grade; Levels VII and VIII with skills taught in the third grade; Level IX with skills taught in the fourth grade; Level X with skills taught in the fifth grade; and Level XI with skills taught in the sixth grade.) By teacher judgment, as well as by standardized test scores, the remedial reading program was successful with a large percentage of students, with gains being shown in a range of one to six levels of the continuous progress curriculum.

The display of pupil placement by teacher judgment was used in the initial identification of the subjects of this investigation. In Table V, students who made no progress in the otherwise successful program are reflected in the heavily outlined squares which descend diagonally and in the figures to the left of the outlined squares. The figures in the outlined squares represent students who, by teacher

TABLE V

ESEA TITLE I READING PROGRAM ANALYSIS OF ALL PUPILS GRADES 1-6
BY READING LEVEL FROM CYCLE 1 TO CYCLE 4, 1972-73

Cycle 1 Distribution Level	Cycle 4 Distribution of Pupils by Reading Level											Total
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	
I	75	201	109	30	8							423
II	6	166	337	260	87	16						872
III		3	64	186	130	51	14	9	1			458
IV		2	2	45	118	100	41	20	6			334
V				1	34	63	44	39	23	10		214
VI		2				15	46	61	31	2		157
VII			1		1	1	37	23	44	26	4	137
VIII								10			7	17
IX					1				25	28	12	66
X										2	8	10
XI											0	0
Total	81	374	513	522	379	246	182	162	130	68	31	2,688

judgments, had not progressed sufficiently at the end of the fourth cycle to warrant their advancement to a higher level of the curriculum. The figures at the left of the outlined squares represent students who either regressed or who were found to have been improperly placed in September.

Of the 2,688 participants remaining in the remedial reading program at the end of the last instructional cycle, a total of 492 (18.3 percent) had either failed to advance or had regressed. Many of the conditions which have affected the students who did not advance in the remedial reading program are reported in the findings of this investigation, but as a part of the setting in which they were identified, the conditions related to reading levels of all participants in the remedial program should be emphasized here. Of the total 2,688 participants, 2,087 (77.6 percent) were originally placed in the first four levels of the reading curriculum, which are equated with the skills generally taught in the first grade of school; 371 (13.8 percent) were originally placed in Levels V and VI, which are equated with the skills generally taught in the second grade; and 430 (16 percent) were originally placed in Levels VII and above, which are equated with skills generally taught at grade three and above. The placement levels described above are a composite of students in grades one through six.

CHAPTER III

REVIEW OF THE LITERATURE

The selection of readings for this investigation was guided by the two broadly defined characteristics of the subjects and by the specific purpose to which the study was addressed. The subjects were known to be economically disadvantaged and to have experienced extreme difficulties in learning to read in elementary grades. The purpose of the study was to consolidate and extend the knowledge about those subjects and to search for factors of their reading disabilities to which instructional treatment might be applied. The review of related literature which follows includes studies which might contribute to a better understanding of the economically disadvantaged child, of the nature of reading disabilities, and the relationship of reading problems to mental ability, language, auditory, visual, and motor functioning.

I. THE ECONOMICALLY DISADVANTAGED CHILD

The literature on the "disadvantaged" child is frequently confusing in its definitions, either implied or stated, of disadvantagedness. Horn suggested that, "the state of disadvantagedness is a relative matter . . .," and wrote:

> Any individual may be disadvantaged socially, economically, psychologically, and/or linguistically, depending upon the particular social milieu in which he is attempting to function at a given time.[1]

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[1]Thomas D. Horn, ed., *Reading for the Disadvantaged: Problems of Linguistically Different Learners* (New York: Harcourt, Brace, and World, Inc., 1970), p. 2.

Frost and Hawkes referred to an equally broad definition: "'Disadvantaged' by its definition implies unfavorable circumstances and conditions; injury to interest, reputation, credit and profit; and influences that are detrimental, harmful, and damaging."[2] In their own studies of the disadvantaged child, however, Frost and Hawkes specified "the conditions resulting from poverty," and addressed the various ethnic groups among whom the incidence of poverty is highest in this country--black Americans, Mexican-Americans, American Indians, and the Anglo poor.[3]

Because of the nature of this study of unsuccessful participants in a Title I, ESEA, remedial reading program, poverty was considered the common denominator of their disadvantaged status, and the conditions of poverty among black Americans and the Anglo poor in an urban setting provided general focus in the selection of the literature for this section of the study.

For some years before the passage of the Elementary and Secondary Education Act (ESEA) of 1965, sociologists, psychologists, and educators had been exploring the education-related issues of poverty. As early as 1945, Brossard, in his study of table talk among families, drew attention to the language differences between lower class families and higher class families. He found that lower class families tend to slur words--run words together so that sounds come to be the important thing--and to

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[2]Joe L. Frost and Glenn R. Hawkes, eds., *The Disadvantaged Child: Issues and Innovations* (Boston: Houghton Mifflin Company, 1970), p. 1.

[3]Ibid., pp. 2-3.

remove irregularities in language. Higher class families, he concluded, use words in an individual sense, express themselves in fuller sentences, and emphasize distinctions and subtleties in language.[4]

More than 20 years later, Deutsch and Brown examined the effects of family life on intelligence and learning. In their study of 543 urban public school children stratified by race, grade level (first and fifth graders), and social class, they found that in the lowest socioeconomic group, there was no father in the home of 15.4 percent of the white and 43.9 percent of the black subjects. In all groups, both male and female, black and white, first and fifth graders, the IQ's of children with fathers in the home were higher than those who had no father in the home.[5]

Riessman's earlier description of the underprivileged family suggested some of the effects of the absence of the father on family life. He pointed out that in order to live without the father as breadwinner, several families often share a single home. The child may have many parent substitutes including aunts, uncles, and grandparents in an "extended family." In black families the grandmother often plays a decisive role. The child may be required to shift from one adult to another for care as the different members of the household move in and out to work or new marriages. The home is often a crowded,

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[4]James H. S. Bossard, "Family Modes of Expression," *American Sociological Review*, April, 1945, pp. 226-237.

[5]Martin Deutsch and Bert Brown, "Social Influences in Negro-White Intelligence Differences," *Journal of Social Issues*, XX (April, 1964), 24-31.

noisy, active place where no one child is focused upon and where intense parent-child relationships are infrequent. Discipline is more likely to be by physical punishment than by reasoning, but attitudes toward punishment may be more accepting. The deprived are more likely to be concerned with functional responsibility than with symbolic training for the future.[6]

Since the publication of Riessman's works on the culturally deprived child, various studies of a more controlled nature have been made or brought to new prominence. Two studies in particular warrant note in relation to the possible environmental effects of poverty on the mental abilities of the disadvantaged child. One was a highly controlled laboratory series of rat studies by Krech, demonstrating the negative effects of a barren environment on both brain chemistry and anatomy.[7] The second was a longitudinal orphanage study--actually a series of studies over a period of more than 20 years--of so-called "feebleminded and normal infants" who, between the ages of one and four years, were placed in environments which differed greatly in the degree of enrichment and personal attention afforded the subjects. Not only did findings of the earlier studies show marked gains in the mental ability of those, originally believed to be feebleminded, who were provided the personally enriched environment, but follow-up studies of the subjects as adults also confirmed their greater life success as compared to the so-called

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[6]Frank Riessman, *The Culturally Deprived Child* (New York: Harper and Row, 1962), pp. 36-42.

[7]David Krech, "The Chemistry of Learning," *Saturday Review*, January 20, 1968, p. 50.

"normal" subjects who did not have the early enriched environment.[8]

During the same period in which many sociologists and social psychologists were reporting the effects of poverty on family lifestyles and on the mental abilities of children, other behavioral scientists, as well as those in medical fields, were engaged in studies of the prevalence of hunger in the nation and of the effects of malnutrition on physical and mental growth.

Two highly controversial reports on hunger in America received wide public attention in 1968. The first report, *Hunger, USA*, was released on April 22, 1968, by the Citizens' Board of Inquiry into Hunger and Malnutrition in the United States. Some of its more important, but controversial, findings were that: (1) one-fifth of the U.S. households have diets determined by the Department of Agriculture to be "poor"; (2) in households of low income levels, 36 percent subsist on "poor" diets; (3) there are 256 counties in the U.S. in which conditions are so distressed as to warrant a presidential declaration naming them hunger areas; (4) the worst possible health conditions exist among migrant farm workers and on some Indian reservations; and (5) existing federal food programs are terribly insufficient.[9]

Two months after release of *Hunger, USA*, the CBS Television Network broadcast an hour-long program entitled "Hunger in America."

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[8]Harold M. Skeels, "Effects of Adoption on Children from Institutions," *The Disadvantaged Child* (Boston: Houghton Mifflin Company, 1970), pp. 100-103.

[9]Citizens' Board of Inquiry into Hunger and Malnutrition in the United States, *Hunger, USA* (Washington: New Community Press, 1968), pp. 85-86.

The televised report was in general agreement with the Citizens' Board of Inquiry report.[10]

Both hunger reports invoked a storm of protest, particularly from officials in the Department of Agriculture and from Congressmen of the states in which the 256 counties were located. Major criticisms were focused on questions regarding the number of people who are poor to the point of suffering from malnutrition, and on the reported inadequacy of federal food programs and policies. Frost and Payne have described both the findings of the hunger reports and the subsequent criticisms. While they neither confirmed nor negated specific items of the controversial reports, they concluded that ". . . hunger exists in America," and that ". . . the younger the individual the greater the likelihood that malnutrition will cause permanent physical and mental damange."[11]

During the same period in which the incidence of hunger in this country was being explored and debated, attention was also being drawn to the effects of malnutrition on mental development. In 1968, Scrimshaw cited the effects on rats and pigs of deprived diets (particularly protein deficient diets). He wrote:

> . . . the animals exhibited signs of central nervous-system damage. Electroencephalograms showed dimunition of rhythmic activity, and degenerative changes were found post-mortem in the nerve cells and neurological cells of the spinal cord and brain medulla.

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[10]Charles Kuralt, "Hunger in America," CBS Television Network, June 22, 1968, cited by Joe L. Frost and Billy L. Payne, "Hunger in America: Scope and Consequences," *The Disadvantaged Child* (Boston: Houghton Mifflin, 1970), pp. 77-78.

[11]Frost and Payne, pp. 74-80.

> Similarly depleted animals were subsequently fed a high-protein diet for one to three months, and their clinical conditions improved promptly; but again, when these animals were examined post-mortem, cells in the central nervous system were still obviously damaged. The severity of such changes was increased by lowering the age at which the deficiency was established, by further reducing the protein value of the diet, or by increasing the duration of the deficient diet.
>
> . . . Severe protein deficiency in early life . . . causes not only the behavioral changes seen in food-restricted groups but also impairs the capacity to perform well in tests requiring the animals to learn from multiple tasks.[12]

Scrimshaw also reported that the studies of rats and pigs had shown that malnutrition affects the brain size of the animals. While the brain of the diet-deprived animals was abnormally large for the body weight, brain size was small for the age of the animal.[13]

Concerns for the deleterious effects of malnutrition among the poor have continued in more recent years, with increasing emphasis on the relationships between malnutrition of the mother during pregnancy and the physical and mental development of the child, and on the long-range effects of the poor dietary habits of adolescent girls. In the *Handbook on Learning Disabilities* prepared under the auspices of the New Jersey Association for Children with Learning Disabilities, DiLeo reported: "Poor food patterns are responsible for the widespread malnutrition among teenagers in general, but inadequate intake is a

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[12]Nevin S. Scrimshaw, "Infant Malnutrition and Adult Learning," *Saturday Review*, March 16, 1968, p. 65.

[13]Ibid., p. 64.

serious problem among the poor."[14]

Regarding the long-range effects of teenage malnutrition, DiLeo stated:

> Malnutrition during a girl's early years may have far-reaching effects. Rickets is no longer common in this country, but where it does exist, it tends to retard and distort the development of bones. Rickets in childhood may cause faulty development of the pelvis, with inadequate space for the easy passage of a fetal head, and the complicated delivery may result in damage to the brain, all traceable to malnutrition in childhood.
>
> More direct effects on the child's neurological integrity are the result of failure to provide adequate nutrients during the actual pregnancy.[15]

The theories of cultural deprivation as the major cause of the educational deficiencies found among poor children, particularly those who are black, were by no means universally accepted. In strong opposition to such conclusions, Clark wrote:

> To what extent . . . are these theories offering an acceptable alibi for pervasive educational default--a default in which the public school system permits and perpetuates educational inefficiency when dealing with powerless children or children from powerless roots in the society? To what extent are the social deprivation theories masking a simple and basic fact in the explanation of educational inefficiency in these lower-status children, mainly the fact that these children, by and large, do not learn, and do not perform up to expected norms, because they are not being taught effectively?[16]

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[14]Joseph H. DiLeo, "Effects of Early Malnutrition and Structure and Function: The Case for Secondary Prevention," *Handbook on Learning Disabilities: A Prognosis for the Child, the Adolescent, the Adult*, ed. Robert E. Weber (Englewood Cliffs, New Jersey: Prentice-Hall, 1974), p. 64.

[15]Ibid., p. 65.

[16]Kenneth B. Clark, "The Culture of Deprivation: A Complex Social Phenomenon," *Children with Reading Disabilities*, ed. Gladys Natchez (New York: Basic Books, 1968), p. 183.

Kappelman and his colleagues on the staff of Sinai-Druid Comprehensive Health Center in Baltimore contended that the effects of cultural deprivation and inappropriate educational processes could not account for all of the learning disorders being disclosed among disadvantaged urban children. In a study of 306 disadvantaged inner-city children with learning disorders, they found that:

> The predominant underlying basis for the learning disorder proved to be a neurological handicap in over 50 percent of the children studied. Approximately one quarter of the children had significant emotional disturbance as the predominant cause of their inability to learn.[17]

Statistics on the number of disadvantaged children in the country and on the percentages of the disadvantaged who are educationally retarded vary according to the definitions of disadvantagedness and of educational retardation. Havighurst estimated that 30 percent of the child population are socially disadvantaged, that about half of the disadvantaged children or 15 percent of the total child population are severely retarded in educational achievement, and that the proportion of socially disadvantaged and educationally retarded children in big cities may be as high as 30 percent.[18]

Precise statistics on the number of students with reading difficulties are not certain, but "most people agree that from 8 to 14 percent

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[17]Murray M, Kappelman, Eugene Kaplan, and Robert L. Ganter, "A Study of Learning Disorders Among Disadvantaged Children," *Journal of Learning Disabilities*, II, 5 (1969), 262.

[18]Robert J. Havighurst, "School Backgrounds: Their Impact on Schoolchildren," *Reading for the Disadvantaged* (New York: Harcourt, Brace and World, 1970), pp. 12-13.

of all school children--more than three times as many boys as girls--have difficulties in mastering the printed word."[19]

II. READING/LEARNING DISABILITIES

Definitions of terms applied in the literature to the conditions of children who have difficulty in learning to read generally vary according to the specialized field of interest of the author. The terms "learning disability" and "learning disorder" are frequently used synonymously, but the definitions of what the terms include are highly inconsistent. The National Advisory Committee on Handicapped Children suggested the following definition of learning disabilities:

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental phasia, etc. They do not include problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance, or to environmental disadvantage.[20]

Notwithstanding the preceding definitions, many authors continue to to treat mental retardation, emotional disturbance, and environmental disadvantage as learning disabilities or disorders.

Definition of the term "reading disability" has been similarly

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[19]Katrina DeHirsch, "Specific Dyslexia or Strephosymbolis," *Children with Reading Disabilities* (New York: Basic Books, 1968), p. 98.

[20]B. R. Gearheart, *Learning Disabilities: Educational Strategies* (St. Louis: The C. V. Mosby Company, 1973), p. 8.

confounded in the literature. It is sometimes used almost interchangeably with "learning disability," or it may be applied specifically to such restricted conditions as dyslexia or strephosymbolia, which refer to "word blindness." DeHirsch distinguished a learning disability as one which " . . . may have its roots in a number of causes, including inferior intelligence."[21] She related specific reading disability to dyslexia and wrote: " . . . the youngster who suffers from specific dyslexia . . . is theoretically at least, bright and reasonably well adjusted. He is the one who runs into trouble when he is first exposed to the printed word."[22]

Since it was not the purpose of this investigation to deal exclusively with specific dyslexia, or even with learning disabilities in restricted definition, but rather to identify those facets of the reading problems of the subjects to which instructional treatment can be applied, the search of the literature has been broadly inclusive, and the terms applied by the authors have been used in all references.

In a five-year study called Project Potential, conducted by Metfessel and supported in part by a U.S. Office of Education basic research grant, more than 3,000 individuals of various ethnic distinctions in dense poverty sectors of the country were investigated to identify individual correlates with academic success and disability, and in particular with success and disability in reading. Profiles were drawn in several categories, including high achievers, low

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[21]DeHirsch, op. cit., p. 99.

[22]Ibid., p. 100.

achievers, and poor readers. A profile of preschool readiness skills which correlated with subsequent school success was also developed.[23]

The profile developed for low achievers provided five categories of characteristics which correlated with poverty and school disability. Some of the major characteristics by categories, summarized in abstract from Metfessel's report, were: (1) learning style (such characteristics as better response to visual and kinesthetic signals than to oral or written stimuli, poor attention span, tendency to persevere longer in a task involving one activity, tendency to learn more readily by inductive than by deductive processes, less ability to learn from what they hear than their middleclass counterparts, and marked difficulty in timed-learning and test situations); (2) value framework and self-concept (such characteristics as self-expectations of failure, "today" orientation with difficulty in responding to long-range goals, lack of imagination, weak ego development, typically disciplined at home by physical force rather than through reason); (3) cognitive structure (such characteristics as important gaps in fundamental knowledge and concepts, not encouraged to ask questions, crippled in language development and language awareness, vocabulary not representative of school culture); (4) models of behavior (such as parents who do not encourage intellectual development, low value of education among parents whose work requires little education, negative parental

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[23]Newton S. Metfessel and Mark W. Seng, "Correlates with the School Success and Failure of Economically Disadvantaged Children," *Reading for the Disadvantaged* (New York: Harcourt, Brace and World, 1970), p. 75.

attitudes toward school, parental lack of involvement in or commitment to the learning processes in school, models of physical force rather than words in handling feelings of hostility); and (5) home environment (often overcrowded and noisy, frequently lacking in stimulating objects that would enhance conceptual development, limited out-of-school experiences relevant to school culture).[24]

The Project Potential profile for the poor reader provided five categories of characteristics which correlated with poverty and reading disability. Some of the major characteristics, summarized in abstract from Metfessel's report, included: (1) physical (such characteristics as vision difficulties in either acuity or perception, hearing difficulties in either acuity or perception, poor general health as evidenced by nervousness, tiredness, lack of energy, poor posture, pallid appearance, frequent complaining, irritability, poor attention, frequent absence from school); (2) mental (such characteristics as mental immaturity, resulting in difficulty in following directions, slowness in understanding assignments, limited vocabulary, poor word recognition, inattention); (3) emotional (such characteristics as tendencies to be temperamental, extremely fearful, easily angered, embarrassed, timid, or stubborn, to have tantrums, cry often, be pugnacious, lack poise, be unable to get along with peers, to show poor independent work habits, to have short recall and overall difficulty in adjusting to school); (4) social (such characteristics as meager vocabulary which will produce accent, hesitation in reading, or slow vocalizations, learning in a

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[24]Ibid., pp. 76-78.

parrot-like manner, difficulty in interpreting stories, lack of interest or understanding, poor school attendance, inattentiveness, inability to adjust, nervous); and (5) instructional (such characteristics as poor oral reading and poor silent reading, resulting in inability to follow directions, slowness in completing assignments, lack of interest in reading).[25]

While the profiles summarized above provide an extensive listing of symptomatic characteristics, errors in instructional treatment may occur if the treatment is addressed exclusively to such symptoms rather than to their underlying causes. The system of categorization applied in the Kappelman, Kaplan, and Ganter study in the Sinai-Druid Comprehensive Health Center in Baltimore suggests varied causative factors of learning disorders which have serious implications for instructional organization and planning. In their study of the 306 affected children, they found both organic learning handicaps and functional learning handicaps. In case reports, the diagnostic impression was focused on the primary cause of the learning disability or, in some cases, the primary combination of causes. Categories which the study team reported included: mental retardation alone; perceptual dysfunctions (e.g., dyslexia, inability to conceptualize, central communication disorder); neurological dysfunctions with hyperactivity; neurological dysfunction with withdrawal (autism); mental retardation with concomitant neurological dysfunction; significant emotional disturbance without organic central nervous system disease; cultural deprivation; and emotional

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[25]Ibid., pp. 83-88.

and educational immaturity.[26]

Because of its particular relationship to this investigation, the full definition of cultural deprivation as a category of learning disorders, applied in the Baltimore study cited above, is included here:

> This category defines those children whose learning disability can be viewed projectively or retrospectively as being caused by a severe degree of deprivation of environmental stimulation. IQ testing tends to show a pattern of "pseudo-retardation," with low IQ results stemming from limited fund of information about the world in general, and poor basic verbal (especially vocabulary) skills. These children tend to do much better on the "action-oriented" performance subtest of the Wechsler Children's Scale. Frequently, the performance IQ is average or even superior while a borderline retarded verbal IQ will bring down the total IQ result dramatically. Interview and family history show a pattern of minimal exposure to opportunities to broaden a child's horizon beyond an extremely restricted environment.[27]

The high incidence of children with various types of learning disabilities, particularly in large urban districts, and the complexity of their instructional needs have led educators to reexamine the traditional organization of special education classrooms. Wallace and Kauffman reviewed various patterns of instructional organization including regular class remediation, special instruction in a resource room for part of the day or week, and special classes which handicapped children attend for the entire day.[28] As possible aids for the provision of regular class remediation, they listed the use of teachers'

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[26]Kappelman, Kaplan, and Ganter, op. cit., pp. 28-30.

[27]Ibid., p. 30.

[28]Gerald Wallace and James M. Kauffman, *Teaching Children with Learning Problems* (Columbus, Ohio: Charles E. Merrill Publishing Company, 1973), pp. 12-14.

aides, team teaching, departmentalization, lay volunteers, the use of personalized instructional tools, programmed materials, and individual study carrels; and they concluded:

> Nothing, however, has been of more help than recognition by many educators of the necessity for planning for individual instructional needs.[29]

The resource room has the advantage of allowing children to be enrolled with their peers, but to spend a part of the day receiving the specialized help which they need. The time in each setting will depend upon the severity of the handicap. The major disadvantage of the resource room is related to the number of children who can be seen by the resource teacher. Of varied plans in which the resource teacher serves as a curriculum specialist or instructional consultant to the classroom teacher, Wallace and Kauffman concluded: "This approach makes more efficient use of the resource teacher's talents and provides direct help to the classroom teachers."[30]

Children, such as those who are mentally retarded, learning disabled, or behaviorally disordered, are still frequently assigned for the entire day to special classes, but the advantages and disadvantages of such an isolated arrangement are still in controversy.[31]

III. MENTAL ABILITY

The extent to which IQ tests in common use actually measure

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[29]Ibid., p. 14.

[30]Ibid., p. 13.

[31]Ibid., pp. 13-14.

intelligence remains uncertain and subject to continuing debate. What is known about such tests is that they do predict high or low success in school, and that IQ scores also correlate with occupation, with income, and with achievement of various kinds.[32]

With the purpose of identifying factors of the subjects' reading disabilities related to mental ability to which instructional treatment can be applied, the primary emphasis in the search of the literature has been on mental functioning rather than measurement.

While many questions concerning the growth, development, and functioning of the brain remain unresolved, it is known that only a portion of the human brain is functionally developed at birth. That portion, sometimes called the "old brain," controls what might be termed survival functions such as breathing, heartbeat, and sucking.[33]

While a large section of the brain as a physical organ--the folds of cortical tissue, or "new brain"--exists at birth, its maturation as a fully functioning organ requires both time and stimulation. Within the cortex, the primary sensory and motor areas are the first to become functional, serving as information receiving stations. Connections between these areas are made through secondary cortical areas, a widespread network of nerve cells, which develop functionally after the primary areas with which they are associated have begun to function. Some of these connecting networks overlap, and the overlapping areas

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[32]Sylvia Farnham-Diggory, *Cognitive Processes in Education: A Psychological Preparation for Teaching and Curriculum Development* (New York: Harper and Row, 1972), p. 159.

[33]Ibid., p. 5.

are sometimes referred to as tertiary areas.[34]

While certain brain functions, such as speech, have identifiable locations in the brain, the actual use of language involves concepts of many kinds; and the connections between various brain areas and the coordination of their functions are particularly important components of the language development process. Since neurological growth is dependent upon the secondary and tertiary association areas, the coordination of functions between and among various cortical areas cannot take place until the association networks are "ready." Regarding such readiness of associative tissue, Farnham-Diggory suggested that ". . . readiness may never occur in the absence of 'outside' stimulation . . . ."[35]

Wepman has conceptualized the neural structure as a three-part system made up of: (1) sensory input which is modality-bound to one of the sensory systems (e.g., visual, auditory, tactile) through which information is received; (2) a central integrative function, not modality-bound, but which receives and integrates information from the several sensory systems; and (3) output which is bound to a specific modality for expression (e.g., motor, speech). In relation to this concept, he noted that the learning abilities of an individual will be variously affected if any of the input or output systems of the brain or its central integrative function is either damaged by trauma (brain injury) or arrested in its development (agenesis). He argued that brain injury may permanently arrest the development of the impaired system and distort

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[34]Ibid., pp. 5-6.

[35]Ibid., p. 7.

input, output, and/or integrative functions; but the development of a mental system which has been arrested agenetically is capable of restoration to an adequately functioning level.[36]

Wepman's concept of agenesis warrants consideration in relation to the "pseudo-retardation" suggested in the definition by Kappelman, Kaplan, and Ganter of cultural deprivation as a category of learning disorders,[37] and to the results of Skeels' orphanage studies.[38]

There is an increasingly convincing school of thought that the negative effects of cultural deprivation on mental ability can be counteracted. Regarding this possibility, Hunt observed:

> So long as it was assumed that intelligence is fixed and development predetermined, the inferiority of children from families of low educational and socioeconomic status had to be considered an unalterable consequence of their genes. With the changes in our perception of man's intellectual development, . . ., there emerges a hope of combating such inferiority by altering for part of their waking hours, the conditions under which children develop. The question is "how?"[39]

A case report by psychotherapist Levi suggested a possible answer. The case involved an 11-year-old boy brought to the psychiatric clinic for failing schoolwork. Psychological test results showed a verbal IQ of 106, a performance IQ of 69, and a full-scale score of 88. The subject

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[36]Joseph M. Wepman, "Cerebral Injury or Agenesis--A Concept of Delayed Development," *Children with Reading Disabilities* (New York: Basic Books, 1968), pp. 151-152.

[37]Kappelman, Kaplan, and Ganter, op. cit., p. 30.

[38]Skeels, loc. cit.

[39]J. McVicker Hunt, "The Implications of the Changing Ideas on How Children Develop Intellectually," *The Disadvantaged Child: Issues and Innovation* (Boston: Houghton-Mifflin Company, 1970), p. 148.

had poor visual-motor and conceptual performances. The treatment goals that were set for him were not tied to the content of the school subjects which he was failing, but to the underlying learning problems. The first phase of his treatment was focused on learning to generalize. Once the notion of category was established and he had acquired a small store of categories, he was taught to scan this store and select the category most appropriate to the generalizing problem which he faced. While engaged in structured perceptual activities, he was led to verbalize his experiences and the accompanying thought processes. In the second and third phases of his treatment, he was given carefully sequenced perceptual activities accompanied by verbalization to improve his ability to see relations between concepts and to see relations between conceptual relations. Within six months after beginning the treatment, the subject's school grades showed marked improvement, and 13 months after the beginning treatment, he was doing average to good work in all subjects. On a comparison of WISC scores attained when first examined with those attained 16 months later, he showed a gain on verbal IQ from 106 to 121, on performance IQ from 69 to 79, and on full-scale IQ from 88 to 101.[40]

Farnham-Diggory has outlined eight key program adjustments which can be made to help teach the child with "thinking disabilities." Only a portion of one is included here: "With learning disabilities, practice,

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[40]Aurelia Levi, "Treatment of a Disorder of Perception and Concept Formation in a Case of School Failure," *Children with Reading Disabilities* (New York: Basic Books, 1968), pp. 385-395.

practice, and more practice may be the only way of developing alternate cortical systems to handle symbolic information."[41]

IV. LANGUAGE FUNCTIONING

"Knowledge of how the normal child learns language will be invaluable in developing the ability to diagnose and treat language difficulties in children."[42]

Within the individual, the processes involved in language comprise a complex system; within the environment to which an individual is exposed, the objects and conditions which may influence the growth of language are innumerable. It is in the convergence and interaction of groups of internal and external factors that the dual character of language development is defined.

Lewis described factors of language development that spring from within the child himself and those that impinge upon him from the community around him. A child is said to be a "born speaker" in that he has innate capacities for speech. From birth he vocalizes and responds to sounds. Biologists are disposed to believe that the young creature is born with a tendency to react to a range of not very specific sound-patterns and that the responses become more specific to those patterns which are heard coming from the parent. It would be justifiable

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[41]Farnham-Diggory, op. cit., p. 68.

[42]Janet W. Lerner, *Children with Learning Disabilities: Theories, Diagnosis, and Teaching Strategies* (Boston: Houghton-Mifflin Company, 1971), p. 6.

to explain the child's responses to the human voice in the same way.[43]

Piaget, basing his studies on the observation of infants and children, has described language as a process of adaptation similar to the biological process, of which he has written: "There is adaptation when the organism is transformed by the environment and when this variation results in an increase in the interchanges between the environment and itself which are favorable to its preservation."[44]

Although Skinner's theories differ in many respects from those of Piaget, he is no less convinced of the interaction between the individual and his environment: "Men act upon the world and change it, and are changed in turn by the consequences of their action."[45]

In verbal behavior, a term which Skinner preferred because of its emphasis on the individual speaker and its specification of behavior shaped and maintained by immediate consequences, he emphasized the importance of the responses of the listener. The behaviors of speaker and listener taken together compose what may be called a total speech episode.[46]

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[43]M. M. Lewis, *Language, Thought, and Personality* (New York: Basic Books, 1963), pp. 13-14.

[44]Jean Piaget, *The Origins of Intelligence in Children* (New York: W. W. Norton and Company, 1952), p. 5.

[45]B. F. Skinner, "A Functional Analysis of Verbal Behavior," *Psycholinguistics*, ed. Sal Saparta (New York: Holt, Rinehart and Winston, 1961), p. 67.

[46]Ibid., p. 68.

While it is true that many things in the individual's environment affect language development, the importance of those heard by the child cannot be overemphasized. In a child's earliest weeks is seen the beginning of a pattern which persists throughout his life. The child utters sounds and responds to the human voice; his mother (or other person) responds to his sounds and speaks to him. If any one of these conditions is impaired, the growth of language may suffer. The retarding effects of defective hearing, infrequency of language sounds heard, or the lack of variety in these sounds can readily be seen. The child contributes to his own growth toward language by his discomfort cries and his comfort sounds. The complementary contribution must come from his mother and the other people around him.[47]

There is evidence to indicate that in language development, as in other areas of learning, children follow a kind of cycle in which they practice what is familiar--their own accidentally created vocal sounds and imitations of those they hear from others; expand upon the familiar by attending to new sounds and trying to reproduce new sounds; then practice the new until it, too, is assimilated. Friedlander's experiments, cited by Farnham-Diggory, confirmed this pattern. Young children (11 to 15 months old) were observed in their playpens in order to identify their preferences for various types of auditory stimulation. The playpens were equipped so that the child could manipulate two plastic cylinders attached to a tape recorder outside. By manipulating one cylinder, the child turned on the mother's voice; the other cylinder

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[47]Lewis, op. cit., pp. 14-15.

turned on a stranger's voice. In subsequent parts of the experiment, the child's choices were between the mother's voice and music, between a stranger's voice and music, between the mother's voice reading monotonous material and a spirited conversation among the baby's mother, father, and a family friend. The experiment also provided for variations in the length of the tape heard. The findings indicated that the early preferences were for the familiar and for the shorter and simpler messages, but that often within a month, the child switched his preference to the more complicated loop.[48]

Cazden compared the effects of expansion and enrichment of language responses to children between two and three years of age in a Boston day care center. In tutorial sessions, some of the children were provided with language expansion responses from the tutor; some were provided with language enrichment responses from the tutor. In the expansion group, the tutor simply expanded the child's statement to the correct version of what the child was trying to say. For example, if the child said, "She sitting down," the tutor's response would be, "She's sitting down?" In the enrichment group, the tutor gave no concern to grammatical correctness, but rather enriched the child's statement. For example, in response to the child's remark, "Dere car," the tutor responded "That's right. That's the kind that cleans streets." The surprising finding was that the children who had

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[48]B. Z. Friedlander, "The Effects of Speaker Identify, Voice Inflection, Vocabulary, and Message Redundancy on Infants' Selection of Vocal Reinforcement" (paper presented to the Society for Research in Child Development, New York, 1967), cited by Farnham-Diggory, op. cit., pp. 344-346.

been enriched developed better grammar than the children who had been expanded. They were also better able to imitate complex sentences, to use longer sentences, and to use more complex noun and verb phrases.[49]

Lerner has emphasized the linkage between language and general cognitive and thinking processes:

> Because of the commonality in the thinking processes underlying all areas of language, the improvement of language skill in one area is likely to result in the improvement of language skill in other areas. For example, improvement in the skill of listening is likely to produce a concomitant improvement in the area of reading comprehension. Further, many children with language disabilities, such as severely delayed language acquisition, have been observed to deteriorate in all areas of intellectual function as they get older. The absence of functional language seems to adversely affect nonverbal cognitive abilities.[50]

Vygotsky's extensive work on the language of thought emphasizes the mutual and interacting dependency between the development of the thinking process and that of the language process:

> The relation of thought to word is not a thing but a process, a continual movement back and forth from thought to word and from word to thought. In that process the relation of thought to word undergoes changes which themselves may be regarded as development. . . . Thought is not merely expressed in words; it comes into existence through them.[51]

V. AUDITORY FUNCTIONING

Auditory language development is frequently categorized as inner

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[49]Courtney Cazden, "Environmental Assistance to the Child's Acquisition of Grammar" (unpublished Doctor's dissertation, Harvard University, 1965), cited by Farnham-Diggory, op. cit., pp. 361-363.

[50]Lerner, op. cit., p. 216.

[51]L. S. Vygotsky, *Thought and Language* (Cambridge, Massachusetts: MIT Press, 1962), p. 125.

language, receptive language, and expressive language.[52]

Lerner described inner language as". . . the pre-verbal ability to internalize and organize experiences, the antecedents of language and speaking."[53] Wallace and Kauffman described inner language development as being dependent upon the child's ability to establish verbal imagery for sounds, words, and concepts, and upon the use of a complex maze of skills needed in a logical thinking process.[54] It is logical to assume that the child whose inner language is deficient will experience serious problems in understanding language, whether it is heard in the speech of others or seen in its printed form.

Receptive language in its auditory form is the ability to understand the spoken language of others. Wallace and Kauffman noted that adequate receptive language involves the ability to auditorially perceive speech sounds, comprehend concrete and abstract words, understand the linguistic structure of sentences, follow directions, listen critically and make judgments.[55] The relationship of such receptive language abilities to inner language is readily apparent.

Expressive language is the process of spoken language which the child uses in communicating with others.[56] While it is a process of output rather than of auditory input, it is mentioned here to illustrate

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[52]Lerner, op. cit., p. 150.

[53]Ibid.

[54]Wallace and Kauffman, op. cit., p. 209.

[55]Ibid., p. 212.

[56]Ibid., p. 219.

the importance of the auditory function in the total language process.

The relationships among inner language, receptive language, and expressive language as they relate to reading difficulties are illustrated in one of Gearheart's case studies of children with learning disabilities. He described an 11-year-old boy in the fifth grade whose reading and language skills were at first and second grade levels on Stanford Achievement Test and whose IQ scores on the WISC were: verbal, 90; performance, 120; and full-scale, 105. The Illinois Test of Psycholinguistic Abilities was used in the diagnosis of the subject's difficulties. Gearheart summarized:

> John's visual association and manual expression are adequate; however, his grammatic closure, auditory memory, and verbal expression are low. This would indicate that he may have difficulty in thinking of things not immediately before him. This type of problem apparently greatly affects his abstract thinking. . . .[57]

A child or adult may have serious difficulty in deriving meaning from language if there is an input problem--auditory perceptual disability--in which the brain incorrectly translates incoming sound waves. Major difficulties also occur in the integration process if the bits of information received through auditory (or other) channels cannot be brought together with each other and with past memory and integrated into meaningful concept. Memory difficulties can be disabling to the language process, if the child has problems with storing and later retrieving information.[58]

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[57]Gearheart, op. cit., p. 196.

[58]Larry B. Silver, "Emotional and Social Problems of Children with Developmental Disabilities," *Handbook on Learning Disabilities* (Englewood Cliffs, New Jersey: Prentice-Hall, 1974), p. 106.

The noisy conditions which frequently characterize the lifestyles of economically disadvantaged families, particularly in urban settings, may lead children to inattentiveness to even the gross sounds around them. If this occurs, the child can hardly develop the fine discriminations of language sounds which must be made for oral comprehension. Lacking the ability to make auditory distinctions among word and letter sounds, the child will have no basis for attaching a word sound to a visual symbol on the printed page.

Lerner has summarized the similarities between listening and reading:

> Both require sensory stimulation, one to the eye and one to the ear. Both require the ability to receive, make sense out of, and organize the sensory stimuli. Both need a memory bank of vocabulary to relate the words that are read or heard. Both need a grasp of the various linguistic systems of the language being used, that is phonology, morphology and syntax. Both require an attentive attitude, for without close attention, half-listening or half-reading results. Finally, both demand the application of specific thinking skills, for comprehension of the ideas being listened to or read.[59]

Historically, far greater attention has been given to study of the visual modality of learning than to the auditory. It has been found, however, that many of the children who have difficulty learning phonics have poor auditory processing skills. The auditory mode of perception can be divided into subskills related to specific auditory functions, such as: auditory discrimination (the ability to recognize a difference between phoneme sounds and to identify words that are the same and those that are different); auditory memory (the ability to store and recall

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[59]Lerner, op. cit., p. 161.

what one has heard); auditory sequencing (the ability to remember the order of items given orally in a sequential list); and auditory blending (the ability to blend single phonic elements into a complete word).[60]

VI. VISUAL FUNCTIONING

Visual functioning, as distinguished from visual acuity, is generally concerned with visual discrimination (the process of detecting differences in objects, forms, letters, or words), and with visual perception (the cognition and interpretation of a visual sensation and the mental association of the present visual stimuli with memories of past experiences).[61]

Wallace and Kauffman listed four major abilities upon which competency in visual perception is dependent: (1) ability to discriminate the constancy of form; (2) ability to perceive objects in foreground and background and to meaningfully separate them; (3) ability to perceive different parts of an object in relation to the observer; and (4) ability to coordinate vision and movements of the body.[62]

Chalfant and Scheppelin identified an expanded list of component skills of visual perception, including: spatial relations (perception of the position of objects in space); visual discrimination (the ability to differentiate one object from another); figure-ground discrimination (the ability to distinguish an object from the background surrounding

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[60]Ibid., pp. 123-124.

[61]Ibid., p. 34.

[62]Wallace and Kauffman, op. cit., pp. 156-157.

it); visual closure (the ability to recognize or identify an object when only a part of it is seen); and object recognition (the ability to recognize the nature of objects when viewing them).[63]

Some children with learning disabilities have difficulty in making the adjustments which are necessary to shift from the perception of the whole to its distinguishing parts. Others may be able to perceive with clarity only one or two visual details, but lack the ability to perceive the object in its entirety.[64]

Figure-ground disturbances seriously inhibit the development of reading competency. This phenomenon is closely related to the difficulties in visual perception of the whole and its parts, as described above. Such a disturbance makes it difficult--in extreme cases, impossible--for the child to distinguish what is in the foreground and what is in the background. For example, on examining a white card with a single letter of the alphabet printed on it, a child with a figure-ground disturbance may visually perceive the shape of the white card broken in the center, but be unable to perceive, with adequate mental emphasis, the shape of the printed letter. Obviously, the effort to read from a page full of such printed letters will result in visual confusion and frustration. There are varying theories related to the characteristic of figure-ground perceptual difficulties, including the

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[63]James C. Chalfant and Margaret A. Scheffelin, "Central Processing Dysfunction in Children: A Review of Research," NINDS Monograph No. 9, Bethesda, Maryland, HEW, 1969, cited in Lerner, op. cit., pp. 122-123.

[64]Lerner, op. cit., pp. 121-122.

postulation of a relationship to immature personality. While such theories may or may not be true, it is known that, for whatever reason, " . . . girls generally have a more difficult time analyzing perceptual materials and discovering the figures that may be imbedded in distracting backgrounds than boys do."[65]

Problems with visual memory contribute seriously to learning problems of numerous kinds. The inability to recall the visual pattern of a word is perhaps the most obvious detriment to reading success, but there are other effects which can compound learning through other modalities than vision. A word heard, for example, will have meaning only to the extent that it invokes a memory or mental association, usually visual. The act of writing original material (as opposed to copying from a sample) requires the visual memory of letters and letter combinations. A case report of the analytic diagnosis of a reading difficulty by Della-Piana illustrates some of the difficulties which can accrue when visual memory, for whatever reason, is faulty. The subject of the report, a 12-year-old sixth grader, had an average reading level of 3.8. He wore corrective lenses but appeared, on Keystone Visual Survey Tests, to have some far-point fusion and acuity difficulty. In summarizing the diagnosis, Della-Piana wrote:

. . . . . .

> 4. It is possible that visual disability in early school years (nearsightedness) was a cause of his original disability in reading.
>
> 5. Assuming corrective lenses are used, the potential

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[65]Farnham-Diggory, op. cit., p. 422.

causes of his reading disability are:

> a. Poor visual memory for words, probably due in part to lack of attention or motivation, and partly due to a habit of ignoring many detailed visual clues because of lack of far-point visual acuity during the time when teachers were using the chalkboard to instruct students in these skills.
>
> b. A heavier reliance on "phonic analysis" skills than on word-form clues together with some deficiency in phonic analysis probably due to visual perception difficulties.[66]

In the process of reading, writing, and spelling, visual sequencing can be a persistent problem for some students. Kephart defined sequence as "the placement of events on a temporal scale so that the time relationships and the order of events are apparent."[67]

The perception of letters and words in proper sequence is closely linked to both time and space. Kephart described the difficulty a child might have when asked to draw a square from a sample copy. The child perceives all four sides simultaneously, but the lines must be drawn in sequence. The shape of the square requires a perception of space. Its reproduction requires the child to translate the task from space to time. The perceptual translation is reversed, however, when word analysis is taught. If the child is taught to "sound out" the parts of words, such as "con-sti-tu-tion," then to put the parts together and say "constitution," or recognize it instantly as a whole, he has

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[66]Gabriel M. Della-Piana, *Reading Diagnosis and Prescription: An Introduction* (New York: Holt, Rinehart and Winston, 1968), pp. 90-91.

[67]Newell C. Kaphart, *The Slow Learner in the Classroom* (2d ed.; Columbus, Ohio: Charles E. Merrill, 1971), p. 180.

had to translate from time to space.[68]

Problems of visual perception are so closely related to motor functions that the two are often discussed conjunctively as visuo-motor perceptual problems. These relationships are reviewed in the following section of this chapter.

VII. MOTOR FUNCTIONING

A number of theories of learning disabilities place high emphasis upon the need to develop a foundation of sensory-motor and perceptual motor learning before proceeding with conceptual and cognitive learning. Certainly, many children who have learning problems also appear to have difficulty with motor performance. Whether this high correlation indicates that the motor problem is the cause of the learning difficulty is not certain.[69]

At birth, an infant is capable of certain survival movements such as heart beat, breathing, and sucking, as previously described in relation to mental ability.[70] Other movement in the newborn infant is generalized throughout the body. Arm and leg movement is not related to their functions, but rather as an adjunct of total movement. As the infact matures and learns, more specific motor responses emerge.[71]

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[68]Ibid., p. 182.

[69]Lerner, op. cit., pp. 105-106.

[70]Farnham-Diggory, op. cit., p. 7.

[71]Eugene G. Roach and Newell C. Kaphart, *The Purdue Perceptual-Motor Survey* (Columbus, Ohio: Charles E. Merrill, 1966), p. 5.

Roach and Kephart proposed that there are two general principles governing the differentiation of specific motor responses. The first suggests that growth and motor development generally proceed from head to foot. The second suggests that growth and motor development proceed from the axis of the body (midline) outward to the periphery.[72]

The beginning development of eye-hand coordination can be observed in infant behavior during the early months of his life. While arm movement in a reaching manner is being developed, or differentiated from total movement, visual focus on an object is being developed. Meanwhile the grasping movement required for holding an object is in process of development. Through an apparent process of maturation and learning, the complex task of integrated visual and motor targeting on a single object is accomplished.[73]

Wepman referred to motor performance as an output modality, reacting to messages from the central integrative function, which receives input from each of the separate senses.[74] Certainly, the body can and does react with various kinds of motor performance in response to stimuli from each of the sensory channels. In consideration of the reading process, the visual-motor and auditory-motor functions are of primary importance.

Wallace and Kauffman noted that overcoming motor problems involves developing : adequate gross motor skills; the ability to

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[72]Ibid.

[73]Fernham-Diggory, op. cit., p. 9.

[74]Wepman, op. cit., p. 152.

maintain balance and move rhythmically; body image and body awareness; lateral consistency in body orientation; directional orientation; and adequate fine motor skills.[75]

Kephart discussed four motor generalizations which are important to success in school: balance and posture; locomotion; contact; receipt and propulsion. He related balance and posture to the child's needs to develop and maintain a sense of gravity. He contended that the gravitational axis of the body is the point of origin for all directions and orientations in space, and he considered posture to be the basic movement pattern upon which all other movements are based. Locomotion permits the exploration of the relationships between objects in space. The motor activity in such exploration must be performed automatically without the attention of the child if the information about the environment is to be perceived and integrated effectively. Contact permits the child to explore the relationships within objects. The contact generalization involves reach, grasp, and release. Here, too, Kephart contended, the motor activities should be performed with sufficient skill not to detract from the exploration of the object. Receipt and propulsion are activities required for environmental exploration when the child and/or the objects to be explored are moving. Receipt is related to the activities through which the child makes contact with an object moving toward him; propulsion involves activities through which movement is imparted to an object.[76]

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[75]Wallace and Kauffman, op. cit., p. 148.

[76]Kephart, op. cit., pp. 96-100.

In discussing the motor learning, Kephart emphasized the importance of starting the child where he is in the learning process and developing the basic motor generalizations before engaging the child in efforts to master skills which demand a high degree of fine motor coordination. To do so, he warned, may result in the development of splinter skills which the child can apply to only a single task, such as writing his name, but without contributing to the development of the motor coordination required for full and continuing exploration of the environment.[77]

Lerner reported that there is little conclusive evidence to indicate that motor programs result in significant academic gains.[78] However, the continuing evidence of high incidence of motor difficulties among children with learning problems demands continued study and experimentation in programs. Perhaps the verbal reinforcement applied as a component of treatment in Levi's case study, previously reviewed, might be tested as a component of treatment for motor difficulties.

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[77]Ibid., pp. 102-103.

[78]Lerner, loc. cit.

CHAPTER IV

PROCEDURES

This investigation was conducted as an exploratory field study, based on an *ex post facto* design, for the identification of common characteristics of students from impoverished communities who have extreme problems in reading, and of the factors of their reading disabilities to which instructional treatment can be applied. The methodology was designed for adaptability to the study of other learning needs than reading and in other settings than that in which this research was conducted, as well as for the uses of this investigation.

I. POPULATION AND SAMPLES

The identification of the population for the study resulted from a review of the findings of the final evaluation of the remedial reading component of a Title I Compensatory Development Project for 1972-73.[1] A total of 2,688 students participated in the special reading project. Of that number, 492 students were found who had made no progress in the otherwise successful remedial reading program. (See Table V, page 29, and the accompanying discussion.)

At the beginning of the 1973-74 school year, of the original number of students who had made no progress in the 1972-73 program, a

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[1] *Title I Evaluation Report* (Chattanooga: Chattanooga Public Schools, August, 1973), pp. 6-22.

total of 324 remained in the Title I program and 168 had left--79 were promoted to junior high school, 14 were transferred to special education, and 75 were transferred to non-Title I schools in or out of the city.

In January, 1974, the elementary schools of Chattanooga were reorganized by a system of school pairing or clustering in fulfillment of the requirements of a U.S. District Court order for desegregation.[2] Schools which had formerly served grades one through six from a single zone were reorganized so that one of two paired schools would serve grades four through six from the two zones. In some situations, a large elementary school was clustered with two smaller schools. In the desegregation process, several of the Title I schools were paired or clustered with non-Title I schools and one was closed. That action resulted in the transfer of approximately half of the students who had previously been identified as having made no measurable progress in the special reading program. Although provisions were made in the Title I project for continued compensatory services for the transferred students, this investigation was focused on only 153 students who remained in the 10 original Title I target schools. The students who remained were generally distributed among grades two through six in 1973-74 as a result of promotion from their assigned grades of the preceding year. The only first grade students remaining in the group were those who had not been promoted to the second grade at the end of the 1972-73 school year.

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[2]*Mapp v. Board of Education of the City of Chattanooga, Tennessee* (District Court of the U.S. for the Eastern District in Tennessee, Southern District), C.A. No. 3564 (Order filed December 18, 1973).

Since the transfer students were identified only on the basis of their assigned grade levels, since students in both primary and intermediate levels were transferred, and since the natural movement of students out of the district was random, the remaining 153 students, who comprised 31.1 percent of the original group, could be considered typical of the 492 students identified from the 1972-73 evaluation report. They were therefore designated as the population for the field-study investigation. Data collection forms from which the following basic data related to the population and samples were compiled are shown in Appendix A.

In February, 1974, out of the 153 subjects in the population, eight (5.2 percent) were in the first grade; 22 (14.4 percent) were in the second grade; 11 (7.2 percent) were in the third grade; 20 (13.1 percent) were in the fourth grade; 49 (32 percent) were in the fifth grade; and 43 (28.1 percent) were in the sixth grade. By chronological age as of October 31, 1973, 30 subjects (19.6 percent of the total population) were seven years old; 11 (7.2 percent) were eight years old; 17 (11.1 percent) were nine years old; 46 (30.1 percent) were 10 years old; 43 (28.1 percent) were 11 years old; and six (3.9 percent) were 12 years old. By sex and race, the population was made up of 93 male subjects (60.8 percent), 60 female subjects (39.2 percent), 137 black subjects (89.5 percent), and 16 white subjects (10.5 percent). A summary of the population by grade, age, sex, and race is shown in Appendix B, Table VI.

Within the population of 153 subjects, three samples were identified for special consideration. The identification of subjects for Sample I was necessitated by the conditions of the district's spring

testing program with regard to the grade levels (one through three) at which the Otis-Lennon Mental Ability Test would be administered. Sample II was selected as a typical group of the population for the administration of two instruments for which both time and cost requirements were too great to involve the total population. The instruments which were not administered to the total population, but which were administered to Sample II, were the Wechsler Intelligence Scale for Children (WISC) and the Developmental Perceptual Motor Fitness Evaluation Test. Sample III was selected, in the course of the research, on the basis of a need for further information about a subset of the population who were unable to respond at a measurable level on more than one item of the Durrell Analysis of Reading Difficulty.

Sample I, hereafter referred to as the primary sample, included subjects enrolled in primary grades in May, 1974. Designation of a primary sample resulted from a decision by the central staff of the school district to provide, for the first time, a district-wide spring testing program. The selection of the Otis-Lennon for inclusion in the spring testing program was based on the need identified in this investigation for information regarding the mental ability of subjects, in order to obtain a reading expectancy level. The decision to administer the test only in primary grades was related to: (1) the priority focus of the State and local reading programs for 1974-75 at primary levels; and (2) cost factors related to the purchase of test instruments and data processing.

The primary sample included in May, 1974, 31 subjects (20.3 percent of the population). Within the sample, five subjects (16.1

percent) were in the first grade, 16 (51.6 percent) were in the second grade, and 10 (32.2 percent) were in the third grade.

By chronological age on October 30, 1973, 21 subjects in the primary sample (67.7 percent) were seven years old, nine (29 percent) were eight years old, and one (3.2 percent) was nine years old.

By sex and by race, the primary sample was made up of 19 male subjects (61.3 percent), 12 female subjects (38.7 percent), 23 black subjects (74.2 percent), and eight white subjects (25.8 percent).

A summary of the primary sample by grade, age, sex, and race is shown in Appendix B, Table VII.

Sample II, hereafter referred to as the pilot schools sample, included the subjects enrolled after January, 1974, in two of the 10 remaining Title I target schools. During the course of this investigation, additional funds were made available to the school district under Title I, ESEA, Part C. These funds were focused on the subjects of this study in two pilot schools, with the dual purpose of providing clinical remedial assistance to the special study group of students and gaining information for use in inservice training programs for teachers in all Title I schools. Portions of this research were underwritten in the Title I, ESEA, Part C project. Ridgedale and Charles A. Bell schools were identified as the pilot schools.

The pilot schools provided target situations which typified a composite of all Title I target schools. After the January organization of elementary schools, three of the Title I schools became primary units serving grades one through three, five became intermediate units serving grades four through six, and two continued to serve all six

elementary grades. One of the pilot schools, Ridgedale, was converted to a primary unit; the other, Bell, was converted to an intermediate unit. Thus, the two pilot schools were organizationally typical of all Title I schools in the district.

Based on data from the needs assessment for the Emergency School Aid Act Basic Project for 1972-73,[3] the mean grade equivalent scores on the reading subtest of the California Achievement Test (CAT) for all third grade students ranged in Title I schools from 1.16 to 2.90. Ridgedale's third grade reading mean was 1.96--second highest among the target schools. The mean grade equivalent on total reading scores for all sixth grade students ranged in Title I schools from 2.65 to 4.94. Bell's sixth grade reading mean was 2.86--second lowest among the Title I schools. Thus, the two pilot schools can be considered typical of a composite of all Title I schools with regard to reading levels in the fall of 1973. It should be emphasized, however, that on reading levels alone, neither pilot school is singly typical of either the Title I primary units or the Title I intermediate units, and findings should be generalized only from a composite of the two pilot schools to a composite of all Title I schools in the fall of 1973. Neither should the mean grade equivalent scores cited above be considered precisely applicable to the pilot schools after January, 1974, since both schools were paired with other schools at that time. For purposes of relative comparability, it can be noted that Ridgedale was paired with

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[3]*Emergency School Aid Act, Basic Proposal - Year II*, Part C, Index 9.1a (Chattanooga: Chattanooga Public Schools, 1974), p. 1. (Hereafter this work is cited as ESAA.)

Howard, which had a lower third grade mean grade equivalent (1.17) in the fall of 1973; Bell was paired with Clifton Hills, which had a higher sixth grade mean grade equivalent (4.94) in the fall of 1973. With regard to reading levels, the nature of the desegregation plan was such that in Title I schools, generally, those with lower achievement levels were paired with schools having higher achievement levels and vice versa. The fall, 1973, scores cited above are applicable to the purpose of this study since most of the subjects of the investigation remained in the same school after the reorganization, with only a few being transferred to one of the other target schools, thereby remaining in the subject group.

For a comparison of economic levels of the two pilot schools, the Title I Survey of Economic Eligibility (revised June, 1973)[4] provided reference. With regard to the percentage of families in each school were were at the poverty level of $3,000 or less in annual income or who were on public welfare, the range in Title I schools was 32.7 percent to 78.9 percent. At that time the poverty level for Ridgedale was 56.02 percent--fifth lowest among the Title I schools. The poverty level for Bell was 75.2 percent--second highest among the Title I schools. Since Bell serves students from a public housing project and Ridgedale does not serve students from a housing project, since there are five Title I schools which do serve public housing projects and five which do not serve a public housing project, and since the percentage of families at poverty level in schools which do serve public

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[4]*Title I, ESEA, Compensatory Education Development Project* (Chattanooga: Chattanooga Public Schools, 1973-74), Appendix VIII, p. 1. (Hereafter this work is cited as Title I, ESEA, 1973-74.)

housing projects is generally higher than in schools which do not serve public housing projects, the two pilot schools in composite can be considered typical of all Title I schools in the fall of 1973 with regard to economic levels. As in the case of reading levels, however, generalizations can only be drawn from the composite of the two pilot schools to the composite of all Title I schools prior to the January reorganization. For purposes of relative comparability, it can be noted that Ridgedale was paired with Howard, which had a higher percentage of poverty (64.9 percent), and Bell was paired with Clifton Hills, which had a lower percentage of poverty (28.41 percent). With regard to percentage of poverty, the nature of the desegregation plan was such that in Title I schools, generally, those with higher percentages of poverty and vice versa. The poverty percentages which prevailed in June, 1973, are applicable to the purposes of this study, since most subjects remained in the same schools after the reorganization and since the study relates to a population of specifically identified students rather than to total school enrollments at any time.

The pilot schools sample includes all subjects from the population who were enrolled in the two pilot schools in February, 1974. On the basis of comparisons described above, the sample is considered typical of the population.

The pilot schools sample in May, 1974, included 32 subjects (20.9 percent of the population). Within the sample, one subject (3.1 percent of all subjects in the sample) was in the first grade; four (12.5 percent) were in the second grade; one (3.1 percent) was in the third grade; 14 (43.7 percent) were in the fifth grade; and

12 (37.5 percent) were in the sixth grade.

By chronological age on October 31, 1973, five subjects (15.6 percent) in the pilot schools sample were seven years old; one (3.1 percent) was eight years old; 11 (34.4 percent) were 10 years old; 14 (43.7 percent) were 11 years old; and one (3.1 percent) was 12 years old.

By sex and race, the pilot schools sample was made up of 14 male subjects (43.7 percent), 18 female subjects (56.2 percent), 27 black subjects (84.4 percent), and five white subjects (15.6 percent).

A summary of the pilot school sample by grade, age, sex, and race is shown in Appendix B, Table VIII.

Sample III subjects, hereafter referred to as the Durrell non-responding sample, were identified in the analysis of findings from the Durrell Analysis of Reading Difficulty which was administered to all subjects. That analysis revealed a number of subjects in the population who were unable to respond at a measurable level on more than one item of the Durrell instrument. Although the research design provided for the administration of the Otis-Lennon in primary grades as a screening device and for the determination of a reading expectancy level, it was deemed advisable to examine the Durrell non-responding subjects through the administration of an individually administered intelligence test. The WISC was selected for the purpose. In the interest of the pilot project previously described, the WISC was also administered to all subjects in the pilot schools sample, Since the Durrell non-responding subjects in the two pilot schools were also included in the pilot schools sample, the subjects for the Durrell

non-responding sample included only those enrolled in the eight Title I target schools which were not direct participants in the Part C project. The Durrell non-responding sample cannot be considered typical of the population because of the selection purpose and method applied. Findings for this sample can only be generalized to students having the most extreme reading difficulties.

The Durrell non-responding sample in May, 1974, included 19 subjects (12.4 percent of all subjects). Within the sample, two subjects (10.5 percent of all subjects in the sample) were in the first grade; 10 (52.6 percent) were in the second grade; one (5.3 percent) was in the third grade; four (21 percent) were in the fourth grade; and two (10.5 percent) were in the fifth grade.

By chronological age on October 31, 1973, 12 subjects (63.1 percent) in the Durrell non-responding sample were seven years old; five (26.3 percent) were nine years old; and two (10.5 percent) were 10 years old.

By sex and by race, the Durrell non-responding sample was made up of 13 male subjects (68.4 percent), six female subjects (31.6 percent), and 19 black subjects (100 percent).

A summary of the Durrell non-responding sample by grade, age, sex, and race is shown in Appendix B, Table IX.

II. INSTRUMENTS

The exploratory field study of elementary students from impoverished communities who have had extreme problems in reading was based upon information derived from 10 instruments. Three of the instruments

were data collection forms developed by the researcher to consolidate information already available in the cumulative records of each subject with regard to personal history, school history, and medical history. Two instruments were standardized achievement tests which are regularly administered to all elementary students in the fall testing program for the school district. The standardized achievement tests are the California Achievement Test (CAT) administered in late September in grades two, three, four, and six, and the Metropolitan Achievement Test (MAT) administered in late September in grade five. Only the reading subtests of the achievement batteries were considered in this investigation. Of the five remaining instruments, four are commercially published: the Otis-Lennon Mental Ability Test, the Durrell Analysis of Reading Difficulty, the Wepman Auditory Discrimination Test, and the WISC. The Developmental Perceptual Motor Fitness Test was developed by the district's physical education resource teacher to include items from several related instruments in common use. It was originally developed to assist physical education teachers who were provided in two elementary schools from the resources of a Model Cities Educational Improvement Program. No local provisions are made for staffing the elementary schools with physical education teachers. Since the administration of any perceptual-motor fitness test to elementary students was dependent upon the use of the available personnel in the district, the Chattanooga adapted instrument was selected because of its greater familiarity to the examiners.

Personal History (Data Consolidation Form)

The form developed for the consolidation of data available in the cumulative record of each subject regarding personal history was designed to include basic information about the student, his/her parents or guardian, and his/her position among siblings.

Basic information on each student was required to guide the research procedures and analyses, to facilitate reporting procedures to the school district for which the investigation was conducted, and to derive an initial description of the subjects by grade, age, sex, and race.

Basic information on parents or guardians of subjects included marital status, adult(s) with whom the child lives, and employment status. An attempt was made to identify educational levels of parents, but these data were not recorded in school records with sufficient consistency to provide valid information.

The subject's position among siblings was identified as (1) only child, (2) twin, (3) youngest child, (4) middle child, or (5) oldest child.

The data consolidation form for personal history is shown in Appendix A.

School History (Data Consolidation Form)

The form developed for the consolidation of data available in the cumulative record of each subject regarding school history was designed to include basic information related to (1) the student's attendance record for the three preceding school years, (2) number of schools

attended, (3) preschool experience, and (4) indications of available psychological information. The data consolidation form for school history is shown in Appendix A.

Medical History (Data Consolidation Form)

The form designed for the consolidation of data available in the cumulative record of each subject regarding medical history was designed to include information reported from (1) the medical examination which is required for each student in the district when he first enters school, (2) the regularly administered Keystone Telebinocular screening and other visual examinations which may have been reported to the schools, and (3) the Beltone Audiometer screening provided in the district and other hearing examinations which may have been reported to the schools. The data consolidation form for medical history is shown in Appendix A.

California Achievement Test (1970 Edition)

The California Achievement Test (CAT) contains tests in three basic skills areas--reading, mathematics, and language. Only the reading subtests were utilized in this investigation. Subtest scores are provided for reading vocabulary, reading comprehension, and reading total.

The revised edition of the CAT was standardized in 1970, with a stratified random sample of school districts. The stratification was assigned to include seven geographic regions (all 50 states and the District of Columbia), three school district enrollment groups (by number of students enrolled), and four community types (urban, rural,

town, and other). Within each school district, schools were selected randomly.[5]

Metropolitan Achievement Test (1970 Edition)

The Metropolitan Achievement Test (MAT) contains tests in six basic areas: reading, language, spelling, mathematics, science, and social studies. Only the reading subtests were utilized in this investigation. Reading scores are provided for word knowledge, reading, and total reading.

The revised edition was empirically standardized at two times during the 1969-70 school year. The standardized samples were selected to represent the national population in terms of geographic region, size of city, socioeconomic status, and public and non-public schools.[6]

Since grade equivalent scores are most frequently used in the school district's testing program as well as in the Title I evaluation reports, only grade equivalent scores have been used in this investigation.

Otis-Lennon Mental Ability Test

The primary level and elementary level I of the Otis-Lennon series provide test items of the pictorial type for which no reading is required. The items sample the mental processes of classifications

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[5]Ernest W. Tiegs and Willis W. Clark, *California Achievement Tests: Examiner's Manual* (Monterey, California: CTB/McGraw-Hill, 1970), pp. 6-7.

[6]Walter M. Durost and others, *Metropolitan Achievement Tests: Teacher's Handbook* (New York: Harcourt, Brace, Jovanovich, Inc., 1971), p. 16.

(eduction of relations), following of directions, quantitative reasoning, and comprehension of verbal concepts. In addition to these items, elementary level I samples the mental process of reasoning by analogy.[7]

In his analysis of the Otis-Lennon series, Milholland stated:

> The construction and norming of this test bespeaks adherence to the highest level of current standards. . . .
> . . . . . .
>
> The standardization sample was chosen to represent the country's educational system, not the population at large. Controls were applied for size of school, family income, educational level of adults, types of school (public, private, church-related), geographic location (all 50 states were represented), and quality of school in terms of educational achievement within its own system. . . .
> . . . . . .
>
> The test correlates adequately with educational criteria and with other measures of general scholastic aptitude. . . .[8]

In this investigation the Otis-Lennon Deviation IQ (DIQ) was used. As described in the test manual, the DIQ is ". . . a normalized standard score with a mean of 100 and a standard deviation of 16 points."[9]

Durrell Analysis of Reading Difficulty (New Edition)

The Durrell Analysis of Reading Difficulty (Harcourt, Brace and World, Inc., New York, 1955, 1937) was developed by Donald D. Durrell, Professor of Education and Director of Educational Clinic, Boston

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[7]Arthur S. Otis and Roger T. Lennon, *Otis-Lennon Mental Ability Test: Manual for Administration* (New York: Harcourt, Brace and World, Inc., 1967), p. 6.

[8]John E. Milholland, "Otis-Lennon Mental Ability Test," *Seventh Mental Measurements Yearbook*, I (Highland Par, New Jersey: Gryphon Press, 1972).

[9]Otis and Lennon, op. cit., p. 14.

University. The individually administered diagnostic instrument, described by Cushenbery and Gilreath as one of the "two most common tests used for diagnostic purposes,"[10] consists of subtests for: oral reading; silent reading; listening comprehension; word recognition and word analysis; letters (naming letters, identifying letters named, and matching letters); visual memory of words; sounds (hearing sounds in words and sounds in letters, and learning to hear sounds in words); and spelling and handwriting. The handwriting test item was not used in this study since it is scored only with regard to difficulties in speed, letter formation, writing position, and height, spacing, and slant of letters; it does not provide norms directly related to visual-motor coordination which might be applied with validity to the reading difficulties of the subjects. (Information related to the visual-motor problems of subjects was derived from the WISC and from the Developmental Perceptual Motor Fitness Test.)

Wepman Auditory Discrimination Test (Revised 1973)

The Wepman Auditory Discrimination Test (Language Research Associates, Inc., Chicago, 1973, 1958) was developed by Joseph W. Wepman, University of Chicago. The individually administered instrument evaluates the child's competency in distinguishing the differences in sounds in pairs of spoken words. As noted by Lerner, the Wepman Test ". . . does not assess auditory perception solely, but also other

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[10]Donald C. Cushenbery and Kenneth J. Gilreath, *Effective Reading Instruction for Slow Learners* (Springfield, Illinois: Charles C. Thomas, Publisher, 1972), p. 21.

learning processes such as short-term memory."[11] The Wepman is included in the batteries of diagnostic instruments recommended and further described by Kephart,[12] Cushenbery and Gilreath,[13] and Lerner.[14]

Wechsler Intelligence Scale for Children

As stated by Osborne, ". . . the WISC has become of age and remains the individual intelligence test of choice for children in the 6-13 age range."[15]

The WISC, which requires individual administration by a qualified and skilled psychometrist, utilizes both verbal and nonverbal performance.[16] The verbal tests use oral language for administration and responses of subjects. The verbal subtests sample such abilities as general information, general comprehension, arithmetic, similarities, vocabulary, and digit span. The nonverbal tests are presented in a visual manner and the subject responds by performing certain tasks. The performance subtests sample such abilities as picture completion (selection of missing elements), picture arrangements (sequencing), block design, object assembly, coding, and mazes. Various patterns of scores

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[11]Janet W. Lerner, *Children with Learning Disabilities: Theories, Diagnosis, and Teaching Strategies* (Boston: Houghton Mifflin Company, 1971), p. 135.

[12]Newell C. Kephart, *The Slow Learner in the Classroom* (Columbus, Ohio: Charles C. Merrill Publishing Company, 1971), p. 43.

[13]Cushenbery and Gilreath, op. cit., p. 51.

[14]Lerner, op. cit., p. 56.

[15]R. T. Osborne, "Wechsler Intelligence Scale for Children," *Seventh Mental Measurements Yearbook*, I (Highland Park, New Jersey: Gryphon Press, 1972).

[16]Cushenbery and Gilreath, op. cit., p. 39.

have been identified to aid in the analysis of deficits and strengths in mental processes.[17]

Anastasi[18] compared the WISC favorably with other individual intelligence scales in the quality of its test construction procedures, but noted the dearth of validity data as its principal weakness. Its advantages lie in the provision of both verbal and performance scales and in the variety of its tasks.

Developmental Perceptual Motor Fitness Test

The developmental Perceptual Motor Fitness Test was developed locally for use by elementary physical education teachers in an Educational Improvement Program under support from the Chattanooga Model Cities project. The instrument is an adaptation of the Purdue Perceptual-Motor Survey developed by Roach and Kephart,[19] with selected items from the Kraus-Weber Test of Physical Fitness.[20]

The Chattanooga adapted instrument includes eight major items, most of which contain several related activities. The items include: identification of body parts; balance beam activities; jumping, hopping, and skipping; angels-in-the-snow (game-like activities for the detection of neuromuscular differentiation and specific problems with right- or

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[17]Lerner, op. cit., pp. 58-59.

[18]Anna Anastasi, *Psychological Testing* (New York: The Macmillan Company, 1958), p. 286.

[19]Eugene G. Roach and Newell C. Kephart, *The Purdue Perceptual-Motor Survey* (Columbus, Ohio: Charles E. Merrill Books, Inc., 1966).

[20]H. Kraus and Ruth P. Hirschland, "Minimum Muscular Fitness Tests in School Children," *Research Quarterly*, XXV, 1 (1954), 178-188.

left-sidedness); test of upper back strength (Kraus-Weber item); test of lower back strength (Kraus-Weber item); ball reaction catch; and chalkboard activities (circle drawing).

In addition to the test items included on the scoring forms, examiners were asked to observe and comment on the subjects' responses on imitative movement. Standards described by Roach and Kephart[21] were applied in the examiner's ratings.

The Developmental Perceptual Motor Fitness Test scoring form is shown in Appendix A.

III. ADMINISTRATION OF INSTRUMENTS

With one exception (the WISC), all instruments used in this investigation were administered by professional staff personnel of Chattanooga Public Schools. The WISC was administered by a clinical psychologist through a contractual arrangement under the provision of a Title I, ESEA, Part C project.

The three data consolidation forms related to personal history, school history, and medical history were submitted to the resource teachers who serve the Title I target schools in which the subjects were enrolled. The resource teachers transferred information from the individual student cumulative records to the data forms.

The CAT and the MAT are administered each fall as a part of the regular testing program for the school district. For this purpose, the local director of testing provides instruction on testing procedures

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[21]Roach and Kephart, op. cit., pp. 26-68.

to all principals and representatives of their teaching faculties. The procedures are reinterpreted by principals to their faculties. Teachers administer the tests and return the completed test booklets and/or scoring sheets to the director of testing services who submits them to the proper testing bureau for machine scoring. The CAT is scored by the California Testing Bureau; the MAT is scored by the Tennessee State Testing Bureau in Knoxville, Tennessee. Scores are returned to the school district on computer printouts.

The Otis-Lennon was administered in a manner similar to that described above for the group achievement tests. Principals and school representatives received oral and written instructions from central staff personnel on testing procedures, and teachers were instructed in the individual schools by principals. Tests were administered by classroom teachers and submitted through the central office of education to the State Testing Bureau in Knoxville, Tennessee, for scoring. By computer code numbers, the scores of subjects were compiled and submitted to the Title I director.

The Durrell was administered by the Title I reading diagnostician as a part of her assigned duties in the Title I project for 1973-74. The test was administered individually to all 324 students remaining in the target schools in the fall of 1973 who had made no measurable progress in reading during the preceding year. Only the results of tests administered to the 153 subjects of this investigation are reported. The scores of individual students on each test item were compiled by the reading diagnostician and submitted to the Title I director.

The Wepman (Form IIA) was administered individually to subjects in the population by the reading resource teacher in each Title I target school. The reading resource teachers scored the tests and submitted the response sheets to the Title I director.

By contractual arrangement under the provision of the Title I, ESEA, Part C project, a clinical psychologist was employed to administer the WISC to subjects in the pilot schools sample and the Durrell non-responding sample. Parental permission for the examination was obtained by the schools. The psychologist administered the test to individual subjects at the school and provided written reports of test scores, interpretations, and recommendations to the Title I director.

The Developmental Perceptual Motor Fitness Test was administered to subjects in the pilot schools sample by the physical education resource teacher for the district, assisted by two physical education teachers. Subjects were scheduled for the test in groups of four to five during their regular remedial reading period in the pilot program, but each subject was examined individually. The test activities were conducted at the school which the subjects attended, in rooms arranged for the purpose. Individual items of the test were scored by the examiners on specially prepared scoring forms shown in Appendix A. The completed forms were submitted to the Title I director.

Data from all sources described above were examined and included in this study by permission of the superintendent of schools. Permission was also granted by the clinical psychologist for the use of data derived from his administration of the WISC and of his related psychological reports.

IV. RESEARCH DESIGN AND TECHNIQUES OF DATA ANALYSIS

The design for this investigation was oriented to the purpose of educational planning with the intention of providing maximum adaptability to the study of other educational problems in other settings than those of this research. The "Design for an Exploratory Field-Study of an Educational Problem," outlined in Figure 2, has provided the research design for this investigation. The design includes four basic components having parallel activities. The basic components are: (1) definition of information needs; (2) data collection activities; (3) data analysis activities; and (4) search of related literature.

The first information need defined for the investigation was related to the identification of the subjects. As described in the preceding section on "Population and Samples," initial data collection activities were focused on the Title I Evaluation Report.[22] Related data analysis activities were directed to: (1) an assessment of the findings of the evaluation which resulted in identification of 492 students who had made no measurable progress in the remedial reading program in which progress had been shown for 2,196 other participants having similar backgrounds and levels of educational deprivation; and (2) assessment of current enrollment status of the students identified which resulted in the reduction of the population for the study to 153 subjects remaining in the original Title I target schools. The related review of the literature at this juncture was focused on evaluation

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[22] *Title I Evaluation Report*, loc. cit.

Definition of Information Needs	Data Collection Activities	Data Analyses Activities	Search of Related Literature
Information for identification of subjects.	Review of needs assessment findings, program evaluation results, individual school test results, and other evaluation information available in the school district.	Assessment of data for identification of priority problem and of subjects for the field-study.	Review of literature related to similar program evaluations.
Information already available on the subjects.	Identification of sources of available data (e.g., cumulative records, anecdotal records, standardized test results, central files). Consolidation of available data.	Assessment of available data to determine needs for new information.	Review of literature from the broad field related to the priority problem and to students in conditions similar to those which apply to the field-study subjects.
New information on subjects.	Identification and/or preparation of instruments for obtaining additional data. Arrangements for instruments to be administered. Administration of instruments. Tabulation of new data.	Determination of procedures and/or techniques of analysis to be applied. Analyses of both originally available and new data.	Review of literature related to instruments and/or techniques for examination of students having problems similar to those on whom the field-study is being focused. Review of literature related to specific components of the identified program.
Information dissemination.	Preparation and dissemination of report of findings.	Assessment of relationships between findings of field-study and findings in the literature.	

FIGURE 2. DESIGN FOR AN EXPLORATORY FIELD-STUDY OF AN EDUCATIONAL PROBLEM.

reports of other compensatory education programs, similar to that in which the subjects of this investigation were engaged.

The second defined need was for a determination of information already available from which characteristics of the subjects might be studied and further information needs might be identified. Major sources of available data were the cumulative records of students which are maintained in each school and the results of standardized tests which are centrally maintained in the Department of Education. Forms were developed for the collection of data from cumulative records on the personal history, school history, and medical history of subjects as shown in Appendix A. Standardized test scores were tabulated directly from computer printouts. Assessment of available data indicated that the only standardized tests related to the purposes of the study which had been administered were the CAT and the MAT. No test of mental ability had been administered, not had any diagnostic instruments been consistently applied. The review of the literature from the broad field led to the determination of needs for information related to the mental ability, language functioning, auditory functioning, visual functioning, and motor functioning of the subjects.

A review of literature related to instruments for the examination of students having problems similar to those of the subjects led to the selection of instruments to provide new information--the Otis-Lennon, the Durrell, and the Developmental Perceptual Motor Fitness Test. Findings from the Durrell led to the selection of two additional instruments to be administered--the WISC and the Wepman.

The Otis-Lennon was scheduled by the school district for

administration by the teachers to all students in grades K-3, May, 1974, as a part of a new spring testing program.

The Durrell was administered by the reading diagnostician assigned to the Title I project staff. It was administered to all 324 Title I participants who remained in city schools in the fall of 1973. Only the results for the 153 subjects who comprised the population of this study are reported.

As previously noted in reference to the population and samples of this investigation, the analysis of results from the Durrell revealed 19 students who were unable to make more than one measurable response on the Durrell instrument. Consequently, contractual arrangements were made under the provisions of the Title I, Part C project for a clinical psychologist in the city to examine the subjects in the Durrell non-responding sample using the WISC. For purposes of the Title I, ESEA, Part C project, the WISC was also administered by the same examiner to all subjects in the pilot school sample.

Upon recommendation by the educational diagnostician who administered the Durrell, arrangements were made for the administration of the Wepman to all subjects. The recommendation was based on the questions raised during administration of the Durrell as to whether the poor responses of the subjects on the Durrell section on auditory discrimination might be as much related to their cultural backgrounds as to their auditory functioning. The Wepman, selected because of the simplicity of its vocabulary, was administered by the reading resource teachers assigned to each Title I school.

The Developmental Perceptual Motor Fitness Test was administered

by the physical education resource teacher for the school district, assisted by two physical education teachers who serve elementary schools. Because of the time requirements of the individually administered test, only the subjects in the pilot schools sample were tested.

Because of the district's organization of elementary grades into primary units and intermediate units, all test data were tabulated for analysis by assigned grades of the subjects. Personal history, school history, and medical history derived from cumulative records for the investigation of characteristics of the subjects were also tabulated for analysis by race and by sex of the subjects.

Data derived from the CAT, the MAT, and the Durrell were analyzed for the total population and for each sample. Data derived from the Otis-Lennon were analyzed only for the primary sample. Data derived from the Wepman were tabulated for analysis by pilot schools sample and by Durrell non-responding sample. Data derived from the Developmental Perceptual Motor Fitness Test applied only to the pilot schools sample.

Data from all sources were tabulated for analysis by items and/or by subtests. Data from the WISC were tabulated for analysis both of scores and of interpretations by the examiner. Test scores were tabulated in frequency distributions.

Arithmetical techniques of analysis were applied to all data, with consideration for both numbers and percentages of incidence.

Data analyses were directed to the identification of the more common characteristics of the subjects with regard to personal history, school history, and medical history for the specific purpose of providing

clues for the early identification of students likely to require special compensatory programs.

Test data were analyzed for the identification of factors related to mental ability, language functioning, auditory functioning, visual functioning, and motor functioning to which instructional treatment might be applied.

All data were reviewed for the identification of any pertinent extraneous information which was not originally sought in the study.

Findings of the investigation were compared with findings in the literature to determine their relationships.

Although information dissemination is included in the "Design for a Field-Study of an Educational Problem," it will be applied only for the purposes of the school district for which the study was conducted; it is not reported in this study.

CHAPTER V

ANALYSIS OF DATA

It was the methodological purpose of this exploratory field study, based on an *ex post facto* design, to employ procedures adaptable to the continuing purposes of educational planning. It was the informational purpose of the study to extend the knowledge about a specific set of subjects (elementary students in impoverished communities who have extreme problems in reading).

In the *ex post facto* design, the reading disability of the subjects was identified as the dependent variable, and the independent variables were addressed in eight open-ended questions. The first three questions specified the use of available school records for the identification of the more common characteristics of the subjects with regard to personal and family history, school history, and medical history. The last five questions were related to the factors of the subjects' reading disabilities which could be identified for instructional treatment in categories of mental ability, language functioning, auditory functioning, visual functioning, and motor functioning. In the report which follows, each of the eight questions which guided the study is restated prior to the presentation of the related data analyses.

Data from all sources were tabulated for analysis by items and/or by subtests. Test scores were tabulated in frequency distributions. All data tables which relate to the independent variables of this study are shown in Appendix B. Only those five tables which relate to the

setting and the rationale for the study are included in the body of the report.

Arithmetical techniques of analysis were applied to all data, with consideration for both numbers and percentages of incidence.

I. PERSONAL AND FAMILY HISTORY

Question 1: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what are the more common characteristics related to the personal and family history which can be identified from available school records?*

The data consolidation form related to personal history is shown in Appendix A. The information required on the form was transferred by the Title I resource teacher in each school from the individual cumulative record maintained by teachers for each student. The form was designed to collect basic information about the student, his/her parent or guardian, and his/her position among siblings.

Basic information on the subjects provided a description of the characteristics of the subjects by grade, age, sex, and race. Basic information on parents or guardians of subjects included: marital status; adult(s) with whom the subject lives; and employment status. The subject's position among siblings was identified as: only child; twin; youngest child; middle child; or oldest child.

Characteristics of Subjects by Grade, Age, Sex, and Race

In February, 1974, among the population of 153 subjects, eight (5.2 percent) were in the first grade, 22 (14.4 percent) were in the

second grade, 11 (7.2 percent) were in the third grade, 20 (13.1 percent) were in the fourth grade, 49 (32 percent) were in the fifth grade, and 43 (28.1 percent) were in the sixth grade. Further examination of the grade distribution of subjects shows that 112 subjects (73.2 percent) were in the intermediate grades and 41 (26.9 percent) were in the first three grades. A summary of the population by grade is shown in Appendix B, Table VI.

It should be noted that only those first grade subjects who were repeating the grade were included in this study, since they were the only children in the first grade of the Title I target schools at the time the study was made (1973-74) whose lack of progress in reading in the preceding year could be known. It should also be emphasized that the students who had failed to progress in the Title I compensatory reading program in grade six of school year 1972-73 were not included in this study. They had been promoted to junior high school and the study was restricted to subjects who remained in the Title I elementary target schools. Consequently, any generalizations regarding the incidence of severe reading problems at primary and intermediate grades must be modified to reflect the data restrictions.

Even when allowances are made for the limitations of the data which resulted from the restricted criteria applied in the identification of subjects, it is still apparent that the incidence of students who were unable to progress successfully in the compensatory reading program was notably higher in intermediate grades than at the primary levels. Examination of the data shown in Appendix B, Table VI, reveals that 61 subjects (39.9 percent) in grades one through four in 1973-74 comprised

the group who were in primary grades during the preceding years when their failure to progress in reading was detected. A total of 92 fifth and sixth grade subjects of the 1973-74 study (60.1 percent) were in the fourth and fifth grades in the year of their identification; these figures do not reflect any intermediate students who were in grade six in 1972-73 who might have had similar reading difficulties.

The age of subjects was generally related to the grade levels described above and to the incidence of grades repeated, which will be reported as a part of the subjects' school history relative to Question 2. The subjects in the population ranged in age from seven years to 12 years in school year 1973-74 when the study was conducted. For purposes of comparison, the ages of all subjects on October 31, 1973, were tabulated for this study. In the population of 153 subjects, 30 (19.6 percent) were seven years old, 11 (7.2 percent) were eight years old, 17 (11.1 percent) were nine years old, 46 (30.1 percent) were 10 years old, 43 (28.1 percent) were 11 years old, and six (3.9 percent) were 12 years old. Examination of individual ages in relation to assigned grades revealed that 22 subjects (14.4 percent) were overage for their grade assignments and two (1.3 percent) were underage. A summary of the population by age is shown in Appendix B, Table VI.

By sex and race, the population was made up of 93 male subjects (60.8 percent) and 60 female subjects (39.2 percent), 137 black subjects (89.5 percent) and 16 white subjects (10.4 percent). When sex and race factors were examined together, it was found that 87 subjects (56.9 percent) were black males, 50 subjects (32.7 percent) were black females, six subjects (3.9 percent) were white males, and 10 subjects (6.5 percent)

were white females. A summary of the population by sex and race is shown in Appendix B, Table VI.

No valid generalizations regarding the race of subjects in direct causal relationship to their reading disabilities can be drawn from this study. The Title I target schools, from which the subjects of the study were identified, as described in Chapter II, are located in the impoverished communities of the core city. The incidence of poverty in the black communities of the core city is known to be higher than in the white communities, and the school populations in these areas reflect both the greater number of black residents and the higher incidence of poverty among the black families. The race of the subjects of this study can be applied for no other purpose than identification.

The high incidence of male subjects identified because of their severe reading difficulties has also been treated in this study as an identification factor for the specific group examined. No attempt was made to establish a causal relationship or to generalize to the broad student population. However, for purposes of identification, the high incidence of males among the subjects was examined in relation to the information concerning the marital status of parents, adults with whom the subjects live, and employment status of parents. The analysis of these factors of parent/guardian status is reported in the following section.

The grade, age, race, and sex of subjects in the three samples were also analyzed for identification of the subsets of subjects to whom special measures were administered. A summary of these factors for the primary sample is shown in Appendix B, Table VII. The summary for the

pilot schools sample is shown in Appendix B, Table VIII. The summary for the Durrell non-responding sample is shown in Appendix B, Table IX.

Characteristics of Subjects in Relation to Parent/Guardian Status

The marital status of parents was examined in relation to both the race and sex of subjects, as well as by total population. Information on the marital status of parents was available in the school records of all but two black male and two black female subjects. All percentages were based on the total number of subjects on whom information was available, and not on the total number in the population.

Among the 149 subjects in the population for whom information on marital status of parents was available, the parents of 40 subjects (26.8 percent) were married; the parents of 15 subjects (10.1 percent) were divorced; and the parents of 94 subjects (63.1 percent) were separated. A total of 109 subjects (73.1 percent) had parents who were either divorced or separated.

Among the 133 black subjects in the population for whom information on marital status of parents was available, the parents of 29 black subjects (21.8 percent) were married; the parents of 13 black subjects (9.8 percent) were divorced; and the parents of 91 black subjects (68.4 percent) were separated. A total of 104 black subjects (78.2 percent) had parents who were either divorced or separated.

Among the 16 white subjects in the population, the parents of 11 subjects (68.7 percent) were married; the parents of two (12.5 percent) were divorced; and the parents of three (18.7 percent) were separated. A total of five white subjects (31.2 percent) had parents

who were either divorced or separated.

Because of the high incidence of male subjects in the population, the marital status of parents was also examined in relation to the sex of subjects.

Among the 91 male subjects in the population for whom information on the marital status of parents was available, the parents of 19 male subjects (20.9 percent) were married; the parents of 10 male subjects (11 percent) were divorced; and the parents of 62 male subjects (68.1 percent) were separated. A total of 72 male subjects (79.1 percent) had parents who were either divorced or separated.

Among the 58 female subjects in the population for whom information on the marital status of parents was available, the parents of 21 (36.2 percent) were married; the parents of five (8.6 percent) were divorced; and the parents of 32 (55.2 percent) were separated. A total of 37 female subjects (63.8 percent) had parents who were either divorced or separated.

A summary of the marital status of parents of subjects by race and sex of subjects is shown in Appendix B, Table X.

Information concerning the adults with whom the subjects lived was examined in relation to both the race and sex of the subjects, as well as for the total population. Information on the adults with whom the subjects lived was available on all subjects in the population except two black male and two black female subjects. All percentages were based on the number of subjects on whom information was available, and not on the total population.

Among the 149 subjects in the population for whom the information

was available, 91 subjects (61.1 percent) lived with the mother; one subject (0.7 percent) lived with the father; 34 subjects (22.8 percent) lived with both parents; 12 subjects (8 percent) lived with a grandmother; two subjects (1.3 percent) lived with both grandparents; eight subjects (5.4 percent) lived with the mother and stepfather; and one subject (0.7 percent) lived with adoptive parents. A total of 103 subjects (69.1 percent) lived with either the mother or grandmother, and neither the father nor grandfather was in the home.

Among the 133 black subjects in the population on whom information was available, 88 (66.2 percent) lived with the mother; one (0.7 percent lived with the father; 24 (18 percent) lived with both parents; 11 (8.3 percent) lived with a grandmother; two (1.5 percent) lived with both grandparents; and seven (5.3 percent) lived with the mother and stepfather. A total of 99 black subjects (74.4 percent) lived with either the mother or grandmother, and neither the father nor grandfather was in the home.

Among the 16 white subjects in the population, three (18.7 percent) lived with the mother; 10 (62.5 percent) lived with both parents; one (6.2 percent) lived with a grandmother; one (6.2 percent) lived with the mother and stepfather; and one (6.2 percent) lived with adoptive parents. A total of four white subjects (25 percent) lived with either the mother or grandmother, and neither the father nor grandfather was in the home. In the white population of 16 subjects, the majority of subjects lived with both parents.

When information concerning the adult(s) with whom subjects lived was examined in relation to the sex of the subjects, it was found

that among the 91 male subjects in the population on whom the information was available, 59 male subjects (64.8 percent) lived with the mother, one (1.1 percent) lived with the father, 17 (18.7 percent) lived with both parents, eight (8.8 percent) lived with a grandmother, five (5.5 percent) lived with the mother and stepfather, and one (1.1 percent) lived with adoptive parents. A total of 67 male subjects (73.6 percent) lived with either the mother or grandmother, and neither the father nor grandfather was in the home.

Among the 58 female subjects in the population on whom information was available, 32 female subjects (55.2 percent) lived with the mother, 17 (29.3 percent) lived with both parents, four (6.9 percent) lived with a grandmother, two (3.4 percent) lived with both grandparents, and three (5.2 percent) lived with the mother and stepfather. A total of 36 female subjects (62.1 percent) lived with either the mother or grandmother, and neither the father nor grandfather was in the home.

A summary of the information related to the adult(s) with whom the subjects lived is shown in Appendix B, Table XI.

The employment status of parents was examined in relation to both the race and sex of subjects, as well as for the total population. Employment information was also examined in relation to the parents who were in the home. Since the school records contained no information on the employment status of the parents of 28 subjects, percentages are based on the 125 subjects for whom information was available.

Analysis of parents' employment status revealed that for 31 subjects in the population (24.8 percent), the mother was employed

and the father was not in the home; for 20 subjects (16 percent) the mother was unemployed and the father was not in the home; for 25 subjects (20 percent) the mother was on public welfare and the father was not in the home; for one subject (0.8 percent) the father was employed and the mother was not in the home; for 14 subjects (11.2 percent) both parents were in the home and both were employed; for 19 subjects (15.2 percent) the father was employed and both parents were in the home; for five subjects (4.0 percent) the mother was employed and both parents were in the home; for one subject (0.8 percent) the grandparent was employed and the parents were not in the home; for six subjects (4.8 percent) the grandparent was unemployed and the parents were not in the home; and for three subjects (2.4 percent) the grandparent was on welfare or social security and the parents were not in the home. For a total of 54 subjects (43.3 percent) the mother or grandmother with whom the subject lived was either unemployed or receiving public welfare or social security, and neither the father nor grandfather was in the home.

Information on the employment status of parents was available for 111 black subjects. For 31 black subjects (27.9 percent) the mother was employed and the father was not in the home; for 19 black subjects (17.1 percent) the mother was unemployed and the father was not in the home; for 24 black subjects (21.6 percent) the mother was on public welfare and the father was not in the home; for one black subject (0.9 percent) the father was employed and the mother was not in the home; for 12 black subjects (10.8 percent) both parents were employed and both were in the home; for 10 black subjects (9.0 percent) the father

only was employed and both parents were in the home; for five black subjects (4.5 percent) the mother only was employed and both parents were in the home; for one black subject (0.9 percent) the grandparent was employed and the parents were not in the home; for six black subjects (5.4 percent) the grandparent was unemployed and the parents were not in the home; and for two black subjects (1.8 percent) the grandparent was on welfare or social security and the parents were not in the home. For a total of 51 black subjects (45.9 percent) the mother or grandmother with whom the subject lived was either unemployed or on welfare or social security and neither the father nor grandfather was in home.

Information on the employment status of parents was available for 14 white subjects. For one white subject (7.1 percent) the mother was unemployed, and the father was not in the home. For one white subject (7.1 percent) the mother was on public welfare and the father was not in the home; for two white subjects (14.3 percent) both parents were employed and both parents were in the home; for nine white subjects (64.3 percent) the father only was employed and both parents were in the home; and for one white subject (7.1 percent) the grandparent was on welfare or social security and the parents were not in the home. For three white subjects (21.4 percent) the mother or grandmother with whom the subject lived was either unemployed or on welfare or social security and neither the father nor the grandfather was in the home. Among the 16 white subjects, however, the more common parental employment status (64.3 percent) was that in which the father was employed and both parents were in the home.

Information on the employment status of parents was available on 76 male subjects. For 23 male subjects (30.3 percent) the mother was employed and the father was not in the home. For 15 male subjects (19.7 percent) the mother was unemployed and the father was not in the home. For nine male subjects (11.8 percent) the mother was on public welfare and the father was not in the home; for one male subject (1.3 percent) the father was employed and the mother was not in the home; for eight male subjects (10.5 percent) both parents were employed and both were in the home; for nine male subjects (11.8 percent) the father only was employed and both parents were in the home; for four male subjects (5.3 percent) the mother only was employed and both parents were in the home; for one male subject (1.3 percent) the grandparent was employed and the parents were not in the home; for three male subjects (3.9 percent) the grandparent was unemployed and the parents were not in the home; and for three male subjects (3.9 percent) the grandparent was on welfare or social security and the parents were not in the home. For a total of 30 male subjects (39.5 percent) the mother or grandmother with whom the subject lived was either unemployed or on welfare or social security and neither the father nor grandfather was in the home.

Information regarding the employment status of parents was available on 49 female subjects in the population. For eight female subjects (16.3 percent) the mother was employed and the father was not in the home; for five female subjects (10.2 percent) the mother was unemployed and the father was not in the home; for 16 female subjects (32.6 percent) the mother was on welfare and the father was not in the

home; for six female subjects (12.2 percent) both parents were employed and both were in the home; for 10 female subjects (20.4 percent) the father only was employed and both parents were in the home; for one female subject (2.0 percent) the mother only was employed and both parents were in the home; and for three female subjects (6.1 percent) the grandparent was unemployed and the parents were not in the home. For 24 female subjects (49 percent) the mother or grandmother with whom the subject lived was either unemployed or on welfare and neither the father nor grandfather was in the home.

Information provided in the school records was not sufficiently clear to identify the types of employment in which the parents of subjects were engaged. A summary of employment status of parents is shown in Appendix B, Table XII.

Characteristics of Subjects in Relation to Their Position Among Siblings

Information on the position of subjects among siblings identified each subject as: only child; twin; youngest child; middle child; or oldest child. These data were examined for the total population and in relation to the race and sex of subjects. There were five black male subjects and six black female subjects for whom this information was not available in the school records. All percentages were based on the number of subjects for whom the information was available and not on the total 153 subjects in the population.

Information on the position among siblings was available on

142 subjects in the total population. Of that number 10 subjects (7.0 percent) were identified as the only child in the family; nine subjects (6.3 percent) were twins (four sets of twins and one subject whose twin was in the school but not a subject of this study); 47 subjects (33.1 percent) were identified as the youngest child; 57 subjects (40.1 percent) were identified as the middle child; and 19 subjects (13.4 percent) were identified as the oldest child. A total of 104 subjects (73.2 percent) were identified as either the middle child or the youngest child.

Information concerning the position among siblings was available on 126 black subjects. Of that number, nine (7.1 percent) were identified as the only child in the family; nine (7.1 percent) were twins (four sets of twins and one subject whose twin was in the school but not a subject of this study); 43 (34.1 percent) were identified as the youngest child; 50 (39.7 percent) were identified as the middle child; and 15 (11.9 percent) were identified as the oldest child. A total of 93 black subjects (73.8 percent) were identified as either the middle child or youngest child in the family.

Information concerning the position among siblings was available on all 16 white subjects in the population. Of that number, one (6.2 percent) was an only child; four (25.0 percent) were identified as the youngest child; seven (43.7 percent) were identified as the middle child; and four (25.0 percent) were identified as the oldest child. A total of 11 white subjects (68.7 percent) were identified as either the middle child or the youngest child in the family. However, among white subjects, there were as many subjects identified as the oldest child as there were subjects identified as the youngest child. Among both black and white

subjects, the greatest percentage were identified as the middle child.

Examination of the position of subjects among siblings in relation to the sex of the subjects revealed the same pattern of distribution which was found in the total population.

Information was available on 88 of the 93 male subjects in the population. Of that number, five males (5.7 percent) were identified as the only child; nine (10.2 percent) were twins (four sets of twins and one subject whose twin was in the school but not included in this study); 26 (29.5 percent) were identified as the youngest child; 34 (38.6 percent) were identified as the middle child; and 14 (15.9 percent) were identified as the oldest child. A total of 60 male subjects (68.2 percent) were identified as either the middle child or youngest child.

Information was available on 54 of the 60 female subjects in the population. Of that number, five (9.2 percent) were identified as the only child in the family; no female twins were identified; 21 (38.9 percent) were identified as the youngest child; 23 (42.6 percent) were identified as the middle child; and five (9.2 percent) were identified as the oldest child. A total of 44 female subjects (81.5 percent) were identified as either the middle child or the youngest child.

A summary of the position of subjects among siblings is shown in Appendix B, Table XIII.

II. SCHOOL HISTORY

Question 2: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what are the more common characteristics related to school history which can*

be identified from available school records?

The data consolidation form related to school history is shown in Appendix A. The information required on the form was transferred by the Title I resource teacher in each school from the individual cumulative record maintained by teachers for each student. The form was designed to collect information about the subjects concerning grades repeated, number of schools attended, preschool experience, attendance, referrals to school social workers, and psychological tests administered.

Characteristics of Subjects Related to Number of Schools Attended

Information on number of schools attended was available on all but one black female subject in the population. Data were examined in relation to both race and sex of subjects, as well as for the total population.

Among the 152 subjects in the population for whom information was available on number of schools attended, 96 subjects (63.1 percent) had attended only one school; 36 subjects (23.7 percent) had attended two schools; 14 subjects (9.2 percent) had attended three schools; three subjects (2.0 percent) had attended four schools; and three subjects (2.0 percent) had attended five schools. These findings reflected a somewhat greater degree of stability among the subjects in relation to schools attended than had been anticipated. The number of schools attended were inclusive of the school changes in 1973-74 when the elementary schools in the district were reorganized by a system of pairing. All but two of the target schools were affected by that reorganization,

and three of those affected were paired with other Title I target schools. The subjects of this study were restricted to those who remained in target schools, but those who had been originally identified in the three schools paired within the Title I target area were included in the new schools to which they were assigned. This circumstance, rather than family transiency, accounts for some of the movement reflected in the data. A total of 17 subjects were assigned in 1973-74 to the three schools in question, but school information provided for the study was not precisely clear as to the number of those who had been transferred from a paired school and the number who had remained in their original assignment.

Analysis of the data on number of schools attended in relation to the race and sex of subjects revealed little difference in the pattern of relative stability among subjects from that of the total population. A summary of schools attended is shown in Appendix B, Table XIV.

Characteristics of the Subjects by Preschool Experience

Preschool experience of subjects was categorized as enrollment in Head Start, kindergarten, or daycare. During the years in which the subjects of this study were of an age for preschool experience, only a few state-supported pilot kindergarten classes were provided in the district, though there were many private and parochial kindergartens in the area. Daycare provisions were also limited in the city. Head Start programs had been conducted for eligible children in the Title I target area since 1965.

Among the 153 subjects in the population, 38 subjects (24.8 percent) were found to have had some kind of preschool experience. Of that number, 24 subjects (15.7 percent of the population) had attended Head Start; 12 (7.8 percent) had attended kindergarten; and two (1.3 percent) had attended a daycare center. A total of 115 subjects (75.2 percent) had no record of preschool experience of any kind.

Among the black population of 137 subjects, 23 (16.8 percent) had attended Head Start; eight (5.8 percent) had attended kindergarten; and two (1.5 percent) had attended a daycare center. For a total of 33 subjects (24.1 percent), some kind of preschool experience was reported. A total of 104 black subjects (74.9 percent) had no record of preschool experience of any kind.

Among the 16 white subjects, one (6.2 percent) had attended Head Start and four (25.0 percent) had attended kindergarten. A total of 11 subjects (68.7 percent) had no record of preschool experience of any kind.

Among the 93 male subjects, 15 (16.1 percent) had attended Head Start; five (5.4 percent) had attended kindergarten; and one (1.1 percent) had attended a daycare center. A total of 72 male subjects (77.4 percent) had no record of preschool experience of any kind.

Among the 60 female subjects, nine (15 percent) had attended Head Start; seven (11.6 percent) had attended kindergarten; one (1.7 percent) had attended a daycare center. A total of 43 female subjects (71.7 percent) had no record of preschool experience of any kind.

A summary of preschool experience of subjects is shown in Appendix B, Table XV.

Characteristics of Subjects in Relation to School Attendance

School attendance for subjects in the first and second grades in 1973-74 was taken from their attendance records for the preceding year. For those in the third grade in 1973-74, the average attendance for the two previous years was taken. For subjects in grades four through six in 1973-74, the average attendance for the three previous years was taken. A frequency distribution in 10-day intervals was used for the analysis of days absent.

Since attendance information was not clear for four subjects, only 149 subjects were included in the analysis. Of that number, 37 subjects (24.8 percent) had averaged less than 10 days absent per year; 47 subjects (31.5 percent) had an average of 10 to 19 days absent per year; 27 subjects (18.1 percent) had an average of 20 to 29 days absent per year; 16 subjects (10.7 percent) had an average of 30 to 39 days absent per year; 12 subjects (8.0 percent) had an average of 40 to 49 days absent per year; and 10 subjects (6.7 percent) had an average of 50 or more days absent per school year. The median fell within the interval of 10 to 19 days absent per year, but calculating one school month as 20 days, it was found that a total of 43 subjects (28.8 percent) had been absent for an average of one to approximately two school months of each year, and 22 subjects (14.7 percent) had been absent for an average of two or more school months of each year.

Among the 134 black subjects, 34 subjects (25.4 percent) had an average of less than 10 days absent per school year; 43 subjects (32.1 percent) had an average of 10 to 19 days absent per year; 25 subjects (18.6 percent) had an average of 20 to 29 days absent per year; 13

subjects (9.7 percent) had an average of 30 to 39 days absent per year; 10 subjects (7.5 percent) had an average of 40 to 49 days absent per year; and nine subjects (6.7 percent) had an average of 50 or more days absent per year. Calculated by school months, absenteeism of 38 black subjects (28.3 percent) averaged from one to approximately two school months per year; and absenteeism for 19 black subjects (14.2 percent) averaged two or more school months per year.

Among the 15 white subjects, three (20 percent) had an average of less than 10 days per school year; four subjects (26.7 percent) had an average of 10 to 19 days absent per year; two subjects (13.3 percent) had an average of 20 to 29 days absent per year; three subjects (20 percent) had an average of 30 to 39 days absent per year; two subjects (13.3 percent) had an average of 40 to 49 days absent per year; and one subject (6.7 percent) had an average of 50 or more days absent per school year. Calculated in school months, absenteeism for five white subjects (33.3 percent) averaged from one to approximately two school months per year; and absenteeism for three subjects (20.0 percent) averaged two or more school months per year. The incidence of excessive absenteeism was found in a greater percentage of white subjects than in any other category (black, male, or female). Since white subjects were in the racial minority in many of the Title I target schools, this may have been a factor of the desegregation process, but insufficient data were available in this study to warrant a valid conclusion.

Among the 92 male subjects whose absenteeism was examined, 29 subjects (31.5 percent) had an average of less than 10 days absent per

school year; 26 subjects (28.3 percent) had an average of 10 to 19 days absent per school year; 16 subjects (17.4 percent) had an average of 20 to 29 days absent per school year; nine subjects (9.8 percent) had an average of 30 to 39 days absent per school year; seven subjects (7.6 percent) had an average of 40 to 49 days absent per school year; and five subjects (5.4 percent) had an average of 50 or more days absent per school year. Calculated in school months, absenteeism for 25 male subjects (27.2 percent) averaged one to approximately two months per school year, and absenteeism for 12 male subjects (13.0 percent) averaged two or more months per school year.

Among the 57 female subjects, eight (14.0 percent) had an average of less than 10 days absent per year; 21 subjects (36.8 percent) had an average of 10 to 19 days absent per year; 11 subjects (19.3 percent) had an average of 20 to 29 days absent per year; seven subjects (12.3 percent) had an average of 30 to 39 days absent per year; five subjects (8.8 percent) had an average of 40 to 49 days absent per year; and five subjects (8.8 percent) had an average of 50 or more days absent per year. Calculated in school months, absenteeism for 18 female subjects (31.6 percent) averaged one to approximately two months per school year, and for 10 female subjects (17.5 percent) the absenteeism average was two or more months per school year.

A summary of days absent is shown in Appendix B, Table XVI.

Characteristics of Subjects Related to Referrals to School Social Worker and Psychological Testing

Because of the severity of the reading difficulties among the

subjects, information was collected to identify the incidence of referrals to school social workers for any reason, and the incidence of psychological testing. Referrals to school social workers may be made for home-school liaison or agency assistance in cases related to problems such as poor attendance, learning difficulties, health needs, economic needs, or discipline.

In the total population of 153 subjects, 34 subjects (22.2 percent) had been referred to a school social worker. For 119 subjects (77.8 percent), no referral had been made for any reason. There was a notable difference in the percentages of black and white subjects who had been referred. Among the 137 black subjects, 27 subjects (19.7 percent) had been referred to the social worker. Among the 16 white subjects, seven (43.8 percent) had been referred. A difference was also noted in referrals of male and female subjects. Of the 93 male subjects, 27 (29.0 percent) had been referred to the social worker. Of the 16 female subjects, seven (11.7 percent) had been referred.

Among the population of 153 subjects having extreme reading difficulties, only 24 subjects (15.7 percent) had been given a psychological test of any kind. A total of 129 subjects had never had a psychological examination. By race and sex, similar differences to those found in referrals to school social workers were found with regard to psychological testing. Among the 137 black subjects, 19 (13.9 percent) had been tested, but among the 16 white subjects, five (31.3 percent) had been tested. In the male population of 93 subjects, 20 (21.5 percent) had been tested, but in the female population, only four (6.7 percent) had been given a psychological test. Reports of

previous psychological test findings were not requested for examination, since the purpose of this portion of the study was only to examine the history of the subjects' school experiences and since provisions had been made to administer the Wechsler Intelligence Scale for Children to two sample groups for analysis of their reading difficulties.

A summary of referrals to school social workers and psychological tests administered is shown in Appendix B, Table XVII.

III. MEDICAL HISTORY

Question 3: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what are the more common characteristics related to medical history which can be identified from available school records?*

The data consolidation form related to medical history is shown in Appendix A. The information required on the form was transferred by the Title I resource teacher in each school from the individual cumulative record maintained by teachers for each student. The form was designed to collect information related to visual screening, auditory screening, and physical examinations of subjects.

Characteristics of the Subjects Related to Reports of Visual Screening

In the school district in which this study was made, Keystone Telebinocular screening is conducted each year in every other grade in elementary schools for the identification of students who appear to need further visual examination.

The resource teachers who collected information from the school

records were asked to report on the information available in the school records on the screening results and on other visual examinations of which the schools had a record.

Examination of data on visual screening and other visual examination indicated that the information was available on 144 of the 153 subjects. Of that number, 134 subjects had been screened and 10 had not been present for the screening. Of those who were screened, 129 subjects (96.3 percent) had received satisfactory reports and five subjects (3.7 percent) had been referred for further examination. Follow-up on those referrals was not sufficiently clear in the records to be applied in this study of the characteristics of subjects. Only four subjects (2.8 percent) of the 144 subjects were reported as wearing glasses, and one subject (0.7 percent) was reported to have had eye surgery. It was concluded that visual problems of a physical nature were not characteristic of the subjects in high incidence. It should be noted, however, that in the school district, visually impaired students are identified as handicapped and treated in the special education program. Consequently, they are generally not included as Title I participants.

A summary of information on visual screening is shown in Appendix B, Table XVIII.

Characteristics of the Subjects in Relation to Reports of Audiometric Screening

The Beltone Audiometer is used in the district to screen students each year in every other grade in the elementary schools. The purpose of the screening process is to detect evidence of possible hearing difficulties

which warrant a referral for further examination. Reports were received on 144 of the 153 subjects. Of that number, 130 subjects had been screened, and 14 had not been present for screening. Of those who were screened, 127 subjects (97.7 percent) had received a satisfactory report and three subjects (2.3 percent) had been referred for further examination. From these data it was concluded that hearing problems were not characteristic of the subjects in high incidence. It should be noted, however, that in the school district, elementary students who are deaf and severely hard of hearing are taught in special education classes. Consequently, they are not included as Title I participants.

A summary of information on audiometric screening is shown in Appendix B, Table XVIII.

Characteristics of Subjects in Relation to Reports of Physical Examinations

Information was received on the medical history from school records of 144 subjects. Of that number, 129 had no record of a physical examination. Of the 15 subjects for whom a physical examination was reported, 13 subjects had received a satisfactory report; one subject was reported as having an anemic condition; one subject was reported to have petit mal seizures; and five subjects were reported to have dental problems. Because of the limited information on the physical condition of subjects, no conclusions could be drawn except that it is widely characteristic of the subjects that they have had little or no attention to the possibility of physical/medical needs.

A summary of information on physical examinations is shown in Appendix B, Table XVIII.

IV. MENTAL ABILITY

Question 4: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what factors of their reading disabilities related to mental ability can be identified for instructional treatment?*

The mental ability of subjects was examined by sampling procedures. A primary sample included 31 subjects in the population to whom the Otis-Lennon Mental Ability Test had been administered in 1974. A pilot schools sample included 32 subjects in two of the Title I target schools in which pilot classes had been organized to provide special instruction for students who were not progressing in the Title I compensatory reading program. A clinical psychologist was engaged to administer the Wechsler Intelligence Scale for Children (WISC) to the 32 subjects in the pilot schools sample. Because of the poor responses of some of the subjects in the population to whom the Durrell Analysis of Reading Difficulty had been administered, a sample group was identified to include those who had been unable to respond at a measurable level on more than one item on the Durrell instrument. The WISC was also administered to the Durrell non-responding sample of 19 subjects.

Since the samples which were examined in this investigation were not randomly selected, some reservations must be applied in generalizing from the findings related to each sample group of subjects. While the findings from the primary sample might justifiably be generalized to the population of the study, the Otis-Lennon scores cannot be considered conclusive with regard to the intelligence of disadvantaged

students. It is a group test which was administered as a screening device, for which it is better suited than as a valid measure of intelligence. The pilot schools sample can be considered typical of a composite of subjects in the target schools only if the two pilot schools are considered in composite, since one serves only primary and one serves only intermediate grades. Findings related to the Durrell non-responding sample can be generalized only to groups of students having the most extreme difficulties in reading, since the sample was specifically selected for that purpose.

Otis-Lennon Mental Ability Test (Primary Sample)

The deviation intelligence scores (DIQ) attained by subjects in the primary sample were tabulated in a frequency distribution in intervals reflecting the ranges of scores for mild retardation (60 to 69), borderline retardation (70 to 79), dull normal (80 to 89), and average (90 to 102). The score of 102 was used in the average interval because it was the highest score attained by any subject. The two intervals for mild and borderline retardation were categorized as educable mentally retarded (EMR) because the school system uses 60 and 79 as the cut-off scores for EMR verification for special education placement. (Group test scores are not used in the district for special education placement. The categorization is used here only for the assessment of trends among the subjects.)

In the primary sample of 31 subjects, seven (22.6 percent) had DIQ scores in the range of mild retardation (60 to 69); seven (22.6 percent) had DIQ scores in the range of borderline retardation (70 to 79);

nine subjects (29 percent) had DIQ scores in the range of dull normal (80 to 89); and eight subjects (25.8 percent) had DIQ scores in the average range (90 to 102). While the group scores cannot be conclusive, they suggest the possibility that as many as 45.2 percent of the subjects may, on further examination, prove to be educably mentally retarded. Analysis of the scores attained on the individually administered WISC should be studied for a more valid conclusion regarding the mental ability of subjects.

A frequency distribution of DIQ scores attained by subjects in the primary sample on the Otis-Lennon Mental Ability Test is displayed in Appendix B, Table XIX.

Otis-Lennon DIQ scores were further examined to determine the disparities between the derived mental age of subjects and their chronological age. These disparities were arranged in intervals of one year, specified in months, to identify those subjects whose mental ages were higher than, the same as, or lower than their chronological ages. Since no subjects had a mental age more than one month higher than his/her chronological age, and no subject had a mental age more than 42 months lower than his/her chronological age, those figures were used in the extreme intervals rather than the full 12-month span.

Among the 31 primary subjects, two (6.4 percent) had mental ages which were one month higher than their chronological ages; one subject (3.2 percent) had a mental age which was the same as his/her chronological age; five subjects (16.1 percent) had mental ages less than one year (one to 11 months) below their chronological ages; 13 subjects (41.9 percent) had mental ages 12 to 23 months below their chronological ages;

eight subjects (25.8 percent) had mental ages 24 to 35 months below their chronological ages; and two subjects (6.4 percent) had mental ages 36 to 42 months below their chronological ages. Though not conclusive from the group test scores, the data indicated the possibility that 28 subjects (90.3 percent) had mental ages from one to three-and-one-half years lower than their chronological ages.

A frequency distribution of disparities between chronological ages and mental ages of subjects in the primary sample is shown in Appendix B, Table XX.

Wechsler Intelligence Scale for Children (Pilot Schools Sample)

Because of the limitations of the Otis-Lennon Mental Ability Test, the WISC was administered to 32 subjects in the pilot schools sample to obtain more valid information concerning the mental ability of subjects.

For purposes of analysis, the WISC scores attained by the subjects were tabulated by verbal IQ scores, performance IQ scores, and full-scale IQ scores. For each category, scores were tabulated in a frequency distribution in intervals reflecting the ranges of scores for mild retardation (60 to 69), borderline retardation (70 to 79), dull normal (80 to 89), average (90 to 109), and, where applicable, bright normal (110 to 119). The two intervals for mild and borderline retardation were categorized as educable mentally retarded (EMR) because the school system uses 60 and 79 as cut-off scores for EMR verification for special education placement.

Analysis of the verbal IQ scores attained on the WISC by the 32

subjects in the pilot schools sample revealed that six subjects (18.7 percent) had verbal IQ scores in the range of mild retardation (60 to 69); 17 subjects (53.1 percent) had verbal IQ scores in the range of borderline retardation (70 to 79); six subjects (18.7 percent) had verbal IQ scores in the dull normal range (80 to 89); and three subjects (9.4 percent) had verbal IQ scores in the average range. A total of 23 subjects (71.8 percent) had verbal IQ scores in the range of educable mentally retarded (60 to 79). This portion of the WISC reports was further analyzed in relation to the language functioning of subjects addressed in study question number five.

A frequency distribution of WISC verbal IQ scores attained by subjects in the pilot schools sample is shown in Appendix B, Table XXI.

Analysis of the performance IQ scores attained on the WISC by the 32 subjects in the pilot schools sample revealed that 12 subjects (37;5 percent) had performance IQ scores in the range of borderline retardation (70 to 79); eight subjects (25.0 percent) had performance IQ scores in the dull normal range (80 to 89); 10 subjects (31.2 percent) had performance IQ scores in the average range (90 to 109); and two subjects (6.2 percent) had performance IQ scores in the bright normal range. The percentage of subjects whose performance IQ scores were in the range of educable mentally retarded was only 37.5 percent as compared to 71.8 percent whose verbal scores were in that range; and none of the subjects whose performance ability was found to be retarded scored in the lower range of mild retardation, while 18.7 percent of the verbal scores were in the range of mild retardation. On performance ability, 12 subjects (37.5 percent) were found to be

average or bright normal.

A frequency distribution of WISC performance IQ scores attained by subjects in the pilot schools sample is shown in Appendix B, Table XXII.

Analysis of the full-scale IQ scores attained on the WISC by the 32 subjects in the pilot schools sample revealed that five subjects (15.6 percent) had scores in the range of mild retardation (60 to 69); 13 subjects (40.6 percent) had scores in the range of borderline retardation (70 to 79); seven subjects (21.9 percent) had scores in the dull normal range (80 to 89); and seven subjects (21.9 percent) had scores in the average range (90 to 99). A total of 18 subjects (56.2 percent) had scores in the range of educable mentally retarded (60 to 79).

A frequency distribution of WISC full-scale IQ scores attained by subjects in the pilot schools sample is shown in Appendix B, Table XXIII.

Analysis of the WISC scores for the pilot schools sample confirmed the indications seen in the primary sample on Otis-Lennon Mental Ability Test that a high incidence of mental retardation exists among the subjects of this study. While some reservations should probably be applied in the singular consideration of verbal IQ scores attained on the WISC by subjects known to be ecnomically deprived, the WISC performance scores can be considered a valid measure; and notwithstanding the concerns for culture-free measures of intelligence, the WISC scores on all test categories--verbal, performance, and full-scale--probably reflect the functioning level of mental ability applicable to school learning tasks, and particularly to those of reading.

Additional analyses of the WISC reports were made in relation to questions concerning the language, auditory, visual, and motor functioning of subjects. Those further analyses were based on the narrative interpretation of the scores which were provided by the clinical psychologist who examined the subjects. Those interpretations are reported in relation to the specific questions of this study to which they apply.

Wechsler Intelligence Scale for Children (Durrell Non-Responding Sample)

Analysis of the findings from the Durrell Analysis of Reading Difficulty, which was administered to all subjects in the population revealed a number of subjects who were unable to respond at a measurable level on more than one item of the Durrell instrument. It was deemed advisable to examine those subjects through the administration of the WISC. In the interest of the pilot project, the WISC was also administered to all subjects in the pilot schools sample, as described above. Since the Durrell non-responding subjects in the two pilot schools were also included in the pilot schools sample, the subjects for the Durrell non-responding sample included only the 19 subjects who were enrolled in the eight Title I target schools which were not engaged in the pilot program. The Durrell non-responding sample cannot be considered typical of the population because of the selection purpose and method applied.

The WISC data for this sample were tabulated in the same manner as that described above for the pilot schools sample. Verbal IQ scores, performance IQ scores, and full-scale IQ scores were analyzed separately in frequency distributions with intervals reflecting the ranges of scores

for mild retardation (60 to 69), borderline retardation (70 to 79), dull normal (80 to 89), and average (90 to 99). The two intervals for mild and borderline retardation were categorized as educable mentally retarded (EMR).

Analysis of the verbal IQ scores attained on the WISC by the 19 subjects in the Durrell non-responding sample revealed that six subjects (31.6 percent) had verbal IQ scores in the range of mild retardation (60 to 69); four subjects (21 percent) had verbal IQ scores in the range of borderline retardation (70 to 79); eight subjects (42.1 percent) had verbal IQ scores in the dull normal range (80 to 89); and one subject (5.3 percent) had a verbal IQ score in the average range (90 to 99). A total of 10 subjects (52.6 percent) had verbal IQ scores in the range categorized as educable mentally retarded (60 to 79), and all but one subject had verbal IQ scores below the average range.

A frequency distribution of WISC verbal IQ scores attained by subjects in the Durrell non-responding sample is shown in Appendix B, Table XXIV.

Analysis of WISC performance IQ scores for the 19 subjects in the Durrell non-responding sample revealed that four subjects (21 percent) had performance IQ scores in the range of mild retardation (60 to 69); five subjects (26.3 percent) had performance IQ scores in the range of borderline retardation (70 to 79); four subjects (21 percent) had performance IQ scores in the dull normal range (80 to 89); and six subjects (31.6 percent) had performance IQ scores in the average range (90 to 99). A total of nine subjects (47.3 percent) had performance IQ scores in the range categorized as educable mentally retarded, as compared to the 10

subjects (52.6 percent) whose verbal IQ scores were in that range.

A frequency distribution of WISC performance IQ scores attained by subjects in the Durrell non-responding sample is shown in Appendix B, Table XXV.

Analysis of the WISC full-scale IQ scores attained by the 19 subjects in the Durrell non-responding sample revealed that five subjects (26.3 percent) had full-scale IQ scores in the range of mild retardation (60 to 69); six subjects (31.6 percent) had full-scale IQ scores in the range of borderline retardation (70 to 79); five subjects (26.3 percent) had full-scale IQ scores in the dull normal range (80 to 89); and three subjects (15.8 percent) had full-scale IQ scores in the average range (90 to 99). A total of 11 subjects (57.9 percent) had scores in the range categorized as educable mentally retarded.

A frequency distribution of WISC full-scale IQ scores is shown in Appendix B, Table XXVI.

These analyses of WISC IQ scores indicate that limited mental ability accounts in part for the inability of subjects to respond on more than one item of the Durrell Analysis of Reading Difficulty, but because of the known economical deprivation of the subjects, the interpretation of scores provided by the clinical psychologist should provide more valid information to serve the instructional planning purpose for which this investigation was made. The analyses of these interpretations, shown in Appendix B, Table XXVII, are reported in the discussions of the questions related to language, auditory, visual, and motor functioning which follow.

V. LANGUAGE FUNCTIONING

Question 5: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what factors of their reading disabilities related to language functioning can be identified for instructional treatment?*

The language functioning of subjects was analyzed from standardized test scores (California Achievement Test and Metropolitan Achievement Test) for the total population, from responses on the Durrell Analysis of Reading Difficulty which was administered to all subjects in the population, and from the psychologists' interpretation of responses on the WISC which was administered to both the pilot schools sample and the Durrell non-responding sample.

Standardized Test Scores

The subjects' scores on the reading subtests of the two standardized achievement tests, which were regularly administered in the fall testing program for the district, were examined as the first step in the analysis of the subjects' language functioning. California Achievement Test (CAT) was administered in late September in grades two, three, four, and six; and Metropolitan Achievement Test (MAT) was administered in late September in grade five.

Standardized test scores for 115 subjects were analyzed by assigned grade (1973-74) in frequency distributions of grade equivalent scores in intervals of 10 months. CAT subtest scores for reading vocabulary, reading comprehension, and total reading were examined for subjects in the four grades in which it was administered. MAT subtest

scores for word meaning, reading, and total reading were examined for subjects in grade five. Because of the use of different instruments at different grade levels, the scores are reported by grade level of the subjects rather than for the total population in composite.

Among the 20 second grade subjects whose CAT scores were examined, 20 subjects (100 percent) had a grade equivalent score below 1.0 on the reading vocabulary subtest. On the reading comprehension subtest, 18 second grade subjects (90 percent) scored below 1.0, and two second grade subjects (10 percent) scored between 1.0 and 1.9. On total reading, 20 subjects (100 percent) scored below 1.0.

Among the 10 third grade subjects whose CAT scores were examined, seven subjects (70 percent) had a grade equivalent score below 1.0 on reading vocabulary subtest; two third grade subjects (20 percent) scored between 1.0 and 1.9 on reading vocabulary; and one third grade subject (10 percent) scored between 2.0 and 2.9 on reading vocabulary. On the reading comprehension subtest, two third grade subjects (20 percent) had grade equivalent scores below 1.0; seven third grade subjects (70 percent) scored between 1.0 and 1.9; and one third grade subject (10 percent) scored between 2.0 and 2.9. On total reading, eight third grade subjects (80 percent) had grade equivalent scores below 1.0; one third grade subject (10 percent) scored between 1.0 and 1.9; and one third grade subject (10 percent) scored between 2.0 and 2.9.

Among the 20 fourth grade subjects whose CAT scores were examined, eight subjects (40 percent) had grade equivalent scores below 1.0 on the reading vocabulary subtest; 11 fourth grade subjects (55 percent) scored between 1.0 and 1.9; and one fourth grade subject (5.0 percent) scored

between 2.0 and 2.9 on reading vocabulary. On the reading comprehension subtest, seven fourth grade subjects (35 percent) had grade equivalent scores below 1.0; 10 subjects (50 percent) scored between 1.0 and 1.9; and three fourth grade subjects (15 percent) scored between 2.0 and 2.9 on reading comprehension. On total reading, eight fourth grade subjects (40 percent) had grade equivalent scores below 1.0; 11 fourth grade subjects (55 percent) scored between 1.0 and 1.9; and one fourth grade subject (5 percent) scored between 2.0 and 2.9 on total reading.

Among the 44 fifth grade subjects whose MAT scores were examined, 30 subjects (68.2 percent) had grade equivalent scores between 2.0 and 2.9 on word meaning; and 14 fifth grade subjects (31.8 percent) scored between 3.0 and 3.9 on word meaning. On the reading subtest of MAT, 26 fifth grade subjects (59.1 percent) had grade equivalent scores between 2.0 and 2.9; 15 fifth grade subjects (34.1 percent) scored between 3.0 and 3.9; and three fifth grade subjects (6.8 percent) scored between 4.0 and 4.9 on the reading subtest. On total reading, 33 fifth grade subjects (67.3 percent) had grade equivalent scores between 2.0 and 2.9; and 11 subjects (22.4 percent) scored between 3.0 and 3.9 on total reading.

Among the 40 sixth grade subjects whose CAT scores were examined, 10 subjects (25 percent) had grade equivalent scores below 1.0 on the reading vocabulary subtest; two sixth grade subjects (5 percent) scored between 1.0 and 1.9; 18 sixth grade subjects (45 percent) scored between 2.0 and 2.9; eight sixth grade subjects (20 percent) scored between 3.0 and 3.9; and two sixth grade subjects (5 percent) scored between 4.0 and 4.9 on reading vocabulary. On the reading comprehension subtest, two

sixth grade subjects (5 percent) had grade equivalent scores below 1.0; 13 sixth grade subjects (32.5 percent) scored between 1.0 and 1.9; 12 sixth grade subjects (30 percent) scored between 2.0 and 2.9; 12 sixth grade subjects (30 percent) scored between 3.0 and 3.9; and one sixth grade subjects (2.5 percent) scored between 6.0 and 6.4 on the reading comprehension subtest. On total reading, seven sixth grade subjects (17.5 percent) had grade equivalent scores below 1.0; six sixth grade subjects (15 percent) scored between 1.0 and 1.9; 17 sixth grade subjects (42.5 percent) scored between 2.0 and 2.9; seven sixth grade subjects (17.5 percent) scored between 3.0 and 3.9; and three sixth grade subjects (7.5 percent) scored between 4.0 and 4.9 on total reading.

While the standardized test scores provide little information which can be applied in diagnosing the nature of the reading difficulties of the subjects, the test scores do confirm the severity of their reading problems. Among the 60 subjects tested (CAT) in grades two through four, only two subjects (3.3 percent) had grade equivalent scores above first grade level on total reading. Among the 44 fifth grade subjects tested (MAT), only 11 (22.4 percent) scored above second grade reading level on total reading. Among the 40 sixth grade subjects tested (CAT), only three subjects (7.5 percent) scored above third grade reading level on total reading. While the CAT and MAT scores cannot be considered precisely interchangeable, they are reviewed here in the grade sequence only to provide a picture of the trend of reading difficulties among the subjects.

The frequency distribution of grade equivalent scores on the reading vocabulary subtest of CAT is shown in Appendix B, Table XXVIII. The frequency distribution of grade equivalent scores on the reading

comprehension subtest of CAT is shown in Appendix B, Table XXIX. The frequency distribution of grade equivalent scores on the total reading subtest of CAT is shown in Appendix B, Table XXX. The frequency distribution of grade equivalent scores for fifth grade subjects on all subtests of MAT is shown in Appendix B, Table XXXI.

Durrell Analysis of Reading Difficulty

The Durrell Analysis of Reading Difficulty was individually administered to all 153 subjects in the population to provide further information about the specific areas of weakness in their reading which can be identified for instructional treatment. Grade equivalency scores on oral and silent reading, listening, flash words, word analysis, and spelling were organized in a frequency distribution with intervals of 10 months. In the analysis of these data, for each reading skill area, the interval in which the median occurred was identified and the percentage of subjects scoring in each interval was determined.

In oral reading the median for all subjects occurred in the grade equivalent interval for first grade reading level (1.0 to 1.9). Among the 153 subjects, 32 subjects (20.9 percent) scored below 1.0; a total of 61 subjects (39.9 percent) scored in the first grade interval (1.0 to 1.9); a total of 33 subjects (21.6 percent) scored in the second grade interval (2.0 to 2.9); a total of 25 subjects (16.3 percent) scored in the third grade interval (3.0 to 3.9); and two subjects (1.3 percent) scored in the fourth grade interval (4.0 to 4.9) on oral reading.

In silent reading the median for all subjects occurred in the

grade equivalent interval for first grade level (1.0 to 1.9). Among the 152 subjects for whom a valid score was obtained on silent reading, 35 subjects (23 percent) scored below 1.0; a total of 63 subjects (41.4 percent) scored in the first grade interval (1.0 to 1.9); a total of 34 subjects (22.4 percent) scored in the second grade interval (2.0 to 2.9); a total of 19 subjects (12.5 percent) scored in the third grade interval (3.0 to 3.9); and one subject (0.6 percent) scored in the fourth grade interval (4.0 to 4.9) in silent reading.

In listening skills the median for all subjects occurred in the grade equivalent interval for third grade level (3.0 to 3.9). Among the 153 subjects in the population, 18 subjects (11.8 percent) scored below 1.0; one subject (0.6 percent) scored in the first grade interval (1.0 to 1.9); a total of 11 subjects (7.2 percent) scored in the second grade interval (2.0 to 2.9); a total of 117 subjects (76.5 percent) scored in the third grade interval (3.0 to 3.9); a total of five subjects (3.3 percent) scored in the fourth grade interval (4.0 to 4.9); and one subject (0.6 percent) scored in the fifth grade interval (5.0 to 5.9) in listening skills.

On flash words, which is a measure of sight recognition, the median for all subjects occurred in the grade equivalent interval for first grade (1.0 to 1.9). Among the 153 subjects in the population, 26 subjects (17 percent) scored below 1.0; a total of 66 subjects (43.1 percent) scored in the first grade interval (1.0 to 1.9); a total of 20 subjects (13.1 percent) scored in the second grade interval (2.0 to 2.9); a total of 22 subjects (14.4 percent) scored in the third grade interval (3.0 to 3.9); a total of seven subjects (4.6 percent) scored

in the fourth grade interval (4.0 to 4.9); a total of six subjects (3.9 percent) scored in the fifth grade interval (5.0 to 5.9); and six subjects (3.9 percent) scored in the sixth grade interval (6.0 to 6.9) on flash words.

On word analysis the median for all subjects occurred in the grade equivalent interval below first grade. Among the 147 subjects for whom a valid score was obtained, 133 subjects (90.5 percent) scored below 1.0; a total of three subjects (2.0 percent) scored in the first grade interval (1.0 to 1.9); and a total of 11 subjects (7.5 percent) scored in the second grade interval (2.0 to 2.9) on word analysis.

In spelling, which is closely related to word analysis, the median for all subjects occurred in the interval below first grade. Among the 153 subjects in the population, 143 subjects (93.5 percent) scored below 1.0; a total of two subjects (1.3 percent) scored in the second grade interval (2.0 to 2.9); a total of six subjects (3.9 percent) scored in the third grade interval (3.0 to 3.9); only one subject scored in the fourth grade interval (4.0 to 4.9); and only one subject (0.6 percent) scored in the sixth grade interval (6.0 to 6.9) in spelling.

The high incidence of extremely low scores in word analysis and spelling provided key information concerning the subjects' lack of success in the Title I remedial program in which large numbers of their cultural peers had succeeded. That program gave particular emphasis to word attack skills through a phonics approach. Obviously, the approach which had proved suitable for others was wholly unsuitable for the subjects of this study. This facet of their difficulties was further considered in the analysis of the psychologist's interpretations of the

subjects' responses on the WISC and in analysis of scores attained on the Wepman Auditory Discrimination Test reported in subsequent sections.

The frequency distribution of grade equivalent scores on the Durrell Analysis of Reading Difficulty is shown in Appendix B, Table XXXII.

Psychologist's Interpretation of Responses of Subjects on WISC

The psychologist's interpretation of the responses on the WISC were analyzed for both the pilot schools sample and the Durrell non-responding sample. The interpretations were categorized as those specific to language difficulties and those specific to perceptual-motor difficulties. The psychologist's statements in each category were tabulated from the narrative reports received for each subject.

Among the 32 subjects in the pilot schools sample, which was the most typical sample of subjects in the population, it was reported that 21 subjects (65.6 percent) showed evidence of a central language disorder (as evidenced by conceptual confusion, abnormal verbal concreteness, and/or telescopic speech); nine subjects (28.1 percent) showed a poor fund of general information; six subjects (18.7 percent) showed impaired concentration (excessive distractibility and short attention span); four subjects (12.5 percent) appeared to have language difficulty related to cultural deprivation; six subjects (18.7 percent) had a poor expressive vocabulary; five subjects (15.6 percent) were reported to have a possible auditory-perceptual handicap; three subjects (9.4 percent) were reported as showing a lack of judgment; nine subjects (28.1 percent) were reported as showing poor self-reliance; one subject

(3.1 percent) was reported as having poor comprehension; and seven subjects (21.9 percent) were reported as showing almost total language weakness. There were none of the subjects examined for whom no serious language difficulty was reported and for the large majority of subjects, several such difficulties were reported.

This portion of the study provided key information for the identification of factors which should be addressed for instructional treatment. It was beyond the scope of this study to determine whether the language disorders evident in such high incidence among the subjects were the result of brain damage occasioned by prenatal or birth trauma, or of brain dysfunction resulting from early experience deficiencies; but whatever the etiology of the conditions, they are quite obviously the primary targets identified in this research upon which clinical instructional treatment should be focused. The serious language problems identified in this portion of the investigation and further amplified in the analysis of scores obtained on the Wepman Auditory Discrimination Test relate particularly to the low scores found on the Durrell Analysis of Reading Difficulty items on word analysis and spelling.

Analysis of the psychologist's interpretations of the responses of the 19 subjects in the Durrell non-responding sample was made for the specific purpose of clarifying possible causes for their poor responses on the Durrell instrument. In that sample of 19 subjects, 12 subjects (63.1 percent) showed evidence of a central language disorder; 11 subjects (57.9 percent) showed a poor fund of general information; three subjects (15.8 percent) showed impaired concentration; three subjects (15.8 percent) were reported as having language difficulty related to

cultural deprivation; two subjects (10.5 percent) showed poor self-reliance; and three subjects (15.8 percent) were reported as showing almost total language weakness. Among the subjects of this sample, as among those of the more representative pilot schools sample, there were no subjects found who showed no serious language difficulty, and most of the subjects had several such difficulties. The subjects' difficulties in responding on the Durrell items can be readily linked to the high incidence of mental retardation, reported in a preceding section, and to the high incidence of language disorders, poor general fund of information, and language difficulties related to cultural deprivation disclosed in the pshcologist's interpretations of the subjects' responses on the WISC. The instructional planning implications of these findings are reported in Chapter VI.

The analysis of the psychologist's interpretations of WISC responses is shown in Appendix B, Table XXVII.

VI. AUDITORY FUNCTIONING

Question 6: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what factors of their reading disabilities related to auditory functioning can be identified for instructional treatment?*

The investigation of the auditory functioning of subjects was based on the results of the Wepman Auditory Discrimination Test, which was administered to 139 of the 153 subjects in the population. The Wepman Auditory Discrimination Test scores include levels which reflect: very good development; above average ability; average ability; below

average ability; below the threshold of adequacy; or invalid (below 10). Scores of the 139 subjects were analyzed to identify those who scored at levels indicating average or above average ability to make auditory discrimination and to identify those whose scores indicated below average ability.

Among the 139 subjects tested, six (4.3 percent) showed very good development; 11 subjects (7.9 percent) showed above average ability; 22 subjects (15.8 percent) showed average ability; 15 subjects (10.8 percent) showed below average ability; 80 subjects (57.5 percent) scored below the threshold of adequacy; and five subjects (3.6 percent) scored too low for their tests to be considered valid (below 10). A total of 100 subjects (71.9 percent) scored below average in their ability to make auditory discriminations.

Further analysis was made to assess the incidence of difficulties in auditory discrimination among primary subjects as compared to intermediate subjects. This analysis revealed that among the 32 subjects tested in grades one, two, and three, there were only three (9.4 percent) whose ability to make auditory discriminations was average or above, while 29 of the primary subjects (90.6 percent) scored below average. Among the 107 subjects tested in grades four, five, and six, there were 36 subjects (33.6 percent) whose ability to make auditory discriminations was average or above, while 71 intermediate subjects (66.3 percent) scored below average.

These findings provided additional insight into the instructional needs of the subjects. The high incidence of limited ability to make

auditory discriminations, considered in relation to the findings previously reported on the subjects' weaknesses in word analysis skills and on the high incidence of serious language problems, strongly suggest an instructional approach which is not dependent upon the ability to learn through auditory channels. Implications for instructional planning are reported in Chapter VI.

A summary of scores on the Wepman Auditory Discrimination Test is shown in Appendix B, Table XXXIII.

VII. VISUAL FUNCTIONING

Question 7: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what factors of their reading disabilities related to visual functioning can be identified for instructional treatment?*

The visual functioning of the subjects of this investigation was analyzed by sampling procedures. As previously described, the subjects in two pilot schools were identified as a sample which, in composite, would be generally typical of the subjects in a composite of all the Title I schools. The 32 subjects in the pilot schools sample were examined by a clinical psychologist, using the WISC as reported in the preceding sections of this study. The psychologist's interpretations of the subjects' responses were analyzed both for language difficulties and perceptual-motor difficulties. Analysis of the interpretations related to perceptual-motor difficulties were applied in consideration of both the visual and motor functioning of the subjects.

The same procedure was applied in the analysis of visual and

motor functioning of the Durrell non-responding sample. While that sample cannot be considered typical of the population, the findings of the examining psychologist are reported to add further insight into the instructional needs of those subjects whose reading problems are most acute, as evidenced by their inability to respond at a measurable level on more than one item of the Durrell Analysis of Reading Difficulty.

Psychologist's Interpretations of WISC Scores Related to Perceptual-Motor Difficulties (Pilot Schools Sample)

Among the 32 subjects in the pilot schools sample, 19 subjects (59.4 percent) showed evidence of visual-motor handicap in dealing with relatively complex motor tasks; eight subjects (25 percent) showed evidence of visual-motor handicap in quick eye-hand motor coordination; nine subjects (28.1 percent) were reported to have a possible figure-ground disturbance; one subject (3.1 percent) showed evidence of perceptual confusion; five subjects (15.6 percent) had problems of visual sequencing; and one subject (3.1 percent) was reported as having a problem of visual comprehension. Only seven of the subjects (21.9 percent) showed no serious visual-motor difficulty. When the interpretations of responses were individually examined, it was found that while language difficulties were in higher incidence, 23 subjects (71.9 percent) had both language difficulties and visual-motor difficulties.

Psychologist's Interpretations of WISC Scores Related to Perceptual-Motor Difficulties (Durrell Non-Responding Sample)

Among the 19 subjects who were identified for further examination

as the Durrell non-responding sample, because of their poor responses on the Durrell Analysis of Reading Difficulty, 11 subjects (57.9 percent) showed evidence on the WISC of having a visual-motor handicap in dealing with relatively complex motor tasks; eight subjects (42.1 percent) showed evidence of a visual-motor handicap in quick eye-hand motor coordination; one subject (5.3 percent) showed evidence of perceptual perseveration; two subjects (10.5 percent) showed left-right confusion; six subjects (31.6 percent) showed evidence of a possible figure-ground disturbance; five subjects (26.3 percent) had problems of visual sequencing; and two (10.5 percent) had no serious visual-motor difficulty. In this sample, typical only of those having the most extreme reading problems, 17 subjects (89.5 percent) had both language and visual-motor problems. This finding not only relates to inability of the subjects to respond on the individually administered reading test; it also has most serious implications for their instructional treatment. The instructional implications are reported in Chapter VI. A summary of the psychologist's interpretation of WISC scores related to perceptual-motor difficulties for both sample groups of subjects is shown in Appendix B, Table XXVII.

VIII. MOTOR FUNCTIONING

Question 8: *Among the subjects of the study (elementary students in impoverished communities who have extreme problems in reading), what factors of their reading disabilities related to motor functioning can be identified for instructional treatment?*

In addition to the psychologist's interpretations of the WISC responses related to perceptual motor functioning by subjects in the

primary schools sample, previously reported, the scores of 31 pilot schools subjects on the Developmental Perceptual Motor Fitness Test (DPMFT) items were analyzed. The DPMFT items tested gross muscular strength, control, and coordination, and the sense of directionality and spatial relationships of the subjects. The WISC items reflected more refined visual-motor coordination and control.

The exercises on the DPMFT for the identification of body parts provide an evaluation of the child's body image, which is considered essential to his/her development of adequate orientation to space. These items proved difficult for a relatively small percentage of subjects. The only body parts which any of the subjects did not identify were ankles, hip, waist, and wrist; and it was assumed that the known difficulties of the subjects in making auditory distinctions accounted for confusion of such parts as "waist" and "wrist." The physical education specialist also suggested that confusion between "hip" and "waist" frequently results when classroom teachers have improperly demonstrated their own instructions, "Hands on hips." Among the 31 subjects examined, 12 subjects (38.7 percent) were in error on identification of "hip"; nine subjects (29.0 percent) were in error on identification of "waist"; six subjects (19.3 percent) were in error on identification of "wrist"; and two subjects (6.4 percent) were in error on identification of "ankles." As expected, the percentages in error were somewhat higher among primary subjects than among those in intermediate grades.

Though not in complete error, some subjects were slow in their identification of feet, ankles, hip, waist, shoulder, and elbow. Because

of the known language difficulties of the subjects, these reactions seemed less likely to be a reflection of inadequate body image than of receptive language difficulties and perhaps general slow reaction timing.

A summary of scores by subjects on the DPMFT items related to identification of body parts is shown in Appendix B, Table XXXIV.

The DPMFT exercises on the walking board provide an evaluation of balance, kinesthetics, and visual-motor association in activities requiring relatively gross movement and visual coordination. On these items, few difficulties were encountered among the 31 subjects. All subjects were successful in walking forward on the beam, and only two subjects (6.4 percent) were unsuccessful in walking each of the other exercises: backward, walking sideward to the left, and walking sideward to the right.

The performance of subjects on the DPMFT walking board exercises is shown in Appendix B, Table XXXV.

The DPMFT exercises of hopping, skipping, and jumping provide an evaluation of gross motor coordination, balance, and ability to sustain movement. On the broad jump exercise all subjects were successful; but on hopping and skipping, though the majority of subjects were successful, some problems were identified. On the hopping exercise, a total of 11 subjects (35.5 percent) showed difficulties ranging from jerky and irregular rhythm in their performances to fully disorganized performance. On the skipping exercise, eight subjects (25.8 percent) had similar difficulties. As expected, the percentages for primary subjects were somewhat greater than for those of intermediate age. A summary of the performance of subjects on the DPMFT hopping, skipping, jumping exercises

is shown in Appendix B, Table XXXVI.

The DPMFT exercises for neuromuscular differentiation and right-left sidedness are based on the children's game, "Angels-in-the-Snow." It provides an evaluation of the child's identification and control of the parts of the body individually or in prescribed combinations.

While the incidence of errors was low among the subjects in performing the Angels-in-the-Snow exercises, it was noted that there was only one movement (both arms together) on which all subjects were completely successful. The highest incidence of difficulty occurred on those exercises requiring the simultaneous movement of an arm and a leg, particularly in cross-lateral movement of limbs on opposite sides of the body. On the simultaneous movement of the right arm and left leg, 10 subjects (32.2 percent) were not completely successful; on the simultaneous movement of the left arm and right leg, nine subjects (29 percent) were not completely successful. On all other single or combination limb movements, fewer than 20 percent of the subjects were unsuccessful.

The performance of subjects on the Angel-in-the-Snow exercises for neuromuscular differentiation and right-left sidedness is shown in Appendix B, Table XXXVII.

The Kraus-Weber items on upper and lower back strength provide an evaluation of general postural and gross motor coordination. On upper-back exercises, one subject (3.2 percent) was unsuccessful; on lower-back exercises, seven subjects (22.6 percent) were unsuccessful.

On the ball reaction catch exercise, which evaluates eye-hand coordination and ocular pursuit, all subjects were successful.

The performance of subjects on the Kraus-Weber and ball reaction catch exercises are shown in Appendix B, Table XXVIII.

The chalkboard circle drawing exercises provide an evaluation of fine motor coordination, laterality, and hand dominance. Successful performance requires the ability to match a motor response with perceptual data and to sustain the matching so that continuous perceptual monitoring is possible. Ratings on the drawing include considerations of the size of the drawing, the position of the drawing in relation to the body's midline, accuracy in reproducing the circle shape and the direction of the drawing in relation to the dominant hand.

A total of 29 subjects were rated on the size of their drawings. Of that number, only 10 subjects (34.5 percent) produced a drawing which approximated the acceptable standard of 20 to 24 inches in diameter; and 19 subjects (65.5 percent) drew circles smaller than the acceptable standard, with 13 of those subjects (44.8 percent) producing very small drawings. These ratings confirm the previously reported findings on the WISC related to visual motor handicaps in dealing with relatively complex motor tasks.

A total of 30 subjects were rated on the position of their drawing in relation to the midline of the body. On this rating, 18 subjects correctly produced a circle aligned with the body's midline; and 12 subjects (40 percent) produced their circles to the right of the midline (20 percent) or to the left of the midline (20 percent). This evidence of the midline cross reflects either difficulty in sustaining and monitoring the perceptual data on both sides of the body, in sustaining and controlling the required motor activity from side to side, or in the

complex coordination of perceptual and motor activities.

Accuracy in producing a circle drawing was rated for 30 subjects. On this rating, 19 subjects (63.3 percent) produced a circle of standard shape; 10 subjects (33.3 percent) produced a fair approximation of the shape; and one subject (3.3 percent) produced a poor approximation of the circle shape.

The direction in which the circle was drawn by the 30 subjects was noted in relation to the dominant hand. Among the 24 right-handed subjects, all but one subject (4.2 percent) correctly drew the circle in counterclockwise direction. Among the six left-handed subjects, three (50 percent) correctly drew in clockwise direction and three (50 percent) incorrectly drew in the counterclockwise direction, indicating either confusion in laterality, or poorly established habits.

The performance ratings of subjects on the chalkboard circle drawing items of the DPMFT is shown in Appendix B, Table XXXIX.

The DPMFT exercises in imitative movement include 17 "semaphore movements" of the arms, performed by the instructor for imitation by the subjects. They provide an evaluation of neuromuscular control and the translation of visual clues into motor activity. All 31 subjects were present for this exercise. Of that number, 13 subjects (41.9 percent) performed at a satisfactory level, and 18 subjects (58.1 percent) performed below standard, further confirming the WISC findings related to perceptual-motor handicaps in handling relatively complex visual-motor tasks. (See Appendix B, Table XL.)

Analysis of the pilot schools subjects' performances on the DPMFT indicated a low incidence of difficulty on those items which

required gross muscular control or relatively simple visual-motor coordination. As motor tasks became more refined and more complex, with increased requirements for visual-motor coordination, the incidence of difficulty increased commensurately. The instructional implications of these findings are reported in Chapter VI.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR PLANNING EDUCATIONAL PROGRAMS

This exploratory field study of economically disadvantaged students, who had made no measurable progress in a compensatory program of remedial reading, has been oriented to the pragmatic purposes of instructional planning. An *ex post facto* design was applied, with the purpose of extending the knowledge about the subjects by the consolidation and analysis of information already available in school records with new information gathered in the course of the investigation.

The questions addressed in the study were in two categories related to the more common characteristics of the subjects, and to the factors of their reading disabilities which could be identified for instructional treatment. The three questions concerning the characteristics of the subjects were posed in order to meet an educational need for guidelines for the early identification of students for whom special instructional approaches might be required. The five questions focused on factors of the reading disabilities of subjects were prompted by the need for a new base of information for the design of more effective programs of instructional treatment.

The findings of this investigation can in no sense be generalized to the broad population of elementary school students in urban districts. Nor can they be applied unreservedly to the mass of economically disadvantaged students in city schools. The study was neither designed nor

conducted for such a purpose. It grew out of the conviction, expressed in the introduction of this report, that linkage between the findings of research and actual school practice will require an initial level of practical research shaped as a tool for a specific planning purpose, conducted in the educational arena where application is intended, and focused on the identification and analysis of variables which prevail in the immediate sphere of application. It is these tenets and the related methodology, rather than the specific findings of this investigation, which the researcher recommends for consideration beyond the specific "educational arena" in which the study was conducted.

I. CHARACTERISTICS OF THE SUBJECTS

The initial investigation of characteristics of the reading disabled subjects involved the consolidation and analysis of information already available in school records. While it cannot be inferred that all students known to have characteristics similar to those of the subjects of this study will necessarily have severe problems in reading, it seems logical to conclude that a high incidence of difficulty in learning to read will occur among students whose personal profiles are closely patterned to the findings of this phase of the investigation.

Summary of the More Common Characteristics of Subjects Related to Personal and Family History

Available school records of the personal and family history of 153 subjects in elementary grades were examined to identify their more common characteristics. The subjects had experienced extreme difficulties

in learning to read even after participating in a compensatory reading program which had proved successful with large numbers of students of similar economic and cultural backgrounds. The examination of personal and family history included consideration of the grade, age, race, and sex of subjects, the status of parents/guardians of subjects as reported in school records, and the position of subjects among siblings. The data upon which the analyses of these factors were based are displayed in Appendix B, Tables VI through XIII.

By the design of the study, the subjects included all students in the elementary grades of 10 Title I, ESEA, target schools who had made no measurable progress during the preceding year in a compensatory remedial reading program. Some subjects were identified in all elementary grades, one through six, but the highest incidence of severe reading problems occurred in intermediate grade levels, with 92 subjects (60.1 percent) appearing in grades four and five in 1972-73, when their non-progress in reading was noted. In that year 61 subjects (39.8 percent) were in primary grades one through three. (These numbers and percentages do not include as subjects any students with reading difficulties who were in grade six in 1972-73, since they had been promoted to junior high school when the study was conducted in elementary grades in 1973-74).

The high incidence of reading disabilities appearing in intermediate grades can probably be related to the increasing complexity of the learning tasks as the subjects progressed through school. Even before the evaluation was made of their progress in 1972-73, the subjects were known to have made poor progress in reading. Otherwise, they would

not have qualified as participants in the Title I project in which they were identified for this study. If the underlying causes of their difficulties in reading were not addressed in earlier grades, it is reasonable to assume that their problems would have become progressively compounded to such a degree that not even minimal progress could be made. It might, in fact, be anticipated that some regressions might occur as the result of growing confusion and frustration. The findings related to motor functions, reported in relation to the last question of this study, support the proposition that learning problems become more evident as learning tasks become more demanding in their requirements for complex integrations of mental operations.

The ages of subjects having extreme difficulties in reading obviously related to their grade placement. Ages in 1972-73 ranged from six to 11 years, but the greatest numbers and percentages of subjects were found to have been nine or 10 years old when their lack of progress in reading was noted. (Ages of subjects shown in Appendix B, Tables VI through IX, reflect their ages during 1973-74, when the study was conducted and special tests administered, not the ages of subjects the preceding year when their lack of progress was noted.)

By race and sex, the most common identification of the subjects having extreme reading difficulties was black male, with 87 subjects (56.9 percent) in this category. The second most common race/sex identification was black female, with 50 subjects (32.7 percent) so identified. Because of the racial configuration and economic conditions of the communities in which the subjects were identified, racial factors can be applied only for purposes of identification of the subjects of this study.

No valid conclusions can be drawn which link race in a causal relationship to reading difficulties.

The higher incidence of male subjects identified (60.8 percent) supports the findings of other researchers that more boys than girls experience difficulty in reading.

Analysis of marital status of the parents identified a notably high incidence of subjects whose parents were either divorced or separated. In the total population, 109 subjects (73.2 percent of the 149 subjects for whom the information was available) had parents who were either divorced or separated. Among black subjects, the percentage was even higher, with 104 subjects (78.2 percent of the 133 subjects for whom the information was available) having parents who were either divorced or separated. A difference was found in the marital status of parents of white subjects, with the parents of 11 white subjects (68.7 percent) being married, and the parents of only five white subjects (31.2 percent) being divorced or separated. The highest incidence of parents who were either divorced or separated was found among male subjects. A total of 72 of the 91 male subjects for whom the information was reported (79.1 percent) had parents who were either divorced or separated.

With regard to the adult(s) with whom the subjects lived, it was found that 103 subjects (69.1 percent of the 147 subjects on whom this information was available) lived with either the mother only or grandmother only, with neither the father nor grandfather in the home. This pattern prevailed for both male and female subjects in the total population, but with a higher percentage among the male population (73.6 percent) and somewhat lower percentage among the females (62.1 percent).

The incidence of subjects living with either mother only or grandmother only was particularly high among black subjects, with 99 of the 133 black subjects (74.5 percent) residing with the female relative. Only among the 16 white subjects was the greater percentage (62.5 percent) found living with both parents.

Information in school records was not sufficiently clear to identify the type of work in which parents of subjects were engaged, though the criteria for identification of the Title I target schools in which the study was conducted indicate a high incidence of poverty level incomes.

With regard to the employment status of parents, it was found that for 54 subjects (43.3 percent of the 125 subjects for whom this information was available) the mother or grandmother with whom the subject lived was either unemployed or on public welfare or social security, and neither the father nor grandfather was in the home. The second most common pattern of parental employment status (24.8 percent) was that in which the mother was employed, and the father was not in the home. These two patterns prevailed in high incidence among the black population, with the mother or grandmother of 51 black subjects (45.9 percent) being unemployed or on welfare or social security, and with the mother of 31 black subjects (27.9 percent) employed and the father not in the home. In the white population of 16 subjects, the most common pattern (64.3 percent) was that in which the father was employed, and both parents were in the home. The second most common pattern of white parental employment status (14.3 percent) was that in which both parents were employed and both were in the home. The two common patterns of mother or grandmother unemployed or on

welfare, and of mother employed with father not in the home, were in high incidence among both male and female subjects. However, the percentage of working mothers with no father in the home was higher for male subjects (30.3 percent) than for female subjects (16.3 percent). The percentage of subjects whose mother or grandmother was unemployed or on welfare was higher for female subjects (49 percent) than for male subjects (39.5 percent).

The findings related to marital status of parents, adult(s) with whom the subjects live, and employment status of parents or guardians are in keeping with the findings of others who have studied family patterns of economically disadvantaged children, such as Deutsch and Brown.[1] Actually, the percentages of subjects of this study who were found to have no father in the home were higher for both black and white students than in the Deutsch and Brown studies. It should be noted, however, that Deutsch and Brown examined subjects who were in lower economic levels, but who were not specifically identified by both reading disabilities and their poverty status. While the higher percentages of subjects with no father in the home found in this study cannot establish a direct causal relationship between reading disability and the absence of a father, that condition should be given serious consideration among the set of characteristics which in composite identify a high potential for learning problems associated with reading. The trend, reflected in the Deutsch and Brown studies, for more male students than female students

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[1]Martin Deutsch and Bert Brown, "Special Influences in Negro-White Intelligence Differences," *Journal of Social Issues*, XX (April, 1964), 24-31.

to be seriously affected in intellectual development was further confirmed in this investigation.

Examination of the position of subjects among siblings revealed that 57 subjects (40.1 percent) were identified as the middle child in the family and 47 subjects (33.1 percent) were identified as the youngest child in the family. Only 10 subjects (7 percent) were identified as the only child in the family. It was notable that nine subjects were black male twins (four sets of twins and one subject whose twin was in the school but not identified as having extreme reading difficulties). Examination of the data in relation to both race and sex of subjects showed that among both black and white subjects and among both male and female subjects, the position of middle child occurred with the greatest frequency, and that of youngest child occurred with second greatest frequency.

The evidence of difficulties among children in competitive situations among siblings, added to that regarding the absence of the father in the home, can be related to Reissman's descriptions of the lifestyle of underprivileged families and to the frequent lack in such households of intense parent-child relationships.[2]

A report of recent research findings which have particular implications for this study were discovered after the study was completed. In a report by Tavris on the studies of Zajonc and his colleague Markus, a theory was posed and extensively substantiated that the number of

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[2]Frank Riessman, *The Culturally Deprived Child* (New York: Harper and Row, 1962), pp. 36-42.

family members and their ages significantly affect the intellectual development of the children in the family. Tavris reported:

> Zajonc and Markus represent the intellectual environment in the home as an average of the absolute intellectual level of all family members. Each person in the family contributes to the total intellectual atmosphere, which changes continually as children grow. The most dramatic changes in the environment occur when someone joins the family or leaves it.[3]

These findings add new insight to the effects on intellectual development of children, regardless of race or socioeconomic status, who have no father in the home. They also relate strongly to the findings of this study that the positions of middle and youngest child among siblings occurred in highest frequency. As Tavris reported from the Zajonc and Markus studies:

> What happens is that the intellectual level of each additional child is diluted by his contact with young siblings, who have not reached full adult intelligence. A child who is the fifth of five grows up in a world influenced heavily by five child-sized minds. The first-born child, by contrast, grows up with his parents as primary forces, which gives him maximum intellectual opportunity.[4]

The authors of the studies cited above make no clain that family size and age of family members are the sole factors which affect intelligence. They also point out that greater spacing between older and younger children lessens the negative effect on the intellect of younger children. Neither do they say that individual predictions of intellectual levels can be made on such a basis.[5] Their studies do pose important considerations for educators seriously bent on developing suitable compensatory

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[3]Carol Tavris, "The End of the IQ Slump," *Psychology Today*, April, 1976, p. 69.

[4]Ibid., pp. 69-71.

[5]Ibid., pp. 71-72.

programs for children who are negatively affected by low intellectual environments.

Summary of More Common Characteristics of Subjects Related to School History

The available school histories of the 153 subjects were examined to identify their more common characteristics with regard to the number of schools attended, preschool experience, record of attendance, referrals to school social workers, and psychological tests administered. The data upon which the analyses of these factors were based are displayed in Appendix B, Tables XIV through XVII.

Examination of the number of schools attended disclosed a somewhat greater degree of stability than had been anticipated. A total of 96 subjects (63.1 percent) had attended only one school, and a total of 36 subjects (23.7 percent) had attended only two schools. Only 20 subjects (13.2 percent) had attended three or more schools, notwithstanding the school desegregation activities which had taken place in the district during the years in which the subjects had been enrolled, and notwithstanding the low economic levels in the Title I target areas from which the subjects were selected. Analysis of the number of schools attended by race and sex of subjects revealed minimal differences in the pattern of relative stability from that found for the total population of the study.

The fact that transiency did not figure strongly as a characteristic of the disabled readers should be qualified somewhat. Only those students with severe reading problems who were still enrolled in the Title I target schools the year after their lack of progress was dis-

closed were identified as subjects for this study. It is quite possible that the more transient children had either moved out of the target school zone or had been transferred to non-target schools in the desegregation process. The criteria applied in the selection of subjects may have weighted the factor of stability in school assignment. Even with allowances for this consideration, it was anticipated that some student movement would take place during the year in which the study was conducted, but not one of the 153 subjects moved during the investigation. It is possible that their poverty status may have locked the subjects into continued residency in the low-rent districts of the core city.

Examination of the preschool experience of subjects revealed a low incidence of preschool experience among the population, for both races, and for both sexes. In the population, a total of 115 subjects (75.2 percent) had no record of preschool experience of any kind. Among the 38 subjects who had attended a preschool class or center, more black subjects had attended Head Start than either kindergarten or daycare centers; more white subjects had attended kindergarten; more male subjects had attended Head Start; and more female subjects had attended Head Start. The greater incidence of attendance in Head Start is probably a factor of the greater availability of the service rather than an indication of special preference. Since only five white subjects had a record of any preschool experience, no conclusions could be drawn regarding the higher incidence of their kindergarten attendance. Since other findings of this study related to the factors of the subjects' reading disabilities point to a need for programs of early intervention, the limited preschool experience of the subjects warrants particular note

among their characteristics.

Examination of the school attendance of subjects revealed a high incidence of absences from school. The average days absent per school year was based on attendance for the years in which the subject had been in school during the three years prior to that in which the study was conducted. These averages were examined in a frequency distribution in intervals of 10 days. While the median fell in the interval of 10 to 19 days absent, it was found that 43 subjects (28.8 percent) had averaged being absent from 20 to 39 days (one to almost two school months) per year, and 32 subjects (14.7 percent) had on the average missed from 40 to more than 50 days (two or more school months) per year.

The predominant causes for the poor attendance of subjects could not be determined from the school records. Possible causes might be poor health (though this was not evident in the available medical history of subjects), low value of school among parents, school resistance among subjects resulting from frustration in the competitive learning situation, or lack of emphasis in the school on regular attendance. Further investigation should be made of this situation, with the purpose of planning courses of action for its correction.

Information on the number of referrals to school social workers and of psychological tests administered to subjects indicated that relatively little special attention other than the Title I compensatory instructional program had been given to the learning problems of the subjects of this study. Of the 153 subjects in the population, only 34 subjects (22.2 percent) had ever been referred to the school social worker for any reason, including school absence; and only 24 subjects (15.7

percent) had ever been given a psychological examination. This circumstance gains additional meaning when considered in relation to the findings of the analysis of psychological examinations (Wechsler Intelligence Scale for Children) administered as a part of this study to subjects in two samples, and to the high incidence of mental retardation and of serious language problems detected in the examinations. Those findings are reported in subsequent sections related to mental ability, language, auditory, and visual functioning. Further analysis of referrals and tests administered indicated that a greater percentage of white subjects (43.8 percent) than black subjects (19.7 percent) had been referred, and a greater percentage of white subjects (31.3 percent) than black subjects (13.9 percent) had been given psychological examinations. A greater percentage of male subjects (29.0 percent) than female subjects (11.7 percent) had been referred, and a greater percentage of male subjects (21.5 percent) than female subjects (6.7 percent) had been given psychological examinations.

Summary of More Common Characteristics of Subjects Related to Medical History

Medical history was examined from the school records of 144 of the 153 subjects in the population. The examination was focused on the results of visual and audiometric screening conducted each year in the school district and on the school's reports of physical examinations. The data provided on the medical history of subjects are displayed in Appendix B, Table XVIII.

This examination yielded little information about the subjects because of the sparsity of data maintained in school records on the

physical condition of students. It was concluded that problems of visual and hearing acuity were not characteristic of the subjects in high incidence. In the visual screening of 134 subjects, evidence was found that only five subjects (3.7 percent) should be referred fur further examination. In the audiometric screening of 127 subjects, only three subjects (2.3 percent) showed evidence of need for further examination.

Information on physical examinations reported in school records was insufficient for use in determining health characteristics of the subjects. For a total of 129 subjects (84.3 percent of the population), the schools had no report of physical examination. Among the 15 subjects on whom there was a report of physical examination in the records, 13 subjects had satisfactory reports; one subject was anemic; one subject had petit mal seizures; and five subjects had dental needs. From these data it could only be concluded as characteristic of most of the subjects that they had not had sufficient attention to the possibility of medical problems. In relation to the continuing reports of the negative effects of malnutrition on intellect, such as those of Scrimshaw[6] and DiLeo,[7] and the evidence of neurological handicaps among disadvantaged children with learning disabilities reported by Kappelman, Kaplan, and Ganter,[8] the

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[6]Nevin S. Scrimshaw, "Infant Malnutrition and Adult Learning," *Saturday Review*, March 16, 1968, p. 65.

[7]Joseph H. DiLeo, "Effects of Early Malnutrition and Structure and Function: The Case for Secondary Prevention," *Handbook on Learning Disabilities: A Prognosis for the Child, the Adolescent, the Adult*, ed. Robert E. Weber (Englewood Cliffs, New Jersey: Prentice-Hall, 1974), p. 64.

[8]Murray M. Kappelman, Eugene Kaplan, and Robert L. Ganter, "A Study of Learning Disorders Among Disadvantaged Children," *Journal of Learning Disabilities*, II, 5 (1969), 27.

minimal attention given to the physical condition of the subjects of this study deserves serious consideration at both school and district level.

Profile of Subjects

The first three questions for investigation in this study were addressed to the identification from school records of the more common characteristics of the reading disabled subjects from economically impoverished communities, related to personal and family history, school history, and medical history. Related findings are summarized in the profile which follows.

Assigned grade. Severe reading difficulties occurred at all elementary grade levels (first through sixth), but a greater percentage of those who had made no measurable progress were found in the intermediate grades.

Age. The age range included all ages from seven to 12 years, but the greatest accumulation of severe reading disabilities occurred among those who were nine and 10 years old in the school year in which their identification was made.

Race and sex. More black than white students, and more male than female students had failed to progress in reading. The most common race/sex identification was black male; the second most common was black female.

Parent/guardian status. The most common family configuration was that of parents either divorced or separated, no father in the home, the subject living with either the mother or grandmother, and with the female parent or guardian unemployed and/or supported by welfare or social security.

Working mothers with no father in the home ranked as the second most common family pattern. Differences were found in the family patterns of black and white subjects, with more white subjects living with both parents and with one or both being employed. The single most common characteristic was that of black male with no father in the home.

Position among siblings. In all categories of race and sex, the greatest percentage of subjects were identified as being a middle child among siblings, with the second greatest percentage being those identified as the youngest child.

Number of schools attended. Most commonly the subjects had attended only one school, with the second most common pattern being attendance in only two schools. This characteristic may not be typical of poor readers in disadvantaged communities, since the disabled readers who were no longer enrolled in the Title I target schools the following year were not included as subjects.

Preschool experience. The lack of preschool experience was highly characteristic of the disabled readers.

School attendance. Absenteeism was excessive among subjects who had failed to progress in reading.

Referrals to social workers. Relatively few of the disabled readers had ever been referred to the school social worker for any reason.

Psychological tests administered. Few of the subjects had ever had a psychological examination.

Visual acuity. Problems of visual acuity were not characteristic of the subjects.

Hearing acuity. Problems of hearing acuity were not commonly evident.

Physical condition. Information in school records was insufficient to draw any conclusions regarding the general health of subjects except that little attention had been given to their physical conditions.

II. FACTORS RELATED TO READING DISABILITIES

The examination of the various factors of the reading disabilities of the subjects was specifically directed to the purpose of planning suitable instructional treatment. The factors considered included: mental ability, language functioning, auditory functioning, visual functioning, and motor functioning. Test scores already available in the school records were consolidated and analyzed, and new information was collected by the use of several additional tests administered during the course of the investigation. In the sections which follow, the findings of each factor of the reading disabilities are summarized and examined in relation to findings of other studies in related fields.

Summary of Findings Related to Mental Ability

For the examination of the mental ability of subjects, three samples were identified.

A primary sample was selected to include all subjects in the primary grades who had been given the Otis-Lennon Mental Ability Test in the district's systemwide testing program. This group test was

administered in the city schools only in grades one through three for use as a screening device to identify students who should be referred for special education assessment. The Otis-Lennon scores should not be considered conclusive with regard to the actual intelligence of the disadvantaged students. They are suggestive only of the trends in the intellectual levels at which the subjects functioned in the group situation.

Because of the need for more definitive information about the mental ability of the disabled readers, the subjects in two pilot schools were designated as a typical sample, and contractual arrangements were made with a clinical psychologist who was asked to administer the WISC and to report on his findings.

Because of the difficulties which some of the subjects in the population had encountered on the Durrell Analysis of Reading Difficulty, a third sample was identified to include all those who had been unable to make more than one measurable response on the Durrell instrument. Those identified in this manner who were subjects in the pilot schools were included in the pilot schools sample only. This was done to maintain the typical character of that sample. The subjects in the Durrell non-responding sample were also given the WISC.

The Otis-Lennon Mental Ability Test scores for the primary sample showed a high incidence of possible mental retardation (45.2 percent of the 31 subjects), with only eight subjects (25.8 percent) scoring in the average IQ range. While the individual scores cannot be considered conclusive, the trend of limited intellectual functioning among the disabled readers warrants note. For further analysis, the Otis-Lennon scores were

used to derive a mental age for the subjects, and their mental ages were compared with their chronological ages to identify the disparities between the two. This analysis showed that only three subjects (9.7 percent) had a mental age which was either the same as or higher (by one month) than the chronological age. There were 23 subjects (74.2 percent) whose mental ages were lower than their chronological ages by one year to as much as three-and-one-half years.

The Otis-Lennon results are shown in Appendix B, Tables XIX and XX.

Findings on the WISC, which was individually administered by a clinical psychologist to the more typical pilot schools sample, were particularly revealing. The WISC provides both verbal and performance IQ scores, as well as a full-scale score. The trend observed on the Otis-Lennon group test scores in the primary sample was confirmed by the WISC findings among the pilot schools subjects. The full-scale WISC scores showed that 56.2 percent of the subjects had IQ's in the educable mentally retarded (EMR) range, but on the breakdown of verbal and performance scores a marked difference was found. On verbal IQ, 71.9 percent of the subjects scored in the EMR range (IQ 60 to 79). On performance IQ, 37.5 percent scored in the retarded range.

Application of the percentages of pilot schools subjects scoring in EMR range to the total population indicated the possibility that as many as 86 of the 153 subjects might be retarded on full scale IQ, 110 might have retarded verbal IQ's, and 57 might have retarded performance IQ's. This interpretation is subject to error and must be taken as an estimate only, since it is unlikely that the sample is precisely typical of the total population of disabled readers who were the subjects of this

investigation. However, even with full allowance for possible differences between the sample and the population, it is apparent that limited mental ability is an important factor in the reading disability of the subjects.

The WISC scores for the pilot schools sample are shown in Appendix B, Tables XXI, XXII, and XXIII.

The interpretation of the WISC scores by the psychologist yielded important information concerning the nature of the mental deficiencies indicated by the scores. Those interpretations are discussed in subsequent sections of this chapter.

In view of the known backgrounds of the subjects of the study, their attained IQ scores should be carefully studied in relation to what is known about the effects of poverty on mental development. In the Kappelman, Kaplan, Ganter study of 306 disadvantaged children with significant learning disorders, it was found that neurological handicap was the primary causative factor in more than 50 percent of the subjects.[9] In the same study report, however, a definition was given of cultural deprivation as one cause of learning disabilities. In that definition, the authors stated:

> IQ testing tends to show a pattern of "pseudo-retardation," with low IQ results stemming from limited fund of information about the world in general, and poor basic verbal (especially vocabulary) skills. These children tend to do much better on the "action-oriented" performance subtest of the Wechsler Intelligence Scale. Frequently, the performance IQ is average or even superior while the borderline retarded verbal IQ will bring down the total IQ result drastically.[10]

In the study presently under discussion, there was not sufficient evidence to determine whether neurological impairment was a cause of the

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[9] Ibid.

[10] Ibid., p. 30.

mental deficiencies reflected in the subjects' scores, if familial retardation might account for the condition, or if the low IQ scores were, indeed, the "pseudo-retardation" resulting from negative environmental conditions. However, there was indirect evidence that the last circumstance is most likely. Certainly, the poverty conditions and the related family life patterns found in the study of the subjects' more common characteristics suggest deficits in their environment which would be antithetical to full intellectual development. It should also be recalled that few of the subjects had ever been referred to the school social worker for any cause. This suggests that they had probably not, with great consistency, been misbehaving children, hyperactive, or behaviorally uncontrollable. Otherwise, teachers would have been more inclined to refer them to the social worker. (All schools in the district have at least part-time social work service.) One of the characteristics which frequently distinguishes the brain-injured (neurologically impaired) child, as Wepman[11] and others have pointed out, is the inability of the individual so affected to control his behavior. To these considerations is added the fact that there were almost twice as many subjects who had verbal IQ's in the retarded range as there were subjects with retarded performance IQ's. If the mental deficiency were familial, it is far more likely that both verbal and performance IQ scores would more consistently be affected. So, while further examination might identify the mental condition of some of the subjects as familial retardation, the evidence

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[11] Joseph M. Wepman, "Cerebral Injury or Agenesis--A Concept of Delayed Development," *Children with Learning Disabilities*, ed. Gladys Natchez (New York: Basic Books, 1968), p. 153.

found in this study points to "pseudo-retardation" as a more realistic diagnosis for many of those who scored at retarded level. If such a diagnosis is correct, instruction of the subjects should be strongly oriented to improvement of their basic thought processes in an effort to overcome the specific developmental lags indicated in individual diagnosis. This implication will be discussed further in the last section of this chapter.

Subjects in the Durrell non-responding sample were examined with the WISC to find possible causes for their inability to respond on the Durrell Analysis of Reading Difficulty. This sample cannot be considered typical of the population.

Findings indicated that mental deficiency was an important factor in the poor responses of subjects on the reading test. Only one subject in the sample scored in the average IQ range on the verbal component of the WISC. Ten (52.6 percent) of the 19 subjects had verbal IQ's in the EMR range, and eight subjects (42.1 percent) had IQ scores in the dull normal range. Unlike the pilot schools sample, there were almost as many Durrell non-responding subjects (nine) who scored at retarded range on the performance component of the WISC as there were verbally retarded subjects (10). There were some indications in the scatter of scores as interpreted by the psychologist that environmental factors may not have been solely the cause of the retardation in this sample. This possibility is discussed further in the findings related to language and visual functions.

WISC scores for the Durrell non-responding sample are shown in Appendix B, Tables XXIV, XXV, and XXVI.

Summary of Findings Related to Language Functioning

The first phase of this investigation involved the consolidation and analysis of information which was already available in the school records of the subjects. The district's testing program at the time this study was conducted provided for the use of California Achievement Test (CAT) in elementary grades two, three, four, and six. Metropolitan Achievement Test (MAT) was administered in grade five. The tests were administered in the fall of 1973. The use of two different instruments requires that some restraints be applied in application of the findings from the standardized test data. No valid grade-to-grade comparisons can be made between fourth and fifth or between fifth and sixth grade scores. While the subtests of the two test batteries are similar, they cannot be considered precisely equivalent. Since other reading analyses were made, the CAT and MAT scores were examined only to identify trends in reading achievement. For that purpose the vocabulary subtest of CAT and the word meaning subtest of MAT, which measure similar skills, were reviewed together; the comprehension subtest of CAT and the reading subtest of MAT were jointly considered, and the total reading scores on the two instruments were reviewed in grade sequence.

On the CAT vocabulary subtest, with the MAT word meaning subtest applied for grade five, the range of achievement among the 134 subjects for whom achievement test scores were available was from pre-reading level to grade four. The median for the subjects was in the second grade interval. A total of 60 subjects (44.8 percent) scored below second grade level. A total of 45 subjects (33.6 percent) scored at pre-reading level, below 1.0.

On CAT total reading, with MAT total reading applied for grade five, the range of achievement among the subjects was from pre-reading to fourth grade. A total of 61 subjects (45.5 percent) scored below second grade level. A total of 43 subjects (32.1 percent) scored at pre-reading level, below 1.0.

While there were moderate differences between vocabulary and comprehension scores for some individual subjects, differences in the composite were minimal. The overall picture derived from the group administered achievement tests was one of extremely poor reading ability, which confirmed the seriousness of the subjects' problems but provided no usable diagnostic information.

Frequency distributions of the subjects' scores on CAT and MAT are shown in Appendix B, Tables XXVII through XXXI.

The Durrell Analysis of Reading Difficulty was individually administered to all subjects. The item analysis included: oral reading, silent reading, listening, flash words, word analysis, and spelling. The range of scores on the various test items reflected those already seen on the standardized achievement tests. On both oral and silent reading, the subjects' scores ranged from pre-reading to grade four, with median scores occurring in the first grade intervals for both skills areas.

The range of Durrell scores on listening was from pre-reading to fifth grade level, with the median occurring in the third grade interval. It is not surprising that scores on listening skills should be somewhat higher than on other skills items, since this is frequently the pattern on such skills tests. This test item assesses the child's ability to comprehend paragraphs read to him and to recall what he has heard. It

should be noted that the median score at third grade level is two years below the median for assigned grade level of the subjects, which occurred in the fifth grade.

The highest individual scores attained on any test item occurred on flash words. On that item, the range of scores was from pre-reading to sixth grade level, but the median occurred in the first grade interval. Since the ability to recognize words when flashed on a card or tachistoscope applies visual perception and memory, the individual subjects who made the high scores on this item probably were those whose WISC item scores showed no marked mental deficiency in those abilities.

The skills areas in which the most marked weaknesses were detected in the Durrell scores were word analysis and spelling. In both areas, the medians occurred at pre-reading level. The range of scores on word analysis was from pre-reading to second grade level. The range on spelling was from pre-spelling to grade four, with the exception of one child whose spelling was at sixth grade level. These deficiencies are important considerations in relation to the inability of the subjects to progress in the Title I remedial reading program, which placed high emphasis on a phonics approach. Word analysis and spelling apply the abilities to hear, perceive, discriminate, and recall the sounds of letters, of letter combinations, and of word parts; to see, perceive, discriminate, and remember sequentially the letter symbols; to integrate the visual and auditory inputs with remembered patterns of sound and visual symbol; to derive meaning from those integrations through processes of both memory and conceptualization; and to perform the output (expressive) operations involved in reading or writing, such as visual, auditory, and motor

functions. If one of these mental abilities is either damaged or undeveloped, the total skills operation will be impaired and it will be particularly important to provide instructional treatment directed to the mental area in which the deficiency lies; to bring the areas of strength into play to assist in developing the weaker areas; and to guide the subjects into new skills of integration as they develop new input and output capabilities. These instructional implications are further discussed in the last section of this chapter.

Key information related to the language functioning of the subjects was disclosed in the analysis of the psychologist's interpretations of the subjects' scores on the WISC. The individual reports were analyzed to determine the types of language difficulties which were reflected in the subjects' responses. The occurrences of each type of difficulty were tallied and percentages were computed. Nine types of language difficulties were identified in the subjects' psychological reports. It was particularly notable that there was not one of the subjects in either the pilot schools sample or the Durrell non-responding sample who had no serious language difficulty, most of the subjects had several such disabilities, and a number of subjects showed almost total language weakness.

Since the pilot schools sample was more typical of the total population, attention is first given to the identified language difficulties of subjects in that sample. Among the 32 subjects in the pilot schools, 21 (65.6 percent) showed evidence of a central language disorder associated with conceptual confusion and/or abnormal verbal concreteness.

This language handicap, considered in relation to a set of other difficulties which appeared in the psychologist's reports, adds strength to the proposition previously submitted that the mental retardation of many of the reading disabled subjects of this study should be considered "pseudo-retardation," as described by Kappelman, Kaplan, and Ganter.[12]

The set of difficulties which, added to the evidence of language disorders, support the proposition of "pseudo-retardation" include: poor general fund of information; language difficulty related to cultural deprivation; and poor self-reliance. It is also possible that impaired concentration, which was also noted as a language difficulty, could be related to environmental effects on mental development. Poor general fund of information was noted for nine subjects (28.1 percent); language difficulty related to cultural deprivation was noted for four subjects (12.5 percent); poor self-reliance appeared in the reports of nine subjects (28.1 percent); and impaired concentration was reported for six subjects (18.7 percent).

In addition to the difficulties listed above, five subjects (15.6 percent) showed evidence of possible auditory-perceptual handicap; six subjects (18.7 percent) showed poor expressive vocabulary; three subjects (9.4 percent) showed a lack of judgment; and one subject (3.1 percent) was noted as having poor comprehension.

While the WISC findings do not in any sense rule out the possibility of either neurological damage or familial retardation in individual subjects, they do suggest a strong likelihood of "pseudo-retardation" as

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[12]Kappelman, Kaplan, and Ganter, op. cit., p. 30.

a highly common condition, which may or may not have neurological damage or familial retardation as a concomitant condition. In any case, the subjects must be considered educable. In no test category did any attain an IQ score at the severe level of retardation. The school's task is to provide programs of instruction geared to the known deficiencies of individuals for whom they have educational responsibility. Among the disabled readers who were subjects of this study, deficiencies in language functioning, whatever their derivation, were found to be key targets for instructional treatment. Program implications are discussed more fully in the concluding section of this chapter.

The psychologist's interpretations of the WISC responses by subjects in the pilot schools sample are shown in Appendix B, Table XXVII.

As previously noted, the WISC scores, as well as the psychologist's interpretation of the responses of the Durrell non-responding sample, suggested that environmental effects might not be solely responsible for the learning disabilities of the subjects who were unable to respond at a measurable level on the Durrell test items. Retarded verbal IQ and retarded performance IQ scores were found in almost equal incidence, and analysis of language difficulties and visual-motor difficulties revealed not only the patterns of language difficulties suggestive of environmental effects as seen in the pilot schools sample, but also recurring evidence of serious visual-motor problems suggestive of concomitant conditions of mental deficiency. These visual-motor problems are discussed in the section of this chapter related to visual functioning.

The psychologist's interpretations of WISC responses by the Durrell non-responding sample are also shown in Appendix B, Table XXVII.

Summary of Findings Related to Auditory Functioning

In addition to the related information derived from analyses of the subjects' responses on the Durrell Analysis of Reading Difficulty and on the WISC, auditory functioning was examined by the use of the Wepman Auditory Discrimination Test which was administered to 139 of the subjects.

The Wepman scores ranged from those which were too low to be considered valid to the level indicating very good development of the ability to make auditory discriminations, but the median score was at the level considered to be below the threshhold of adequacy. A total of 100 subjects (71.9 percent) scored below average on auditory discrimination, with 85 subjects (61.1 percent) scoring below the threshold of adequacy or so low that their scores were considered invalid.

Auditory discrimination was particularly poor among the primary age group. A total of 32 subjects were tested in grades one through three. Of that number 29 subjects (90.6 percent) were unable to make auditory discriminations at the average level of competency. A total of 107 subjects were tested in grades four through six. Of that number, 71 subjects (66.3 percent) scored below average.

Findings on the Wepman Auditory Discrimination Test relate particularly to the difficulties disclosed on the word analysis and spelling items of the Durrell Analysis of Reading Difficulty. The ability to discriminate among the sounds of letters and combinations of letters is prerequisite to success in both word analysis and spelling skills. The phonics approach which was emphasized in the Title I remedial reading program could not have been successful with the subjects of this study without a concerted

preliminary effort to overcome their deficiencies in auditory discrimination.

Since only 15.6 percent of the subjects in the pilot schools sample showed evidence on the WISC of a possible auditory-perceptual handicap, it is quite possible that the high incidence of low ability to make auditory discriminations on the Wepman test can be related to the combination of disadvantaged environmental conditions, the lack of preschool experience, and the omission by teachers of the preliminary training needed in auditory discrimination. These findings have important implications for the design of instructional treatment programs.

The scores attained on the Wepman Auditory Discrimination Test are shown in Appendix B, Table XXXIII.

Summary of Findings Related to Visual Functioning

The Durrell Analysis of Reading Difficulty disclosed a high incidence of low scores on flash word recognition, which involves visual perception, visual sequencing, visual memory, the ability to link the perceived visual image with an auditory memory, and to express the remembered word in speech. This complex skill was further analyzed on the WISC responses as interpreted by the psychologist who examined the subjects in the pilot schools sample and the Durrell non-responding sample.

In the pilot schools sample, six perceptual-motor difficulties were identified in the psychologist's reports of the WISC examinations. In the responses of the 32 subjects in the sample, there was evidence that 25 subjects (75.1 percent) had some difficulty in visual-motor functioning, and some had more than one kind of visual-motor difficulty.

A total of 19 subjects (59.4 percent) showed evidence of a visual-motor handicap in performing relatively complex motor tasks; and eight subjects (25.0 percent) showed evidence of visual-motor handicap in quick eye-hand motor coordination. Such handicaps would be reflected in reading, writing, and spelling skills. Possible figure-ground disturbance was detected in the responses of nine subjects (28.1 percent). This particular difficulty, frequently seen in brain-damaged children, can pose very serious reading problems requiring specialized teaching techniques. One subject (3.1 percent) showed perceptual confusion, which is also a frequently occurring condition among brain damaged children and difficult to remediate. Five subjects (15.6 percent) showed problems of visual sequencing. The perception and memory of letters, word parts, and words in proper sequence is obviously essential to the most basic reading skills. One subject (3.1 percent) was noted as having a problem of visual comprehension.

The visual-motor handicaps identified may, in many cases, relate to early experiential lacks when the mental operations of visual-motor integrations should have been developed. There is at least reason to hope that these difficulties will be amenable to purposive instructional treatment and may, in time, be overcome to the level of adequate functioning. Some of the difficulties found in lower incidence, however, are serious impediments to learning which may well require clinical instruction on a continuing basis--particularly if they are, indeed, evidence of neurological damage or disorder.

The subjects in the Durrell non-responding sample were examined with the WISC in a search for clues to their inability to respond at measurable level on the Durrell Analysis of Reading Difficulty. Their

retarded scores and the pattern of their language difficulties have already been reported, but in this sample, even more than in the pilot schools sample, there were indications of problems which might not be wholly accounted for by negative environmental conditions and resulting developmental lag. Visual motor handicaps in performing relatively complex motor tasks were reported for 57.9 percent of the subjects, closely approximating the pilot schools sample. Handicaps related to quick eye-hand coordination were found in a greater percentage of cases (42.1 percent) than in the pilot schools sample. Eye-hand coordination difficulties can occur as a result of mental developmental lag or lack of related learning experiences, but they also occur frequently in children with neurological damage in areas of the brain which control fine motor coordination. In addition to the subjects in whom visual-motor handicaps were detected, one subject (5.3 percent) showed perceptual perseveration; two subjects (10.5 percent) showed left-right confusion; six subjects (31.6 percent) showed possible figure-ground disturbance; and five subjects (26.3 percent) had problems with visual sequencing--all of which are difficulties which occur frequently as the result of neurological damage or disorder.

While the conditions of visual-motor functioning reported above cannot be considered conclusive evidence of neurological damage, the possibility should not be overlooked or treated lightly. While neurological examination might or might not provide additional information which would be helpful in instructional planning, the schools have an obligation to refer children in whom such conditions are detected. If there is a possibility of brain damage or disorder, there is also an implicit

possibility of progressively increasing damage from sub-clinical seizures which are often concomitant effects of brain damage, but which frequently cannot be detected in the classroom. Referral of subjects for clinical examination would seem especially important for those who tend to regress in their achievement levels, as appeared to be the case for some of the subjects of this study.

In the Durrell non-responding sample, there were 17 subjects (89.5 percent) who had problems in both language and visual-motor areas. Instructional treatment for children with multiple learning handicaps, such as those found in this sample, will require highly skilled teachers, small instructional groups, and a coordinated team effort, probably for the duration of the subjects' student years. The prognosis for overcoming all or even most of their difficulties is poor.

The analyses of the psychologist's interpretations of WISC responses for both the pilot schools sample and the Durrell non-responding sample are shown in Appendix B, Table XXVII.

Summary of Findings Related to Motor Functioning

In addition to the information derived from the WISC on visual-motor difficulties further investigation was made of the motor functioning of subjects through the use of the Developmental Perceptual Motor Fitness Test (DPMFT) administered by physical education teachers to 31 subjects in the pilot schools sample.

The findings concerning the performance of subjects on the various exercises of the DPMFT were more revealing in relation to the sequence of the difficulties encountered than with regard to the specific errors within each exercise. The general pattern noted was that subjects had relatively

little difficulty with gross motor activities requiring minimal integration of thought processes, but increasing difficulty as the exercises required more refined movements and more complex mental integrations.

On the identification of body parts, each body part, except mouth, ears, and knees presented some difficulty for at least a few of the subjects, but the only total errors in identification were of hip, waist, wrist, and ankles. It is likely that confusion between waist and wrist reflected problems of auditory discrimination rather than motor difficulty. It is also probable that confusion between hip and waist occurs because of the tendency of some teachers to confuse their own demonstrations of the directions, "Hands on hips."

Responses on the exercise for identification of body parts are shown in Appendix B, Table XXXIV.

The pattern of difficulty in performing exercises requiring more complex mental integrations was seen in the hopping, skipping, broad jump exercises. None of the subjects had difficulty with the broad jump, but hopping and skipping posed problems for some. On the hopping exercise, 35.5 percent performed poorly; on skipping, 25.8 percent had difficulty. As expected, primary age subjects had more difficulties with these exercises than the older subjects in the intermediate grades.

Responses on the hopping, skipping, jumping exercises are shown in Appendix B, Table XXXV.

On the exercise derived from a children's game called "Angels-in-the Snow," the subjects were required to lie down and respond to the instructor's hand signals by moving the limb(s) to which the instructor

pointed. The subjects were totally successful in moving one arm or one leg at a time, whether left or right. Difficulties occurred for as many as 37.5 percent of the subjects when they were instructed to move two limbs simultaneously. The greatest difficulty occurred when cross-lateral movement (e.g., left arm, right leg) was required. The sequence of increasing difficulties with increasingly complex mental operations required for motor control were apparent within this single exercise, as well as in the sequence of the exercises.

The responses on the "Angels-in-the-Snow" exercises for neuromuscular differentiation and right-left sidedness are shown in Appendix B, Table XXXVI.

None of the subjects had difficulty with the ball reaction catch exercise, possibly because most children, whatever their environmental situations, engage in play with balls of some kind and develop at least minimal skill unless severe motor damage is present.

Only one subject showed poor upper back strength, and seven subjects (22.6 percent) showed deficient lower back strength in the Kraus-Weber exercises. These exercises require muscular strength rather than complex mental coordinations.

Responses on the Kraus-Weber exercises and ball reaction catch are shown in Appendix B, Table XXXVII.

The DPMFT chalkboard circle drawing began to show evidence of problems for some subjects in handling more complex mental operations in motor activities. This trend was most notable in the size of the subjects' drawings. In this exercise each subject has three opportunities to produce the drawing. It was found that 65.5 percent of the

subjects were unable to draw a circle of the acceptable size, and 44.8 percent produced circles which were quite small. The difficulty indicated by such a response is one of integration of movement. In order to draw a chalkboard circle, the subject must be able to visualize a circle, hold the image in mind long enough to trace it, and perform coordinated motor functions from shoulder, to arm, to wrist, to fingers. The small drawings are produced when the child reduces the complexity of the task by ruling out shoulder and arm movement and involving only wrist and fingers.

Some children have difficulty with crossing the midline of the body in circle drawing (as well as in reading and writing activities requiring such movements of eyes and hands). This is believed by some to indicate inadequate motor development beyond the infantile pattern of limb movement from the center of the body in an outward direction. In the subjects of this sample, 40 percent avoided the midline by producing their circles to the right or left of the midline. The extreme difficulties with midline crossing which Kephart described[13] were not otherwise apparent in the subjects' responses, with the exception of one right-handed subject who drew half the circle clockwise, started over and drew the other half counterclockwise.

It was notable that among the six left-handed subjects, half of them drew their circles in a clockwise direction (correct for left-handedness), and the other half drew in the counterclockwise direction. This

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[13]Newell C. Kephart, *The Slow Learner in the Classroom* (2d ed.; Columbus, Ohio: Charles D. Merrill, 1971), pp. 91-92.

frequently occurs as the result of improper instruction by right-handed parents and teachers.

The responses of the subjects on the chalkboard circle drawing exercise are shown in Appendix B, Table XXXVIII.

The greatest difficulties on the DPMFT exercises were seen in imitative movement. These are semaphore movements of the arms from one demonstrated position to another. The subject must visually perceive the instructor's movement--its direction for each arm and the final position of each arm, perform the mental operations required for the performer to locate his own limbs, initiate the movement of each limb in the proper direction, and conclude the movement at the demonstrated position. The difficulties seen in the "Angels-in-the-Snow" exercises are compounded in this exercise, since the identification of limbs to be moved require more self-direction, each movement is initiated from a different position, and the direction of movement changes for each semaphore position. On this more complex exercise, 58.1 percent of the subjects performed unsatisfactorily.

Summary of Conclusions Related to Factors of the Subjects' Reading Disabilities

Specific findings regarding the factors of the subjects' reading disabilities have been reported in both Chapter V and Chapter VI of this report, but for the planning purpose to which the study was addressed, a broader set of conclusions have been drawn and summarized in relation to each factor of reading disability which was examined.

Mental ability. Mental deficiency is a widely pervasive factor

of the reading disabilities of the economically disadvantaged subjects of this investigation. While this circumstance cannot be generalized to all economically disadvantaged children, it was concluded that whenever extreme reading difficulties are found not to be amenable to remedial instruction that is successful with other children in like conditions, mental deficiency should be suspected, and early assessment should be made in order to verify or negate the existence of such limitations.

It was further concluded that there is a high probability that the mental deficiencies identified in many of the reading disabled subjects may be the "pseudo-retardation" resulting from agenetic causes (developmental lag) and, therefore, subject to improvement, assuming that proper instructional treatment is provided. Such treatment will require greater attention by teachers to the systematic development of thought processes than to the actual content of academic subjects.

While "pseudo-retardation" was suspected in high frequency, it was concluded that the possibility of neurological damage or disorder could not be completely ruled out for some of the subjects, particularly those in the Durrell non-responding sample and, in somewhat lesser percentages, in the pilot schools sample. It was a related conclusion that, in some cases, retardation from agenetic causes may be a concomitant to familial retardation, neurological impairment, or both. Where this is found to be the case, the prognosis for overcoming the mental deficiencies is poor, and long-range programs of specialized instruction will be required.

Although some of the subjects attained IQ scores above the retarded range, it was concluded that the differences in their mental

functioning were more differences of degree than of kind. Analysis of their performances on various tests and test items indicated that learning difficulties similar to those in the retarded subjects also occurred among those in the dull normal and average ranges of intelligence.

Language functioning. It was concluded that deficiencies in language functioning were not only root causes of the reading disabilities of the subjects; they were quite possibly major determinants of their mental levels of functioning. It was further concluded that the deficient language functioning of the subjects was chiefly characterized by: (1) limited mental command of words, word meanings, and syntactical structures with which to think and derive meaning from language received through either auditory or visual channels; and (2) developmental deficiencies and/or distortions of the central integrative processes. Large percentages of the subjects appeared to have serious difficulty in bringing new auditory and visual "messages" together in the mind; linking them to remembered images, sounds, or concepts; sorting categorizing and deriving new meanings and concepts.

It was tentatively concluded that the expressive use of language was a less basic problem in the reading disabilities of the subjects than receptive language and the language integration functions. It appeared that whatever expressive problems occurred were more likely to be reflections of the input and integration problems than of actual expressive aphasia.

The findings of this study related to language functioning confirm the earlier findings of Deutsch and others, reported by Achilles,

that problems of both expressive and receptive language in children of low socioeconomic status (SES) are compounded as they progress through higher elementary grades.[14] It was further concluded in the study by Deutsch and others that ". . . SES is a more powerful determinant of language behavior than is racial membership."[15]

While the findings of this investigation cannot be generalized to all economically disadvantaged students, it can be concluded that where disadvantaged environments and continuing reading disability are both evident, serious language difficulties other than reading are likely to be present in high incidence.

Auditory functioning. The conclusion was reached that the high incidence of problems found among the disabled readers in making auditory discriminations was an underlying cause of their inability to progress in a remedial reading program which placed high emphasis on a phonics approach. Without extensive preliminary and/or accompanying training in auditory discrimination, such an approach was not feasible for these subjects. Since serious problems of auditory perception were found in low incidence by the examining psychologist, it was concluded that the weaknesses in auditory discrimination of language sounds are subject to correction, assuming revised instructional treatment.

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[14]Martin Deutsch and others, *The Communication of Information in the Elementary School Classroom* (New York: Institute for Developmental Studies, Department of Psychiatry, New York Medical College, Cooperative Research Project No. 908, 1964), p. 118, cited by Charles M. Achilles in "Communication," *Research and the Classroom Teacher* (Genesee, New York: Genesee Valley School Development Association, November, 1964), p. 5.

[15]Ibid., p. 114.

Visual functioning. Although visual-motor problems were found in a somewhat lower percentage of subjects than language difficulties, it was concluded that many of the visual-motor problems identified were of a serious order likely to be major impediments to reading progress unless clinical treatment can be applied.

It was further concluded that inadequately developed and/or distorted processes of central integration of visual and auditory messages, newly received and remembered, are basic deficits which must be addressed as a part of any instructional approach designed for the reading disabled subjects of this study.

Although the scope of this investigation was not sufficient to warrant a conclusion, there was sufficient evidence suggestive of possible neurological impairment in some individual subjects to warrant a recommendation that those whose test performances showed severe language and visual-motor disorders be referred for full clinical examination.

Motor functioning. Gross muscular operations posed relatively little difficulty for the subjects, but increasing difficulties were detected when it became necessary to make more complex visual and motor integrations. It was concluded that the poorly developed or distorted central integration processes noted in language and visual functioning were also affecting conditions in the poor motor performances of some of the subjects.

Notwithstanding the evidence of some difficulties in visual-motor performances, motor functions were better developed among the subjects than language, auditory, or visual functions. This conclusion suggests

the possibility that motor activities might be designed to help develop and reinforce the weaker modalities.

It was the opinion of the investigator, in view of the recurring pattern of deficient ability to integrate language, visual, and motor operations, that motor training should be directly accompanied by training in visual memory and visual sequencing, and by verbalization of the motor tasks being performed.

III. IMPLICATIONS FOR PLANNING EDUCATIONAL PROGRAMS

The total of 153 subjects selected for this study comprised slightly less than one-third of the number originally identified as having made no measurable progress in the Title I remedial reading program in 10 target schools. While the original number of 492 students represented only 18.3 percent of the Title I participants, others whose progress was minimal may also be nearing the point at which the increasing complexity of their learning tasks will block further progress unless their learning difficulties can be relieved. While the incidence of disabled readers is likely to be higher in the target schools in the core city, there will still be large numbers of students in other elementary and secondary schools in the district who are experiencing similar difficulties.

The resolution of problems of such scope demands more comprehensive attention and effort than a single teacher, or even a single program staff can produce. For this reason, attention has been given to implications for planning educational programs in the broader sense, as well as to planning direct instructional treatment in the classroom.

Need for Early Intervention

The strong evidence that many of the learning problems of the subjects of this study were rooted in environmental deficiencies in the crucial years of early childhood reaffirms the need for preschool programs in the poverty areas of the city. The fact that so few of the reading disabled subjects of this investigation had ever had preschool experience is itself an endorsement of the Head Start program. It is known that far more than 24 children in the target school communities had been served in Head Start classes during the period when the subjects were of preschool age.

The nature of the learning problems identified in this investigation suggest that preschool programs in the core city, whether Head Start or kindergarten, should be designed to: (1) expand the experiences and the fund of information which young children will bring to their school learning tasks; (2) provide a high degree of language stimulation, guided language development, and verbalization of experiences; (3) provide sensory stimulation and consistent attention to sensory development; and (4) engage parents and others in the child's immediate out-of-school environment in active participation in the preschool learning processes of the child.

Early Identification of Learning Problems

Relatively few of the disabled readers in this study had ever been referred to the school social workers for any reason; fewer had ever had a psychological examination; and even fewer had any record of physical examination. The higher incidence in intermediate grades of

students who were no longer able to progress in reading strongly suggests the need for early identification before problems are compounded. The patterns of multiple learning disorders identified in some of the subjects posed a serious need for clinical examination. These are findings and implications which can and should be addressed administratively.

Apparently, there is a need for teacher training in techniques of classroom observation for the identification of serious learning problems. It appears that there is also a need to sensitize teachers and principals to the fact that persistent learning difficulties in children warrant psychological examination and the full use of available supportive services.

Even though some teachers may lack skill in diagnosis of learning problems by observation, the standardized achievement test results obtained in the district's testing program each year can provide useful information for initial screening. In this investigation the subjects who scored at low levels on the individually administered Durrell Analysis of Reading Difficulty had also scored low in reading on the standardized tests. With standardized test information available each year, students should not be allowed to move through several grades before their learning handicaps are identified.

In the assessment of learning problems, IQ scores alone are inadequate. The scatter of scores and the interpretation of responses were far more revealing in this study than the scores themselves. This has implications for the kind of assessment services which will assist teachers in planning instructional treatment for learning disabled students. Diagnostic testing services are equally as important as psychological testing services for purposes of instructional planning. When

psychological examinations or educational diagnostic tests have been given by specialized supportive personnel, most teachers will need help in interpreting the findings. Either written interpretations or follow-up conferences with teachers should be provided when testing services are given, with the purpose of looking beyond the total scores.

Student Attendance

The high incidence of absenteeism among the poor readers under investigation deserves administrative attention. Whether the frequent absence from school contributed to the reading problems of the subjects cannot be judged from the findings, but it can be safely concluded that they did not contribute to their solution. The subjects' records of persistent absenteeism should also be noted in relation to the infrequent referrals to the school social workers.

If the subjects' patterns of absenteeism stem from inadequate parental understanding of the importance of school attendance, which seems likely, the schools should make a concerted effort to alter that condition.

Organization of Special Classes

The multiple learning problems identified in this study will require instructional treatment beyond the capabilities of the average teacher in the regular classroom with the average class load. Whether the subjects of this study and their counterparts are mentally retarded, dull normal, or of average intelligence, serious learning problems such as those detected in this investigation will require special programming, the use of specialized teaching techniques, and a level of

individual attention which the regular classroom teacher cannot provide.

The provision of small special classes to be attended full-time by students with multiple learning problems is advisable. Students assigned to such classes should be those who show serious disorders or deficiencies in both visual and auditory modalities of input and in the related integrative functions. Part-time classes serving small groups of students should be organized according to the students' peculiar instructional needs rather than on the basis of IQ scores alone. Students who are unable to learn through auditory channels, for example, should be grouped together for specialized instruction for at least a part of the school day; those with visual and/or perceptual-motor problems should be similarly grouped.

In order to base class assignments on modality groups, diagnoses and related recommendations should be made in the spring of each school year in order that projections can be made for class organization for the following fall term. For small schools or schools with fewer disabled learners, provisions should be made in centrally located sites for full-time classes to which students with multiple learning problems can be transported.

While these recommendations may seem to be in conflict with the prevailing concept of "mainstreaming" handicapped children in the regular classroom, the researcher feels that they are not in conflict with the best aspects of the "mainstream" intent, which are obviously related to peer-to-peer learning and to socialization. The regular classroom milieu is inevitably competitive. The student who spends six to seven hours of the day in a situation in which he cannot perform within the

range which his peers perceive as adequate can hardly be expected to make good social adjustments for long. The student who cannot adequately understand the language of his teacher is not likely to learn positively from the language of his classmates. The student who does not perceive the same images which his nonhandicapped classmates perceive cannot understand or emulate their reactions to the same visual stimuli. There is no evidence that observing other students read successfully is helpful in the development of reading skills for a student with perceptual problems or central language disorder. Part-time association with his peers in activities in which his learning weaknesses are least evident can be socially rewarding if, for a part of each day, the mentally limited student can be engaged in learning activities in which he is successful and which are conducted beyond the view of his more able, but often critical, peers. In time, the student with multiple learning problems is more likely to react in the regular classroom with socially unacceptable behavior than to develop so-called socialization skills.

Where students with learning disorders or deficits spend part of or all of the day in the regular classroom, the teacher will need in-class assistance. Paraprofessional aides, parents, or community volunteers can be particularly helpful in schools where there are large numbers of students with learning problems, but their usefulness can only be assured if they are given adequate training and supervision.

Coordination of Programs and Services

A major administrative responsibility in the provision of instructional treatment programs in varied organizational patterns will be that

of coordinating the efforts of regular classroom teachers, special class teachers, itinerant teachers, supportive service personnel, and supervisory personnel. In addition to the problems involved in scheduling the students' school day to minimize confusion and avoid the fragmentation of programs, the provision of time for regular classroom teachers and special class teachers to coordinate their instructional plans for the students whom they share is an impelling need which will require continuing attention in both central administrative and attendance center level planning.

Instructional Treatment

Treatment methods suitable for various types of retardation may differ more in emphasis than in kind. Where general familial retardation is present, it will probably prove most effective to plan a program which is paced at a slower rate than for normal children, and with prolonged emphasis on concrete learning activities. For the brain damaged child, suitable treatment may entail a highly structured program which minimizes distractions and which gives particular emphasis to drill in the learning processes which seem to have been affected by damage to brain tissue, in order to effect transfer of the peculiar learning function to healthy tissue and unblocked nerve paths. Where "pseudo-retardation" is suspected, the instructional program should be one of high language stimulation and guided verbalization of experiences, with greater emphasis on the thought processes being applied to any learning task than on mere memorization of subject content, and with the stronger mental faculties being used to reinforce the development of those identified as weak or underdeveloped.

While assignment to special education classes may be the most effective first step in the provision of treatment programs for the "pseudo-retarded" child, it will be particularly important to re-test such students at frequent intervals. If their environmentally caused developmental lags are properly attended, there is reason to believe that they can be brought to an adequate level of mental functioning. Reevaluation of the students' intellectual abilities and analysis of their intelligence test item scores can provide important clues to the effectiveness of their treatment and to the design of new directions for instructional programming. If the "pseudo-retarded" child is assigned to a special education teacher for only a part of the school day, it will be important for both the special education teacher and the regular classroom teacher to focus on the needs for language stimulation and for guidance in the thought processes being applied throughout the child's school day. To the extent possible, parent counseling on the basic principles of the instructional approach should be applied in an effort to alter the out-of-school language environment of the child.

The findings of this study have been persistently suggestive of the possibility that the mental limitations of the subjects are reflections of delayed mental development. It would seem, therefore, that the major purpose in curriculum planning for such students ought to be the design of programs specific to the development of the thought processes which they must apply in any subject or skills area. For the child whose mental development has been environmentally delayed, the first reading skill must be thinking skill.

In such a program, there is a continuing need to expand the

students' fund of basic information to be stored in the mind for use in the complex process of integrating new input with remembered images and concepts and making new generalizations. This recommends an experience approach in which students are given daily opportunities for close observation, examination, and manipulation of real objects and materials new to their environments, and in which they are encouraged--indeed, prodded--to verbalize their experiences. It is in this verbalization, guided by careful questioning and language enrichment responses from teachers, that the child's mental growth is most likely to occur. This approach and the related techniques of questioning and language enrichment response should be applied by both the regular classroom teacher and the special class teacher where instructional responsibilities are divided. They are basic techniques which should be applied in most of the learning activities arranged for the language deprived students. The verbalization of experiences not only serves to increase the fund of inner language; it can also reinforce learning through each sensory channel and provide teachers with cues to the child's mental operations in any learning activity. It is the avenue through which a teacher can "get inside the student's mind" and guide his thought processes.

In environmentally disadvantaged children, language awareness has rarely been developed to the extent that it has in children of more affluent backgrounds. Teachers can promote such awareness by constantly drawing the child's attention to the language in the classroom environment; by reading aloud, both factual and fictional material, and drawing attention to particular language patterns read; by such comments as "That's a good way to say that," or "What's another way to say that?" or

"Let's find some new words for this picture."

Many of the disabled readers in this study had input problems through either visual or auditory channels, or both. Retraining will require reinforcement through several modalities to assure that what is seen or heard is properly channeled to the brain. Verbalization of the details of visual images is one recommended technique. Tactile examination is another which is particularly helpful with the language-deficient child; but when it is applied, the child should also be helped to verbalize the tactile sensations. Movement and action reinforcement can improve such perceptions as those related to distance, size, and direction.

Perceptual confusion may result when a student is unable to shift his focus, either visual or auditory, from the whole to the parts or vice versa. Training for such problems should be structured and sequential. The natural order of a child's visual or auditory learning is first to perceive the whole, then gradually develop the perception of parts. In auditory perception, gross sounds are first attended and recognized, with the refinements of sound parts following. Similarly, gross visual images precede the image of parts and details in the natural learning process. It is this sequence which should be applied in retraining perceptually confused students. For those with serious perceptual disorders, over-emphasis may be required, such as practice with exaggerated sounds, gradually refined, or the use of heavy outlines around pictures with inner details omitted, or added only after the whole configuration has been perceived. For such students, word configuration should be emphasized before phonics decoding is introduced. In order to develop the ability to shift the perceptual focus, the training program

should first provide emphasis on the whole, then a period of emphasis on the parts, then exercises requiring the shifting of attention from whole to parts. For such exercises, real objects and pictures, and gross sounds should be used before printed words or language sounds are applied. When language sounds and symbols are taught, the same sequence of whole, to parts, to alternating focus should be followed.

This is not to suggest that no direct reading instruction can be initiated until the more gross and concrete perceptions are fully formed. It is rather to suggest an order of primary emphasis. Continued practice with sounds less refined than those of language and with objects and pictures less complex than printed words can accompany and supplement early reading instruction, particularly if the use of experience charts is being applied in the instruction of reading. The larger print on charts, and the teacher's provision of wider spacing between words, can aid the perceptually confused child make the transfer of learning to perceive the whole words. Word card matching to words on charts with the shape of a word blacked in, to be matched to the actual word on the chart, can draw attention to total configuration.

In addition to difficulties in the perception of sounds and images, many students are unable to perceive sounds or images in proper sequence or to recall them in sequence. In the reading process, such inadequacies can be particularly serious impediments. School age children who still have such problems are obviously unable to develop sequencing skills by incidental learning. The perceptual process must be specifically taught. Sequencing problems are closely related to problems in the perception of wholes and parts. The order of whole

images in sequence may be confused; within a whole image, the order of parts may be confused, thus distorting the total image. Similarly, the sequence of sounds and the separate parts of sounds can be distorted.

Problems of visual sequencing may be related to or accompanied by problems of directional confusion (left, right). Where this is found, motor training and action-oriented activities can prove helpful. Here, as in other activities, verbalization of the learning tasks can strengthen the mental processes and expand the inner language applicable to thought.

A particularly difficult perceptual disorder is that of figure-ground disturbance. An extreme example is seen in the different perceptions of a normal child and those of a brain-damaged child. Presented with a square card on which a blue star has been drawn, the child with normal perceptual ability will immediately identify the star. The severely brain-damaged child might perceive the image of a white handkerchief with a hole in the center. While the example is extreme, varying degrees of figure-ground disturbance can occur where perceptual clarity has not been established. In school-age children with such problems, direct instruction should be addressed to the disorder. Drawing and pasting activities in which the student builds his own foreground can help. Tracing of pictures and tactile examination of pictures and objects can be reinforcing. The use of dark cardboard with cutout "windows" to enclose the object or word to which the attention of a student is being drawn can help. Questioning techniques can be applied to draw the child's attention to foreground-background distinctions.

Where such perceptual confusions as those discussed above are present, certain rules-of-thumb can be applied in planning the instructional treatment: (1) concrete learning should precede abstract or

symbolic learning; (2) gross distinctions should precede refined distinctions; (3) learning in a weakened or undeveloped input modality can be reinforced by the use of another stronger input modality; (4) verbalization of the learning experience can build an expanded inner language of thought and help the teacher guide the thought processes; (5) distorted perceptual processes must be unlearned and replaced by clear and orderly processes; (6) building new patterns of perception and thought requires consistent and continuing practice in varying contexts in order to establish generalizations; and (7) perception involves not only the receipt of clear messages, but the mental processes of comparing the message received to other messages or images stored in the memory, the identification of their likenesses, differences, and similarities, the selection of related memories, and the processes of categorizing and of generalizing from the combination of old and new information; it is to these thought processes that instruction for perceptual improvements must be directed.

In the investigation of factors of the reading disabilities of the subjects of this study, a high percentage were found to have central language disorders related to conceptual confusion. The process of conceptualization obviously requires that input be received, perceived, and stored; but storage of information in the memory bank is not enough for orderly conceptualization. The central integration system must be able to scan the stored information to find what can be used in deriving meaning from new input. This process requires the ability to detect likenesses, differences, and similarities; to sort and categorize like

information; and in advanced processes to identify categories that are similar. It is from such mental sorting, categorizing, and comparing that concepts are built and expanded, and that generalizations are derived. For the student who has not developed these processes, a whole curriculum sequence will be needed, and the constant prodding for verbalization will be a key technique to guide the student's thought processes and develop the inner language required for orderly thought and conceptualization. The case study by Levi,[16] cited in Chapter III of this report, will be helpful to teachers in planning such a curriculum sequence.

While such a program as that suggested in this report may seem designed to delay rather than advance reading skills, it is not so intended. The principles of thought training proposed are applicable to the reading instructional approach, as well as to all other areas of learning for students whose learning abilities have been undeveloped. Specifically directed reading activities in a thought development approach will provide for high emphasis on pre-discussion of the child's experiences which have some relation to the material to be read, and on related picture study to stimulate visual images in the mind. The child's own experience charts and stories which can be related to new reading material can be recalled for further stimulation to the mind's stock of previously stored information. Word study can pursue the sequence of perceptual clarifications discussed above--the gross sound

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[16]Aurelia Levi, "Treatment of a Disorder of Perception and Concept Formation in a Case of School Failure," *Children with Learning Disabilities*, ed. Gladys Natchez (New York: Basic Books, 1968), pp. 385-395.

of words, the gross configuration of words, the examination of word parts, letters, sounds, and back to the total word with new and clearer perception. Tactile and motor reinforcement can also be applied in word study. A thought development approach will include heavy emphasis on oral reading activities to give practice in the linkage of language sounds to symbols. In reading classes or in content studies, such as social studies or science, the teacher will provide frequent read-to activities with the teacher reading and the child following the printed words in the book.

The distinctive difference being proposed for the instructional treatment of disabled readers with undeveloped mental and language functions is that the learning objectives, the design, and sequence of the child's curricular activities, and the methods and materials of instruction will be oriented to the development of thought processes. The extent to which such treatment can effect reading improvement among the subjects of this study remains to be tested. The extent to which its omission has thus far negated their reading success is the concluding tenet resulting from this investigation.

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APPENDICES

APPENDIX A

DATA COLLECTION INSTRUMENTS

CHATTANOOGA PUBLIC SCHOOLS
Chattanooga, Tennessee

TITLE I STUDENT INVENTORY

PERSONAL HISTORY

Student

Name _____ School _____

Address _____

Birthdate _____ Teacher _____

Age _____ Race _____ Grade _____ Data Collection Date _____

Parents

Marital Status: Married ____ Divorced ____ Separated ____

Child lives with: Mother ____ Father ____ Both Parents ____

Other (state relationship) _____

Employment Status:

Mother: Occupation _____

Work Status: Employed full-time ____ Part-time ____

Unemployed ____ Public Welfare ____

Father: Occupation _____

Work Status: Employed full-time ____ Part-time ____

Unemployed ____ Public Welfare ____

Other Guardian (if applicable):

Occupation _____

Work Status: Employed full-time ____ Part-time ____

Unemployed ____ Public Welfare ____

Student's Position Among Siblings

Only Child ____ Twin ____ Youngest Child ____ Middle Child ____

Oldest Child ____

Comments: (Factors which may affect student's school progress.)

SCHOOL HISTORY

Student's Name _____ School _____

Days Absent

Preceding School Years: Year _____ Days Absent _____

Year _____ Days Absent _____

Year _____ Days Absent _____

Current School Year: ____ days absent out of ____ school days to date.

Schools Attended

School	*Grades*	*Dates Attended*
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Preschool Experience

Kindergarten (years attended) _____

Head Start (years attended) _____

Other (e.g., Day Care) _____ _____
Name of Program Years Attended

Psychological Information

Referred to Social Worker (date) _____

Psychometric Examination:

Test Administered	*Date*	*Results (e.g., verbal, nonverbal, IQ)*

MEDICAL RECORD

Vision

Keystone Telebinocular Screening:

Date of Screening: _____

Results: Satisfactory ____ Referral Recommended ____

Parent has ____/has not ____ been advised.

Comments: _____

_____

_____

_____

Other Visual Examination:

Date of Examination: _____

Examination performed by: _____

Examination suggests: Nearsightedness ____ Farsightedness _____

Astigmatism ____ Coordination Difficulty ____ Other _____

Child Now Wears Classes:

Yes ____ No ____ Has glasses but does not wear them ____

Hearing

Beltone Audiometer Screening:

Date of Screening: _____

Results: Satisfactory ____ Referral Recommended _____

Parent has ____/has not ____ been advised.

Comments: _____

_____

Other Hearing Examination:

Date of Examination: _____

Examination performed by: _____

Examination suggests: _____

_____

_____

_____

Medical Examination

Latest medical examination (date): _____

Examination performed by: _____

Physical Limitations:

Heart condition _____

Asthma _____

Speech _____

Hearing _____

Cripple _____

Allergy _____

Petit Mal (Epilepsy) _____

Diabetes _____

Others (list) _____

CHATTANOOGA DEVELOPMENTAL PERCEPTUAL-MOTOR FITNESS TEST

Student's Name _____ Sex _____

School _____ Teacher _____

Examiner _____ Date of Survey _____

Birthdate of Student: _____

Identify Body Parts. *Ask child to identify:*

		Pretest	*Posttest*
1.	*Feet*	_____	_____
2.	*Ankles*	_____	_____
3.	*Knees*	_____	_____
4.	*Hip*	_____	_____
5.	*Waist*	_____	_____
6.	*Shoulder*	_____	_____
7.	*Elbow*	_____	_____
8.	*Wrist*	_____	_____
9.	*Mouth*	_____	_____
10.	*Ears*	_____	_____

Checklist: 1 = correct; 2 = slow; 3 = error

Balance Beam. *Task: Walk forward, backward, sideward on 8-foot balance beam (4").*

	Pretest	*Posttest*
1. Walks forward on 8'x4" beam without stepping off.	Yes __ No __	Yes __ No __
2. Walks backward on 8'x4" beam without stepping off.	Yes __ No __	Yes __ No __

	Pretest	*Posttest*
3. Walks sidewards left on 8'x4" beam without stepping off.	Yes __ No __	Yes __ No __
4. Walks sidewards right on 8'x4" beam without stepping off.	Yes __ No __	Yes __ No __

Jumping, Hopping, and Skipping

		Pretest	Postest
Standing Broad Jump:	*Emphasize take-off with both feet and measure distance to nearest inch.*	__ft.__in.	__ft.__in.

Hopping: *Hop forward over three lines on the left foot and hop back on the right foot.*

	Pretest	Posttest
1. Smooth and rhythmical	_____	_____
2. Jerky and irregular rhythm	_____	_____
3. Alternate hops	_____	_____
4. Disorganized	_____	_____

Skipping: *Skip 30 feet without breaking alternating rhythm.*

	Pretest	Posttest
1. Smooth and rhythmical	_____	_____
2. Jerky and irregular rhythm	_____	_____
3. Alternate hops	_____	_____
4. Disorganized	_____	_____

Angels-in-the-Snow: *Ask child to lie on floor on back with arms at side and feet together. Follow the sequence below; use directions such as "Move just this arm (point), and back."*

	Pretest	Posttest
1. Right arm	_____	_____
2. Left arm	_____	_____

Angels-in-the-Snow (continued):	Pretest	Posttest
3. Right leg	_____	_____
4. Left leg	_____	_____
5. Both arms	_____	_____
6. Both legs	_____	_____
7. Left arm, left leg	_____	_____
8. Right arm, right leg	_____	_____
9. Right arm, left leg	_____	_____
10. Left arm, right leg	_____	_____

Scoring: Check each move completed successfully according to:

1 = smooth, decisive; 2 = almost, but indecisive;
3 = disorganized

Upper Back Strength (Kraus-Weber item): *With feet (no shoes) held firm, with arms behind neck, child lifts head and chest off mat as high as possible (place pad under hips). Hold for 10 seconds.*

Pretest: Yes____ No____ Posttest: Yes____ No____

Lower Back Strength (Kraus-Weber item): *With pads under hips, child lifts feet (no shoes) as high off mat as possible and holds for 10 seconds.*

Pretest: Yes____ No____ Posttest: Yes____ No____

Ball Reaction Catch: *Ask child to stand at the end of a stepboard and catch a 7-inch utility ball with the fingers and hands.*

Pretest: Yes____ No____ Posttest: Yes____ No____

Chalkboard: *Ask the child to draw a circle on the chalkboard.*

	Pretest	Posttest
1. Preferred hand	Right _____ _____	Right _____ Left _____
2. Size of drawing	_____	_____
3. Position of drawing with reference to midline of body	_____	_____
4. Accuracy of production	_____	_____
5. Direction	CCW _____ CW _____	CCW _____ CW _____

APPENDIX B

SUMMARY TABLES OF DATA COLLECTED

TABLE VI

SUMMARY OF POPULATION BY GRADE, AGE, SEX, AND RACE

Description of Population		Number	Percent
Assigned Grade (1973-74):	Grade 1	8	5.2%
	Grade 2	22	14.4
	Grade 3	11	7.2
	Grade 4	20	13.1
	Grade 5	49	32.0
	Grade 6	43	28.1
Age (October 31, 1973):	7 Years	30	19.6%
	8 Years	11	7.2
	9 Years	17	11.1
	10 Years	46	30.1
	11 Years	43	28.1
	12 Years	6	3.9
Sex:	Male	93	60.8%
	Female	60	39.2
Race:	Black	137	89.5%
	White	16	10.5
Race/Sex:	Black Male	87	56.9%
	Black Female	50	32.7
	White Male	6	3.9
	White Female	10	6.5

TABLE VII

SUMMARY OF PRIMARY SAMPLE BY GRADE, AGE, SEX, AND RACE

Description of Primary Sample		Number	Percent
Assigned Grade (1973-74):	Grade 1	5	16.1%
	Grade 2	16	51.6
	Grade 3	10	32.2
Age (October 31, 1973):	7 Years	21	67.7%
	8 Years	9	29.0
	9 Years	1	3.2
Sex:	Male	19	61.3%
	Female	12	38.7
Race:	Black	23	74.2%
	White	8	25.8

TABLE VIII

SUMMARY OF PILOT SCHOOLS SAMPLE BY GRADE, AGE, SEX, AND RACE

Description of Pilot Schools Sample		Number	Percent
Assigned Grade (1973-74):	Grade 1	1	3.1%
	Grade 2	4	12.5
	Grade 3	1	3.1
	Grade 4	0	0.0
	Grade 5	14	43.7
	Grade 6	12	37.5
Age (October 31, 1973):	7 Years	5	15.6%
	8 Years	1	3.1
	9 Years	0	0.0
	10 Years	11	34.4
	11 Years	14	43.7
	12 Years	1	3.1
Sex:	Male	14	43.7%
	Female	18	56.2
Race:	Black	27	84.4%
	White	5	15.6

TABLE IX

SUMMARY OF DURRELL NON-RESPONDING SAMPLE BY GRADE, AGE, SEX, AND RACE

Description of Non-Responding Sample		Number	Percent
Assigned Grade (1973-74):	Grade 1	2	10.5%
	Grade 2	10	52.6
	Grade 3	1	5.3
	Grade 4	4	21.0
	Grade 5	2	10.5
	Grade 6	0	0.0
Age (October 31, 1973):	7 Years	12	63.1%
	8 Years	0	0.0
	9 Years	5	26.3
	10 Years	2	10.5
	11 Years	0	0.0
	12 Years	0	0.0
Sex:	Male	13	68.4%
	Female	6	31.6
Race:	Black	19	100.0%
	White	0	0.0

TABLE X

MARITAL STATUS OF PARENTS OF SUBJECTS IN POPULATION
BY RACE AND BY SEX OF SUBJECTS

Marital Status of Parents	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Married	29	21.8%	11	68.7%	19	20.9%	21	36.2%	40	26.8%
Divorced	13	9.8	2	12.5	10	11.0	5	8.6	15	10.1
Separated	91	68.4	3	18.7	62	68.1	32	55.2	94	63.1
Total*	133		16		91		58		149	

*Information on the marital status of parents was not available in the school records of two black male and two black female subjects. Percentages have been based on the recorded totals in each category.

TABLE XI

ADULTS WITH WHOM SUBJECTS LIVE BY RACE AND SEX OF SUBJECTS IN POPULATION

Adult(s) With Whom Subjects Live	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Mother	88	66.2%	3	18.7%	59	64.8%	32	55.2%	91	61.1%
Father	1	0.7	0	0.0	1	1.1	0	0.0	1	0.7
Both Parents	24	18.0	10	62.5	17	18.7	17	29.3	34	22.8
Grandmothers	11	8.3	1	6.2	8	8.8	4	6.9	12	8.0
Both Grandparents	2	1.5	0	0.0	0	0.0	2	3.4	2	1.3
Mother and Stepfather	7	5.3	1	6.2	5	5.5	3	5.2	8	5.4
Adoptive Parents	0	0.0	1	6.2	1	1.1	0	0.0	1	0.7
Total*	133		16		91		58		149	

*Information was not available in the school records of two black males and two black females. All percentages have been based on the recorded totals in each category.

TABLE XII

EMPLOYMENT STATUS OF PARENTS OF SUBJECTS IN POPULATION
BY RACE AND BY SEX

Employment Status of Parent*	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Mother Employed (father not in home)	31	27.9%	0	0.0%	23	30.3%	8	16.3%	31	24.8%
Mother unemployed (father not in home)	19	17.1	1	7.1	15	19.7	5	10.2	20	16.0
Mother on welfare (father not in home)	24	21.6	1	7.1	9	11.8	16	32.6	25	20.0
Father employed (mother not in home)	1	0.9	0	0.0	1	1.3	0	0.0	1	0.8
Both parents employed (both parents in home)	12	10.8	2	14.3	8	10.5	6	12.2	14	11.2
Father only employed (both parents in home)	10	9.0	9	64.3	9	11.8	10	20.4	19	15.2
Mother only employed (both parents in home)	5	4.5	0	0.0	4	5.3	1	2.0	5	4.0
Grandparent employed (parents not in home)	1	0.9	0	0.0	1	1.3	0	0.0	1	0.8

TABLE XII (Continued)

Employment Status of Parent*	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Grandparent Unemployed (parents not in home)	6	5.4%	0	0.0%	3	3.9%	3	6.1%	6	4.8%
Grandparent on Welfare or Social Security (parents not in home)	2	1.8	1	7.1	3	3.9	0	0.0	3	2.4

*No information was available in school records of 28 of the 153 subjects in the population. Percentages have been based on the 125 subjects for whom information was recorded.

TABLE XIII

POSITION OF SUBJECTS AMONG SIBLINGS BY RACE AND BY SEX

Position Among Siblings	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Only Child	9	7.1%	1	6.2%	5	5.7%	5	9.2%	10	7.0%
Twin	9	7.1	0	0.0	9	10.2	0	0.0	9	6.3
Youngest Child	43	34.1	4	25.0	26	29.5	21	38.9	47	33.1
Middle Child	50	39.7	7	43.7	34	38.6	23	42.6	57	40.1
Oldest Child	15	11.9	4	25.0	14	15.9	5	9.2	19	13.4
Total*	126		16		88		54		142	

*No information on siblings was available in the school records of five black male and six black female subjects. Percentages have been based on the recorded totals in each category.

TABLE XIV

NUMBER OF SCHOOLS ATTENDED BY SUBJECTS BY RACE AND SEX

Number of Schools Attended	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
One	85	62.5%	11	68.7%	56	60.2%	40	67.8%	96	63.1%
Two	34	25.0	2	12.5	24	25.8	12	20.3	36	23.7
Three	12	8.8	2	12.5	10	10.7	4	6.8	14	9.2
Four	2	1.5	1	6.2	1	1.1	2	3.4	3	2.0
Five	3	2.2	0	0.0	2	2.1	1	1.7	3	2.0
Total	136		16		93		59		152	

TABLE XV

PRESCHOOL EXPERIENCE OF SUBJECTS BY RACE AND SEX

Preschool Experience	Race				Sex				Total (153)	
	Black (137)		White (16)		Male (93)		Female (60)			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Head Start	23	16.8%	1	6.2%	15	16.1%	9	15.0%	24	15.7%
Kindergarten	8	5.8	4	25.0	5	5.4	7	11.6	12	7.8
Daycare	2	1.5	0	0.0	1	1.1	1	1.7	2	1.3
Total	33	24.1	5	31.2	21	22.6	17	28.3	38	24.8

TABLE XVI

AVERAGE NUMBER OF DAYS ABSENT PER SCHOOL YEAR FOR POPULATION BY RACE AND SEX

Average Number of Days Absent Per School Year	Race				Sex				Total	
	Black		White		Male		Female			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
0 - 9	34	25.4%	3	20.0%	29	31.5%	8	14.0%	37	24.8%
10 - 19	43	32.1	4	26.7	26	28.3	21	36.8	47	31.5
20 - 29	25	18.6	2	13.3	16	17.4	11	19.3	27	18.1
30 - 39	13	9.7	3	20.0	9	9.8	7	12.3	16	10.7
40 - 49	10	7.5	2	13.3	7	7.6	5	8.8	12	8.0
50+	9	6.7	1	6.7	5	5.4	5	8.8	10	6.7
Total	134		15		92		57		149	

TABLE XVII

REFERRALS TO SCHOOL SOCIAL WORKER AND PSYCHOLOGICAL TESTS ADMINISTERED TO SUBJECTS IN POPULATION BY RACE AND SEX

Referrals and Psychological Testing	Race				Sex				Total (153)	
	Black (137)		White (16)		Male (93)		Female (60)			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Referral to School Social Worker	27	19.7%	7	43.8%	27	29.0%	7	11.7%	34	22.2%
Psychological Test Administered	19	13.9	5	31.3	20	21.5	4	6.7	24	15.7

TABLE XVIII

MEDICAL HISTORY OF SUBJECTS IN POPULATION

Medical History	Number	Percent
*Keystone Telebinocular Screening:**		
Satisfactory Report	129	96.3%
Referred for Further Examination	5	3.7
Not Present for Screening	10	6.9
Total Subjects Reported	144	94.1*
Other Vision Reports:		
Wear Glasses	4	2.8%
Eye Surgery	1	0.7
Beltone Audiometer Screening:		
Satisfactory Report	127	97.7%
Referred for Further Examination	3	2.3
Not Present for Screening	14	9.7
Total Subjects Screened	144	94.1
Reports of Physical Examinations:		
Physical Examination Reported	15	
Satisfactory Report	13	
Anemic Condition	1	
Petit Mal Seizures	1	
Dental Needs	5	
No Report of Physical Examination	129	

*Percentages for screening results are based on total number screened; percentages for total subjects reported are based on 153 subjects in population; percentages for those not present for screening and for other vision reports are based on the 144 subjects reported.

TABLE XIX

FREQUENCY DISTRIBUTION OF DEVIATION IQ SCORES ATTAINED BY SUBJECTS IN THE PRIMARY SAMPLE ON OTIS-LENNON MENTAL ABILITY TEST

	EMR (Mild (60-69)		Borderline (70-79)		Dull Normal (80-89)		Average (90-102)	
Assigned Grade	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	2	40.0%	1	20.0%	1	20.0%	1	20.0%
Two	2	12.5	4	25.0	6	37.5	4	25.0
Three	3	30.0	2	20.0	2	20.0	3	30.0
Total	7	22.6%	7	22.6%	9	29.0%	8	25.8%

TABLE XX

FREQUENCY DISTRIBUTION OF DISPARITIES BETWEEN CHRONOLOGICAL AGE OF SUBJECTS IN PRIMARY SAMPLE AND MENTAL AGE DERIVED FROM DEVIATION IQ SCORES ON OTIS-LENNON MENTAL ABILITY TEST

Chronological Age vs. Mental Age	Number	Percent
Mental Age Higher:		
One Month	2	6.4%
Mental Age Same as Chronological Age:	1	3.2
Mental Age Lower:		
1-11 Months	5	16.1%
12-23 Months	13	41.9
24-35 Months	8	25.8
36-42 Months	2	6.4

TABLE XXI

FREQUENCY DISTRIBUTION OF VERBAL IQ SCORES ATTAINED BY SUBJECTS IN THE PILOT SCHOOLS SAMPLE ON WISC

Assigned Grade	EMR							
	Mild (60-69)		Borderline (70-79)		Dull Normal (80-89)		Average (90-99)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	0	0.0%	1	100.0%	0	0.0%	0	0.0%
Two	0	0.0	2	50.0	0	0.0	2	50.0
Three	0	0.0	0	0.0	0	0.0	1	100.0
Four	---------- *no subjects* ----------							
Five	3	21.4	8	57.1	3	21.4	0	0.0
Six	3	25.0	6	50.0	3	25.0	0	0.0
Total	6	18.7%	17	53.1%	6	18.7%	3	9.4%

TABLE XXII

FREQUENCY DISTRIBUTION OF PERFORMANCE IQ SCORES ATTAINED BY SUBJECTS IN THE PILOT SCHOOLS SAMPLE ON WISC

Assigned Grade	EMR Borderline (70-79)		Dull Normal (80-89)		Average (90-109)		Bright Normal (110-119)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	1	100.0%	0	0.0%	0	0.0%	0	0.0%
Two	0	0.0	1	25.0	1	25.0	2	50.0
Three	0	0.0	0	0.0	1	100.0	0	0.0
Four	---------- *no subjects* ----------							
Five	5	35.7	6	42.8	3	21.4	0	0.0
Six	6	50.0	1	8.3	5	41.7	0	0.0
Total	12	37.5%	8	25.0%	10	31.2%	2	6.2%

TABLE XXIII

FREQUENCY DISTRIBUTION OF FULL-SCALE IQ SCORES ATTAINED BY SUBJECTS IN THE PILOT SCHOOLS SAMPLE ON WISC

Assigned Grade	EMR							
	Mild (60-69)		Borderline (70-79)		Dull Normal (80-89)		Average (90-99)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	0	0.0%	1	100.0%	0	0.0%	0	0.0%
Two	0	0.0	0	0.0	1	25.0	3	75.0
Three	0	0.0	0	0.0	0	0.0	1	100.0
Four	---------- *no subjects* ----------							
Five	2	14.3	9	64.3	2	14.3	1	7.1
Six	3	25.0	3	25.0	4	33.3	2	16.7
Total	5	15.6%	13	40.6%	7	21.9%	7	21.9%

TABLE XXIV

FREQUENCY DISTRIBUTION OF VERBAL IQ SCORES ATTAINED BY SUBJECTS IN THE DURRELL NON-RESPONDING SAMPLE ON WISC

	EMR							
	Mild (60-69)		Borderline (70-79)		Dull Normal (80-89)		Average (90-99)	
Assigned Grade	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	0	0.0%	0	0.0%	2	100.0%	0	0.0%
Two	1	10.0	2	20.0	6	60.0	1	10.0
Three	1	100.0	0	0.0	0	0.0	0	0.0
Four	2	50.0	2	50.0	0	0.0	0	0.0
Five	2	100.0	0	0.0	0	0.0	0	0.0
Six	---------- *no subjects* ----------							
Total	6	31.6%	4	21.0%	8	42.1%	1	5.3%

TABLE XXV

FREQUENCY DISTRIBUTION OF PERFORMANCE IQ SCORES ATTAINED BY SUBJECTS IN THE DURRELL NON-RESPONDING SAMPLE ON WISC

	EMR							
	Mild (60-69)		Borderline (70-79)		Dull Normal (80-89)		Average (90-99)	
Assigned Grade	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	1	50.0%	0	0.0%	0	0.0%	1	50.0%
Two	2	20.0	2	20.0	1	10.0	5	50.0
Three	0	0.0	0	0.0	1	100.0	0	0.0
Four	1	25.0	1	25.0	2	50.0	0	0.0
Five	0	0.0	2	100.0	0	0.0	0	0.0
Six	---------- *no subjects* ----------							
Total	4	21.0%	5	26.3%	4	21.0%	6	31.6%

TABLE XXVI

FREQUENCY DISTRIBUTION OF FULL-SCALE IQ SCORES ATTAINED BY SUBJECTS IN THE DURRELL NON-RESPONDING SAMPLE ON WISC

	EMR							
	Mild (60-69)		Borderline (70-79)		Dull Normal (80-89)		Average (90-99)	
Assigned Grade	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	1	50.0%	0	0.0%	0	0.0%	1	50.0%
Two	2	20.0	2	20.0	4	40.0	2	20.0
Three	0	0.0	1	100.0	0	0.0	0	0.0
Four	1	25.0	2	50.0	1	25.0	0	0.0
Five	1	50.0	1	50.0	0	0.0	0	0.0
Six	---------- *no subjects* ----------							
Total	5	26.3%	6	31.6%	5	26.3%	3	15.8%

TABLE XXVII

INTERPRETATIONS OF RESPONSES BY SUBJECTS IN PILOT SCHOOLS AND DURRELL NON-RESPONDING SAMPLES ON WISC

Psychologist's Interpretations	Pilot Schools Sample (32)		Durrell Non-Responding Sample (19)		Total (51)	
	No.	Percent	No.	Percent	No.	Percent
Language Difficulties						
Evidence of central language disorder	21	65.6%	12	63.1%	33	64.7%
Poor general fund of information	9	28.1	11	57.9	20	39.2
Impaired concentration	6	18.7	3	15.8	9	17.6
Language difficulty related to cultural deprivation	4	12.5	3	15.8	7	13.7
Poor expressive vocabulary	6	18.7	0	0.0	6	11.8
Possible auditory-perceptual handicap	5	15.6	0	0.0	5	9.8
Lack of judgement	3	9.4	0	0.0	3	5.9
Poor self-reliance	9	28.1	2	10.5	11	21.6
Poor comprehension	1	3.1	0	0.0	1	2.0
Almost total language weakness	7	21.9	3	15.8	10	19.6
No serious language difficulty	0	0.0	0	0.0	0	0.0
Perceptual-Motor Difficulties						
Visual-motor handicap (relatively complex motor tasks)	19	59.4	11	57.9	30	58.8

TABLE XXVII (Continued)

Psychologist's Interpretations	Pilot Schools Sample (32) No.	Percent	Durrell Non-Responding Sample (19) No.	Percent	Total (51) No.	Percent
Perceptual-Motor Difficulties (continued)						
Visual-motor handicap (quick eye-hand motor coordination)	8	25.0%	8	42.1%	16	31.4%
Perceptual perseveration	0	0.0	1	5.3	1	2.0
Left-right confusion	0	0.0	2	10.5	2	3.9
Possible figure-ground disturbance	9	28.1	6	31.6	15	29.4
Perceptual confusion	1	3.1	0	0.0	1	2.0
Problem of visual sequencing	5	15.6	5	26.3	10	19.6
Problem of visual comprehension	1	3.1	0	0.0	1	2.0
No serious visual-motor difficulty	7	21.9	2	10.5	9	17.6
Problems in both language and visual-motor areas	23	71.9	17	89.5	40	78.4

TABLE XXVIII

FREQUENCY DISTRIBUTION OF SCORES BY SUBJECTS IN POPULATION ON READING VOCABULARY SUBTEST OF CALIFORNIA ACHIEVEMENT TEST

Grade Equivalent Scores	Grade 2		Grade 3		Grade 4		Grade 6	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
6.0 - 6.4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
5.0 - 5.9	0	0.0	0	0.0	0	0.0	0	0.0
4.0 - 4.9	0	0.0	0	0.0	0	0.0	2	5.0
3-0 - 3.9	0	0.0	0	0.0	0	0.0	8	20.0
2.0 - 2.9	0	0.0	1	10.0	1	5.0	18	45.0
1.0 - 1.9	0	0.0	2	20.0	11	55.0	2	5.0
Below 1.0	20	100.0	7	70.0	8	40.0	10	25.0
Total Tested	20		10		20		40	

TABLE XXIX

FREQUENCY DISTRIBUTION OF SCORES BY SUBJECTS IN POPULATION ON READING COMPREHENSION SUBTEST OF CALIFORNIA ACHIEVEMENT TEST

Grade Equivalent Scores	Grade 2		Grade 3		Grade 4		Grade 6	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
6.0 - 6.4	0	0.0%	0	0.0%	0	0.0%	1	2.5%
5.0 - 5.9	0	0.0	0	0.0	0	0.0	0	0.0
4.0 - 4.9	0	0.0	0	0.0	0	0.0	0	0.0
3.0 - 3.9	0	0.0	0	0.0	0	0.0	12	30.0
2.0 - 2.9	0	0.0	1	10.0	3	15.0	12	30.0
1.0 - 1.9	2	10.0	7	70.0	10	50.0	13	32.5
Below 1.0	18	90.0	2	20.0	7	35.0	2	5.0
Total Tested	20		10		20		40	

TABLE XXX

FREQUENCY DISTRIBUTION OF SCORES BY SUBJECTS IN POPULATION ON TOTAL READING SUBTEST OF CALIFORNIA ACHIEVEMENT TEST

Grade Equivalent Scores	Grade 2		Grade 3		Grade 4		Grade 6	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
6.0 - 6.4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
5.0 - 5.9	0	0.0	0	0.0	0	0.0	0	0.0
4.0 - 4.9	0	0.0	0	0.0	0	0.0	3	7.5
3.0 - 3.9	0	0.0	0	0.0	0	0.0	7	17.5
2.0 - 2.9	0	0.0	1	10.0	1	5.0	17	42.5
1.0 - 1.9	0	0.0	1	10.0	11	55.0	6	15.0
Below 1.0	20	100.0	8	80.0	8	40.0	7	17.5
Total Tested	20		10		20		40	

TABLE XXXI

FREQUENCY DISTRIBUTION OF SCORES BY SUBJECTS IN GRADE FIVE OF POPULATION ON SUBTESTS OF METROPOLITAN ACHIEVEMENT TEST

Grade Equivalent Scores	Word Meaning		Reading		Total Reading	
	Number	Percent	Number	Percent	Number	Percent
6.0 - 6.4	0	0.0%	0	0.0%	0	0.0%
5.0 - 5.9	0	0.0	0	0.0	0	0.0
4.0 - 4.9	0	0.0	3	6.8	0	0.0
3.0 - 3.9	14	31.8	15	34.1	11	22.4
2.0 - 2.9	30	68.2	26	59.1	33	67.3
1.0 - 1.9	0	0.0	0	0.0	0	0.0
Below 1.0	0	0.0	0	0.0	0	0.0
Total Tested	44		44		44	

TABLE XXXII

FREQUENCY DISTRIBUTION OF SCORES FOR POPULATION ON DURRELL ANALYSIS OF READING DIFFICULTY

Grade Equivalency	Reading: Oral Number	Reading: Oral Percent	Reading: Silent Number	Reading: Silent Percent	Listening Number	Listening Percent
6.0 - 6.9	0	0.0%	0	0.0%	0	0.0%
5.0 - 5.9	0	0.0	0	0.0	1	0.6
4.0 - 4.9	2	1.3	1	0.6	5	3.3
3.0 - 3.9	25	16.3	19	12.5	117	76.5
2.0 - 2.9	33	21.6	34	22.4	11	7.2
1.0 - 1.9	61	39.9	63	41.4	1	0.6
Below 1.0	32	20.9	35	23.0	18	11.8
Total (Valid)	153		152		153	

	Flash Words		Word Analysis		Spelling	
6.0 - 6.9	6	3.9	0	0.0	1	0.6
5.0 - 5.9	6	3.9	0	0.0	0	0.0
4.0 - 4.9	7	4.6	0	0.0	1	0.6
3.0 - 3.9	22	14.4	0	0.0	6	3.9
2.0 - 2.9	20	13.1	11	7.5	2	1.3
1.0 - 1.9	66	43.1	3	2.0	0	0.0
Below 1.0	26	17.0	133	90.5	143	93.5
Total (Valid)	153		147		153	

TABLE XXXIII

SUMMARY OF SCORES BY SUBJECTS IN POPULATION ON WEPMAN AUDITORY DISCRIMINATION TEST

Grade	Very Good Development		Above Average Ability		Average Ability		Total Average or Above		Below Average Ability		Below Threshold of Adequacy		Invalid (Scores Below 10)		Total Below Average	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
One	0	0.0	0	0.0	0	0.0	0	0.0	1	25.0	2	50.0	1	25.0	4	100.0
Two	1	5.3	2	10.5	0	0.0	3	15.8	2	10.5	11	57.9	3	15.8	16	84.2
Three	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	8	88.9	1	11.1	9	100.0
Four	0	0.0	2	11.1	3	16.7	5	27.8	2	11.1	11	61.1	0	0.0	13	72.2
Five	0	0.0	5	10.4	10	20.8	15	31.2	6	12.5	27	56.2	0	0.0	33	68.7
Six	5	12.2	2	4.9	9	21.9	16	39.0	4	9.7	21	51.2	0	0.0	25	61.0
Total*	6	4.3	11	7.9	22	15.8	39	28.0	15	10.8	80	57.5	5	3.6	100	71.9

*This test was administered to 139 of the total 153 subjects in the population. Percentages are based on the number tested.

TABLE XXXIV

SUMMARY OF SCORES BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST EXERCISES FOR IDENTIFICATION OF BODY PARTS

Body Part Identified	Correct		Slow		Error	
	Number	Percent	Number	Percent	Number	Percent
Primary Grades (1-3):						
Feet	7	87.5%	1	12.5%	0	0.0%
Ankles	5	62.5	3	37.5	0	0.0
Knees	8	100.0	0	0.0	0	0.0
Hip	1	12.5	3	37.5	4	50.0
Waist	5	62.5	1	12.5	2	25.0
Shoulder	7	87.5	1	12.5	0	0.0
Elbow	6	75.0	2	25.0	0	0.0
Wrist	5	62.5	0	0.0	3	37.5
Mouth	8	100.0	0	0.0	0	0.0
Ears	8	100.0	0	0.0	0	0.0
Total	60	75.0	11	13.7	9	11.2
Intermediate Grades (5-6):						
Feet	23	100.0	0	0.0	0	0.0
Ankles	19	82.6	2	8.7	2	8.7
Knees	23	100.0	0	0.0	0	0.0
Hip	15	65.2	0	0.0	8	34.8
Waist	16	69.6	0	0.0	7	30.4
Shoulder	23	100.0	0	0.0	0	0.0
Elbow	21	91.3	2	8.7	0	0.0

TABLE XXXIV (Continued)

Body Part Identified	Correct		Slow		Error	
	Number	Percent	Number	Percent	Number	Percent
Intermediate Grades (5-6) (Continued):						
Wrist	19	82.6%	1	4.3%	3	13.0%
Mouth	23	100.0	0	0.0	0	0.0
Ears	23	100.0	0	0.0	0	0.0
Total	205	89.1	5	2.2	20	8.7
Primary and Intermediate Grades:						
Feet	30	96.8	1	3.2	0	0.0
Ankles	24	77.4	5	16.1	2	6.4
Knees	31	100.0	0	0.0	0	0.0
Hip	16	51.6	3	9.7	12	38.7
Waist	21	67.7	1	3.2	9	29.0
Shoulder	30	96.8	1	3.2	0	0.0
Elbow	27	87.1	4	12.9	0	0.0
Wrist	24	77.4	1	3.2	6	19.3
Mouth	31	100.0	0	0.0	0	0.0
Ears	31	100.0	0	0.0	0	0.0
Total	265	85.5	16	5.2	29	9.3

TABLE XXXV

ANALYSIS OF PERFORMANCE BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST EXERCISES ON WALKING BOARD

Exercise	Yes		No	
	Number	Percent	Number	Percent
Ability to Walk Forward on Beam	31	100.0%	0	0.0%
Ability to Walk Backward on Beam	29	93.5	2	6.4
Ability to Walk Sideward to Left on Beam	29	93.5	2	6.4
Ability to Walk Sideward to Right on Beam	29	93.5	2	6.4

TABLE XXXVI

SUMMARY OF SCORES BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST EXERCISES ON HOPPING, SKIPPING, AND BROAD JUMP

Exercise	Primary Grades		Intermediate Grades		Total Grade Levels	
	Number	Percent	Number	Percent	Number	Percent
Hopping:						
Smooth and Rhythmical	3	37.5%	17	73.9%	20	64.5%
Jerky and Irregular Rhythm	4	50.0	4	17.4	8	25.8
Alternate Hops	0	0.0	0	0.0	0	0.0
Disorganized	1	12.5	2	8.7	3	9.7
Skipping:						
Smooth and Rhythmical	3	37.5	20	86.9	23	74.2
Jerky and Irregular Rhythm	3	37.5	2	8.7	5	16.1
Alternate Hops	1	12.5	0	0.0	1	3.2
Disorganized	1	12.5	1	4.3	2	6.4
Standing Broad Jump:						
Successful	8	100.0	23	100.0	31	100.0
Unsuccessful	0	0.0	0	0.0	0	0.0

TABLE XXXVII

ANALYSIS OF PERFORMANCE BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST EXERCISES FOR NEUROMUSCULAR DIFFERENTIATION AND RIGHT-LEFT SIDEDNESS

	Smooth, Decisive		Almost but Not Decisive		Disorganized	
Limbs to be Moved	Number	Percent	Number	Percent	Number	Percent
Primary Grades (1-3):						
Right Arm	7	87.5%	0	0.0%	1	12.5%
Left Arm	7	87.5	0	0.0	1	12.5
Right Leg	7	87.5	0	0.0	1	12.5
Left Leg	7	87.5	0	0.0	1	12.5
Both Arms	8	100.0	0	0.0	0	0.0
Both Legs	8	100.0	0	0.0	0	0.0
Left Arm, Left Leg	6	75.0	2	25.0	0	0.0
Right Arm, Right Leg	7	87.5	0	0.0	1	12.5
Right Arm, Left Leg	6	75.0	0	0.0	2	25.0
Left Arm, Right Leg	5	62.5	2	25.0	1	12.5
Total	68	85.0	4	5.0	8	10.0
Intermediate Grades (4-6):						
Right Arm	21	91.3	0	0.0	2	8.7
Left Arm	21	91.3	0	0.0	2	8.7
Right Leg	19	82.6	3	13.0	1	4.3
Left Leg	20	86.9	2	8.7	1	4.3

TABLE XXXVII (Continued)

Limbs to be Moved	Smooth, Decisive		Almost but Not Decisive		Disorganized	
	Number	Percent	Number	Percent	Number	Percent
Intermediate Grades (4-6) (Continued):						
Both Arms	23	100.0%	0	0.0%	0	0.0%
Both Legs	22	95.6	1	4.3	0	0.0
Left Arm, Left Leg	19	82.6	2	8.7	2	8.7
Right Arm, Right Leg	20	86.9	1	4.3	2	8.7
Right Arm, Left Leg	15	65.2	5	21.7	3	13.0
Left Arm, Right Leg	17	73.9	3	13.0	3	13.0
Total	197	85.6	17	7.4	16	6.9

TABLE XXXVIII

ANALYSIS OF PERFORMANCE BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST ITEMS FOR BACK STRENGTH AND BALL REACTION CATCH

Test Item	Yes		No	
	Number	Percent	Number	Percent
Kraus-Weber (selected tests of back strength):				
Upper Back	30	96.8%	1	3.2%
Lower Back	24	77.4	7	22.6
Ball Reaction Catch:	30	100.0	0	0.0

TABLE XXXIX

ANALYSIS OF PERFORMANCE BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST ITEMS ON CHALKBOARD CIRCLE DRAWING

Test Item	Primary		Intermediate		Total	
	Number	Percent	Number	Percent	Number	Percent
Size of Drawing:						
Large	3	37.5%	7	31.8%	10	34.5%
Medium	1	12.5	5	22.7	6	20.7
Small	4	50.0	10	45.4	13	44.8
Position in Relation to Midline:						
Midline	6	75.0	12	54.5	18	60.0
Right	1	12.5	5	22.7	6	20.0
Left	1	12.5	5	22.7	6	20.0
Accuracy:						
Good	5	62.5	14	63.6	19	63.3
Fair	2	25.0	8	36.4	10	33.3
Poor	1	12.5	0	0.0	1	3.3
Direction:						
Right-Handed (24)*						
Counterclockwise	7	100.0	16	94.1	23	95.8
Clockwise	0	0.0	0	0.0	0	0.0
Left-Handed (6)						
Counterclockwise	1	100.0	2	40.0	3	50.0
Clockwise	0	0.0	3	60.0	3	50.0

*One right-handed subject in the sixth grade drew half the circle clockwise and half counterclockwise. Percentages are based on all 24 right-handed subjects.

TABLE XL

ANALYSIS OF PERFORMANCE BY SUBJECTS IN PILOT SCHOOLS SAMPLE ON DEVELOPMENTAL PERCEPTUAL MOTOR FITNESS TEST ITEMS ON IMITATIVE MOVEMENT

	Primary		Intermediate		Total	
Test Items	Number	Percent	Number	Percent	Number	Percent
Satisfactory	3	37.5%	10	43.5%	13	41.9%
Slow (hesitant, not definite)	2	25.0	8	34.8	10	32.2
Jerky	1	12.5	3	13.0	4	12.9
Both Slow and Jerky	2	25.0	2	8.7	4	12.9

VITA

Nita Lawson Nardo is director of Planning and Evaluation Services for Chattanooga Public Schools. She began her professional career in Chattanooga in 1951. Since that time, she has served in the Chattanooga system as primary teacher; intermediate teacher; special education resource teacher; administrative director or curriculum director for various federal projects related to desegregation, middle school development, and compensatory education for the economically disadvantaged and educationally deprived; director of information services and special projects; and director of planning and program development.

She has served as curriculum consultant, writing consultant, or desegregation consultant in Tennessee, Georgia, Alabama, Kentucky, Illinois, and West Virginia.

Her early education was received in Cedartown, Georgia. She received a Bachelor of Arts degree in English with minors in education and speech and drama, and a Master of Arts degree in elementary education from the University of Chattanooga. She received the Doctor of Education degree from The University of Tennessee in 1976, with a major in Educational Administration and Supervision and collaterals in curriculum and instruction and in sociology.

She is married to John Nardo, of Bellaire, Ohio.