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ABSTRACT
              The purpose of this research was to investigate the
Wechsler Intelligence Scale for Children (WISC) subtest scores of
information (IN), arithmetic (AR), digit span (DS), and coding (CO).
The subjects were all of the students admitted to and remaining in
the Seattle Public School District #1 Learning/Language Disability
(LLD) Program since September 1971, who were born between July 1957
and 1966, whose full scale IQs were 90 or above, and whose reading
achievement was one or more grade levels below academic expectancy
for students of chronological ages (CA) 7.6 to 10.5 and two or more
grade levels below academic expectancy for students CA 10.6 to 15.11.
To examine the IN, AR, DS, and CO characteristics of LLD students,
the eleven subtest scaled scores were totaled for each subject, and
each subject's deviation from his own mean was computed. The WISC
mean deviations by group were also computed from the deviations from
the students' own means. Some of the results indicated that the LLD
students showed a group pattern of low IN, AR, DS, and CO; but the
pattern did not hold for individual cases; the WISC subtest pattern
did not vary with degree of underachievement; and WISC full scale IQ
correlated negatively with reading deficit and was apparently a poor
measure of reading success. (WR)

IMPLICATIONS OF THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN (WISC)

INFORMATION, ARITHMETIC, DIGIT SPAN, AND CODING SUBTESTS

OF SEVERELY RETARDED READERS ON READING ACHIEVEMENT

A DESCRIPTIVE-PREDICTIVE STUDY

by

Gale Davis

THIS STUDY WAS CONDUCTED AS PARTIAL FULFILLMENT FOR WORK LEADING

TO A MASTERS DEGREE IN READING THROUGH WESTERN WASHINGTON

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TABLE OF CONTENTS

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I.   Statement of the Problem

It is the purpose of this paper to investigate the WISC subtest scores

of information, arithmetic, digit span, and coding (hereafter referred to as

Inf, Arith, DS and Cod) of children who are severely retarded academically

and to look for the implications these scores may have on reading achieve-

ment.

In order to have what is termed an adequate IQ, that is 90 or above

in this study, as determined by the WISC, a child must achieve a scaled

score of 86 on the combined 11 subtests of the WISC. (Sometimes only 10

subtests are given. For this study, 11 tests were given and prorated to 10.)

Thus, if a child is high in one test and low in another, or vice-versa, he

can still score an adequate IQ when the subtests are totaled to compute full

scale IQ. Within a group of reading underachievers, all of whom have

adequate IQ, does a child with a low profile on these subtests historically

show lower reading achievement than a child whose WISC profile is adequate in these subtests? If such is the case, it might help educators deal more realistically with children who achieve poorly in spite of having adequate IQ.

When confronted with such a child, educators grope for a reason. After screening out those children with acute manifestations of physical and/or neurological impairments and identifying those children whose problems stem mainly from severe cultural deprivation and/or emotional disorders, there remains a body of children who appear to have an average or above academic functioning potential; and yet they achieve poorly. Possibly a child's WISC profile is a better measure of academic potential than overall full scale IQ itself.

According to the literature, the WISC subtests of Inf, Arith, DS, and Cod seem to relate to memory.[1, 2, 3, 4] If memory or some other facet of intelligence can be attributed to these scores, and if, in fact, these scores do differentiate degree of underachievement, then academic potential might be better assessed, at least in some cases, by considering these subscores rather than full scale IQ alone.

In an attempt to investigate the correlation between the WISC subtests of Inf, Arith, DS, and Cod and reading achievement, this study will deal with the WISC profiles and reading achievement scores of children in the Seattle Public School Learning/Language Disability (LLD) Program.

Specifically, do Seattle LLD students with poor Inf, Arith, DS, and Cod WISC subtest scores have more severe reading problems than those who achieved an adequate or better IQ score by testing adequate or high on these subtests and consequently low in other areas of the test?

II. Review of Related Research

A review of the related research was undertaken in an attempt to determine what prior considerations had been focused on the WISC subtest patterns as a means of differentiating reading disability. It was found that probably no search for WISC subtest patterns has been as prolific as that which involved the profiles of retarded readers.[5] The goals of the searches, according to Coleman and Rasof, have been three-fold: (a) to distinguish the learning disorder population from the normal population; (b) to correlate results with the severity of the disorder; and (c) to relate findings to a student's ability to profit from the treatment.[6]

Glaser and Zimmerman added that the WISC can point the way to specific emotional or perceptual problems, which are contributory to, if not root causes, of scholastic deficiency.[7] It was found that almost all recommended test batteries did use the WISC rather than the Stanford-Binet or some other intelligence test because the obtained verbal and performance IQ scores plus the subtests were useful for diagnosis.[8] For years the WISC has been a principal instrument used by psychologists, and more recently it has been viewed by reading specialists as a test that has significance for reading, particularly as an aid in diagnosing reading problems.[9]

A survey of 14 studies indicated that disabled readers tend to exhibit low WISC subtest scores in Inf, Arith, DS, and Cod. Studies which agreed on low WISC scores on all four of these subtests were Robeck (1960),[10] Coleman,[11] Robeck (1964),[12] Belmont,[13] Corwin,[14] and Ackerman.[15] Burks,[16]

Altus,[17] and Kallos[18] did not include DS in their analyses but reported agreement on low Inf, Arith, and Cod. Graham[19] and Hirst[20] did not include the Inf subtest, but reported low scores on Arith, DS, and Cod. Cohen[21] and Neville[22] omitted Cod subtests but agreed on low scores on the other three tests. Reed[23] also reported low Arith and DS scores but reported no scores for Inf or Cod.

In addition, researchers have considered not only the WISC subtest patterns but also whether poor readers score significantly different in the verbal or performance sections of the WISC. Such investigations seem to have consequences for this study as Inf, Arith, and DS are classified as verbal subtests on the WISC. Cod is classified as a performance subtest, but some researchers suggest that it may belong more to the verbal scale.[24] Graham,[25] Neville,[26] MacLean,[27] Belmont,[28] Reed,[29] and Ackerman[30] agreed that performance IQ for poor readers was higher than verbal IQ. By contrast Altus,[31] Kallos,[32] and Sandstedt[33] found no significant difference between verbal and performance IQ for poor readers. Huelsman,[34] after considering 23 studies, concluded that 60 percent of the disabled readers had high performance IQ scores in relation to verbal IQ scores. He stated, "It is possible that the relationship between verbal and performance IQs might show sub-classifications of disabled readers: high performance IQ, high verbal IQ, or equal performance and verbal IQ.[2]

Researchers have looked at the scatter pattern of WISC subtests. For example, Pikulski[35] found that poor readers often showed considerably wider discrepancies between verbal and performance WISC sections than do normal readers. Also, Pattera[36] found more individual variability among the high verbal groups than among the high performance groups. Ackerman[37]

concluded that although poor readers show somewhat more discordance between
WISC verbal and performance IQs than normal readers, the child needs
integrity in both domains in order to realize his potential in either.
Black's study[38] went a step further and showed the lack of significant
effect of intelligence on level of reading retardation and suggested that
factors other than WISC full scale IQ must be significant in reading problems.

Thus, it must be concluded that many researchers have hunted for clues
to reading disability not only in the WISC subtest scores but also in terms
of the verbal and performance scores which the test yields. They also
have considered the influences which might be exerted on the WISC scores
due to age, school-type learning, emotional disability, social class, and
sex.

Research is inconsistent regarding the part that chronological age (CA)
might have on WISC subtest patterns. Coleman[39] found no significant
differences in underachievers CA below 11.5 and underachievers CA above
11.5 on the WISC verbal or performance scales. However, Reed[40] further
delineated his groups by dividing retarded readers into CA 6 and 10. He
found no significant differences on verbal and performance scores for the
younger group, but the older group showed verbal abilities lower than
performance abilities. This lead him to conclude, in contrast to Coleman,
that the significance of difference for reading achievement between verbal
and performance IQ depends on stage of development. On the other hand,
Sawyer[41] used groups of retarded readers CA 8.0, 10.5, and 13.0 and con-
cluded that the ability of the WISC subtests to discriminate between mildly
and severely disabled readers declined in effectiveness as CA increased.
She concluded that WISC subscores could aid in early identification of

retarded readers. Belmont[42] concluded that, "Since the composition of intellectual factors does in fact vary with age, a wide range can result in findings which reflect artifacts of age distributions rather than real differences in patterning of intellectual capacities." Cohen's factorial analysis of the WISC[43] was in agreement with Belmont's observations.

Neville[44] and Coleman[45] agreed that retarded readers are low in Inf, Arith, and DS subtests; and Coleman also found retarded readers low in Cod. They concluded that poor readers do poorest in tests resembling school-type learning.

That reading disability and emotional disability in general tend to exert similar influences on the WISC subtest pattern was shown by Coleman[46] and McLean.[47]

Reid[48] analyzed WISC subtest patterns to determine the relationship between the patterns, reading achievement, and social class. He reported that all social class effects and interactions involving social class were non-significant.

Kallos[49] reported that most educational research supports consideration of boys and girls separately. He stated that reading clinics report a minimum of five boys to every girl among disabled readers. Sawyer[50] also supported this. She found that different WISC subtests played different parts in discrimination when only boys were considered.

The above has been a summary of research reports done over a 20 year period on the WISC scores of poor readers. The research was also consulted in an effort to assess what integreties are tapped by the WISC subtests of Inf, Arith, DS, and Cod.

It was Kender[51] reporting in 1972 who suggested that an effort should

be made to understand the implications that the WISC subtest have for the reading process itself.

Although the research showed much overlapping and many inconsistencies, there did seem to be an underlying innuendo suggesting that good memory plays an important role in scoring well in the Inf, Arith, DS, and Cod subtests.

Burks[52] reported that the Inf, Arith, and Cod tests are strongly dependent on memory function; and underachievers are lowest on these subtests. Coleman[53] concluded that underachievers as a group scored significantly low on WISC subtests heavily loaded with school-type learning, sustained concentration, and memory factors. Sanstedt[54] studied the relationship between memory span and intelligence of severely retarded readers and concluded that retarded readers perform equally well on performance or verbal scales of the WISC. However, she suggested that a memory span battery would appear of diagnostic value in reading disability. Ackerman[55] also suggested that the primary deficiency of most learning disabled children "may be an inability to hold several bits of information until these bits can be synthesized into a whole" and added that the WISC Arith and DS subtests most likely tap this factor. Zigmond[56] used DS as a measure of gross memory function and found that dyslexics (learning disabled children for this researcher's purposes) were inferior in memory with or without consideration of sequence. He wrote that sequential reproduction was no better at differentiating dyslexics from normals than were measures of gross memory.

Glasser and Zimmerman[57] in their Clinical Interpretation of the WISC warn against trying to dissect out intellectual traits from the WISC subtests. They wrote: "So-called scatter, pattern or sign analysis has been utilized

widely but with even less than indifferent success. This appears to be because of similarities between the aspects measured by different subtests plus the overlapping in populations studied." They reported that variations between the subtests are often used as diagnostic "signs" despite cautions against utilizing such interpretations. Nevertheless, their analyses of what each WISC subtest measures again revealed an underlying reference to memory as a factor being tapped by the Inf and DS subtests in particular.

They reported the Inf subtest as measuring remote memory, ability to comprehend, capacity for associative thinking, interests and reading back-ground, and degree of intellectual ambition. Arith was cited as measuring ability to relate cognitive and non-cognitive factors in terms of thinking and performance as well as attitudes toward school achievement. Cod was discussed as a factor which has not been associated with any known trait or ability. DS was noted to test immediate auditory recall or immediate auditory memory (attention) span.

Pattern analyses of WISC scores also have been used to explore the severity of reading disability. Hirst[58] found a mildly retarded group and severely retarded group all low on Arith, DS, and Cod. However, the severely retarded group was also low on similarity and vocabulary subtests. Coleman,[59] Silberberg,[60] and Ackerman[61] found the WISC patterns of under-achievers varied only slightly with degree of underachievement. By contrast, Sawyer[62] was able to discriminate between mildly disabled and severely disabled readers maintaining exceptionally high validity on cross validation.

In summary as pointed out by Coleman,[63] Belmont,[64] Huelsman,[65] and Kender,[66] it is not surprising that available findings are somewhat incon-sistent with respect to performance of underachievers on the WISC. From

their analyses of past studies they cited the following inconsistencies
and weaknesses in available research: differences in population character-
istics of both experimental and control groups, small samples, wide age
ranges, joint consideration of sexes, failure to use appropriately selected
comparison groups, variation in defining reading disability, wide range of
IQ levels, lack of adjustments for individual IQ differences, and diverse
methods of treatment. Kender also stressed that reporting average scores
for poor readers obscured the individual differences.

Thus, as has been shown, research on the WISC has been abundant.

III. Design

Hypotheses

A. Ther: is not a WISC subtest score pattern of low information, arithmetic, digit span, and coding characteristic of children identified as language/learning disabled by criteria of Seattle School District #1.

B. The WISC subtest score pattern of information, arithmetic, digit span, and coding for underachieving readers will not vary with degree of under-achievement as measured by the Wide Range Achievement Reading Test.

As will be explained later in this study, every child diagnosed in Seattle Schools as an LLD child is an underachieving reader.

Population

The population will be all of the students admitted to and remaining in the Seattle Public School District #1 Learning/Language Disability Program since September, 1971, whose birth years are July, 1957, to 1966, inclusive, whose full scale IQs are 90 or above, and whose reading achievement is one or more grade levels below academic expectency for students CA 7.6 to 10.5 inclusive and two or more grade levels below academic expectency for students CA 10.6 to 15.11 inclusive.

Eligibility requirements for the Seattle LLD Program: According to the LLD handbook,[67] to be eligible for admission to the program, a pupil must have "an average academic functioning potential with a learning disorder in one or more of the processes of speech, language, reading, spelling, writing, or arithmetic. The primary cause of the problem is not mental

retardation, sensory deprivation, cultural or instructional factors."

In actual practice, according to Jerald C. Winger, supervisor of the LLD program, and Norma Naiden, district psychometrist, a child is admitted to the Seattle program only if he fulfills the above criteria by having a full scale IQ of 90 or better on the WISC and by achieving two or more grade levels below academic standards as measured by the Wide Range Achievement Test (WRAT),[68] Spache Diagnostic Reading Scales,[69] Gray Oral Reading Test,[70] and Boder Informal Word Recognition and Spelling Test.[71] Some leniency is shown concerning the degree of reading deficit, especially with the younger students. However, every child diagnosed in Seattle School District as an LLD child is a severely disabled reader as well.

Number of students: An overview of the Seattle LLD program reveals 7rc students currently enrolled in 36 classes. Ages range from 7 to 17. As information is gathered for this study, many students will be deleted because they do not fit the requirements set for the study. Another consideration should be mentioned here. Because public schools are public institutions, they must occasionally bend to pressures from parents, teachers, and administrators. Thus, some students have been admitted to the program without specifically meeting the eligibility requirements simply because they cannot function adequately in a normal classroom. These students will also be eliminated from this study. When the actual number of students are delineated for this study, random sampling will probably be necessary simply because of the hours involved in collecting data.

Age: Subjects in this study will be separated into three groups of ages, i.e. $7\frac{1}{2}$, $10\frac{1}{2}$, and $13\frac{1}{2}$ as of June 30, 1973. Specifically:

    Group I   CA 7.6 to 10.5 inclusive   Birthdates 12-31-65 to 1-1-63 Inc.
    Group II   CA 10.6 to 13.5 inclusive   Birthdates 12-31-62 to 1-1-60 Inc.
    Group III   CA 13.6 to 15.11 inclusive   Birthdates 12-31-59 to 5-31-57 Inc.

The rationale for this grouping is based on Wechsler's choice of these age classifications as "being probably most representative of the age range for which the WISC is designed."[72] The cut off age of 15.11 will be used because it coincides with the scaled score equivalents for raw scores in the WISC manuel. Older students are given the Wechsler Adult Intelligence Scale.

Sex: As reported in the research for this paper, most educational research supports consideration of boys and girls separately. An overview of Seattle's LLD population shows 3.7 boys to every girl, a fact which in itself tends to confirm the difference in boys' and girls' school perform- ance. For this study, the sex of each student will be reported, but both boys and girls will be treated as one group. The rationale for this is that neither the WISC nor the WRAT, the tests which will be used in this study, delineate between boy/girl performance.

IQ: For purposes of this study, only students with full scale IQ of 90 or above will be included. The rationale for this is that Wechsler,[73] in his intelligence classifications, cited full scale IQs of 90 to 109 as average with IQs above being progressively classified as bright normal, superior, and very superior. IQs of 89 or below were classified as dull normal and proceeded toward lower classifications of borderline and mental defective. Also, as noted under eligibility requirements, Seattle School's LLD Program eligibility criteria specifies "average academic functional potential," i.e. full scale IQ of 90 or above. Both verbal and performance as well as full scale IQ will be reported.

Degree of achievement: Reading achievement deficit, i.e. reading disability, in this study will be defined as a one year or greater deficit

for Group I and a two year or greater deficit for Groups II and III between
actual reading achievement and expected reading achievement as determined
by the WRAT tables[74] for computing average grade achievement expected for
a child of a given age. The rationale for figuring underachievement from
a reading expectancy formula for each student rather than from a standardized
expectancy for average achievers is that it will block for differences in
IQ. Because the WRAT reading test will be used to measure achievement, it
seems consistent to use the WRAT reading expectancy formula.

The rationale for using a one year or more deficit for Group I and a
two year of more deficit for Groups II and III as the basis for defining
underachievement is that this essentially is Seattle's practice. Reading
deficiencies in terms of years and months tend to become greater as more
years in school are completed.

Cut-off date for entrance to the LLD program: Only students admitted
to and remaining in the Seattle LLD Program since September, 1971, will be
included in this study. The rationale for choosing this date is that
screening of LLD candidates in Seattle Schools became much more thorough
at that time. A full time psychometrist was hired then, and a wider
battery of tests was administered before entrance to the program was
granted.

Social, economic, and cultural composition: Seattle Public School
System #1 has an enrollment of 74,020 students drawn from a wide range of
communities with varied social, economic, and cultural backgrounds. Since
the schools are publically financed, no fees are charged for children
enrolled in the LLD program. Student referrals are initiated by principals
and teachers in the school of the attendance area where the pupil resides.

If LLD placement is deemed necessary, students attend classes either in their own attendance area or in the nearest available school, and transportation is provided by the district. Thus, in theory, the Seattle LLD students should draw from a cross section of the entire school population.

Length of time in the LLD program: Date of entrance to the Seattle LLD Program will be reported for each student. Time completed in the program will not be considered in determining achievement.

The rationale for this is that each child's educational experiences are unique. An attempt to report them would be beyond the scope of this paper. However, reporting this data may be of some value for future studies by the Seattle LLD Department.

IV. Method

This will be a correlation study comparing reading achievement as measured by the WRAT and WISC subtest scores. Specifically, the method will be as follows:

1. IBM cards will be used to record student's name, age, sex, birthdate, and entrance date to the Seattle LLD Program. This information is available in the Seattle LLD Office.

2. WISC subtest scores as well as verbal, performance, and full scale IQ scores will be recorded on IBM cards. This information is available in the Seattle LLD Office.

3. Randominization of students will be done if necessary.

4. Students will be separated into three groups according to birthdates listed earlier in this study.

5. The WRAT reading section will be administered to each subject during April and May, 1973.

6. Degree of reading disability in terms of years and months will be calculated for each student by subtracting his actual achievement score from his expected reading achievement as determined by the tables in the WRAT manual.

7. Students in each age group will be ranked according to degree of under-achievement, i.e. high deficit in months and years equals the greatest degree of underachievement.

8. A correlation study will be run by computer to compare reading achievement with WISC subtest deviation scores.

V. Variables Controlled

The controlling of IQ has been given a great deal of thought in this study. First, it seemed reasonable to include only students with IQs of 90 or above. Otherwise, in effect, the study would have been redefining reading disability to include general low achievement as well.

Secondly, reading deficit has been calculated by subtracting actual reading achievement from expected reading achievement as determined by the WRAT tables. These tables compute reading expectency based on age as well as IQ. Thus, differences in individual IQs have been taken into account.

Thirdly, in handling the WISC subtest scores, deviations from the student's own mean have been used. When considering high and low WISC subtest scores, recording deviations from the national mean would have been misleading. A student may have had a low or high score as compared to the national norm, but this is not to imply that his score was low or high as compared to his own WISC profile. Recording deviations from students' own means has taken into account his particular IQ. In other words, it has blocked for variation in IQs.

Dividing the students into age groups has alleviated differences which reflect artifacts of age distributions rather than real differences in patterning of intellectual capacities.

Hopefully, the definition of reading disability has been controlled to include only severely retarded readers. According to Huelsman,[75] there has been serious disagreement in this area. He suggested that the capacity-achievement differences of two years (which was applied to Groups II and

III in this study) may be appropriate though somewhat high. As of 1970, Huelsman had two studies underway to define underachievement more carefully. Durrell[76] noted that a retardation of six months in the first grade is more serious than a retardation of six months at sixth grade.

Harris[77] considered a child retarded in reading with a six month deficit at first grade, nine month deficit at grades four and five, and a year deficit at grades six or above.

In light of the above, for purposes of this study the criteria for reading disability for Group I consisting of students CA 7.6 to 10.5 inclusive was set somewhat arbitrarily and possibly high at one year. Setting a criteria of a two year deficit for Groups II and III, CA 10.6 to 15.11 inclusive, may also have been high. At any rate, this stringent criteria has been set in an effort to limit the subjects in this study to only those students with severe reading disabilities.

VI. Variables Not Controlled

Basically the problems of control center around the fact that this
study deals with living, viable people each one unique in himself.

Thus, adequate screening of LLD students could be a real problem even
though Seattle's diagnostic procedures have been much more thorough since
September, 1971, than previously; and only students screened since then are
included in this study. Some of the factors which might confuse results
are students' current and past familial relationships; interests; present
and past physical, social, and emotional adjustment factors; personality
organization and adjustment; individual consciousness; persistence; study
habits; and satisfactions in their present home and school situations.

Because Seattle's LLD students are drawn from a cross section of the
city, their social, economic, and cultural backgrounds should be diverse.
Nevertheless, they could effect the study.

Previous school experience could heavily influence the outcomes of
this study. The students under study have all experienced varying degrees
of failure in school. Possibly the alleviation of the failure syndrome
by placement in an LLD class will effect the WISC subtest pattern and
achievement correlation. Other ramifications of special education such
as length of time in the program, small groups, special curriculum, and
various teaching methods may also confuse the results.

WRAT reading achievement tests will be administered during April and
May of 1973. This two month gap in testing may have a slight effect on

achievement scores. Furthermore, some teachers routinely administer the WRAT to their students. If the test has been given recently, it would be unreliable to repeat it; and the teacher's results will have to be used in this study.

Absentees could cause unreliability. Merely because of the time factor, they will not be tested.

Also, for reasons given earlier, boys and girls will not be treated as separate groups.

VII. Hazards Which May Be Encountered

Although the WRAT and WISC are standardized tests often used in educational research, they each respectively may not actually give true measures of achievement and intelligence. This is beyond the scope of this paper and yet may produce confounding effects.

Particularly, as has already been pointed out, from what this researcher cound find in the literature, there is much confusion over what the WISC subtests actually test.

Grouping students' scores for statistical analysis may be another hazard. It may submerge individual scores into the group, i.e. one group of poor readers may actually exhibit a low WISC profile of Inf, Arith, DS, and Cod while another group, also poor readers, ranks high in tese subtests and offsets or nullifies the first group's scores. Thus, there may truly be a certain type of learning disability characterized by the low WISC profile of Inf, Arith, DS, and Cod which is obscured by the statistical treatment.

VIII. Potential Findings/Implications

If hypothesis A is accepted, it will imply that subjects in this study are not low in the WISC subtest score pattern of Inf, Arith, DS, and Cod. Thus, WISC subtest scores probably do not differentiate problem readers, and WISC full scale IQ score in itself is probably a realistic diagnostic criteria of academic potential.

If hypothesis B is accepted, it will imply that the WISC subtest scores of Inf, Arith, DS, and Cod do not delineate retarded from severely retarded readers. Thus, the WISC full scale IQ score in itself probably is an adequate basis for assessing academic potential.

If hypothesis A is rejected, it will imply that subjects in this study are significantly low in the Inf, Arith, DS, and Cod subscores. Thus, the WISC subtests probably differentiate poor readers, and the WISC full scale IQ may not give as complete a picture of academic potential.

If hypothesis B is rejected, it will imply that the WISC subtests of Inf, Arith, DS, and Cod tend to be lower as degree of ach'.evement is lower. Thus, these subtests might prove useful in diagnosing some reading problems.

Hypothesis B merely reinforces hypothesis A. If A is accepted, then B would logically be accepted also. If A is rejected and B is accepted, then it would appear that the WISC subtests of Inf, Arith, DS, and Cod do differentiate poor readers but not severity of the problem.

As was pointed out as a possible hazard of this study, hypothesis A could be accepted (i.e., there is not a WISC subtest pattern...) if one

group of poor readers scores significantly low on the WISC Inf, Arith, DS, and Cod scores as opposed to another group who scores significantly high, thus obscuring the scores of individuals. In that event, there actually may be a learning disability characterized by low Inf, Arith, DS, and Cod which is not evident by the statistical treatment of this study.

If this finding occurs, further research would probably be warranted using, if possible, a retarded reader group and an adequate reader control group all of whom have this low WISC profile and adequate full scale IQ.

If the null hypotheses are rejected, or if only hypothesis A is rejected, then further research should probably be directed towards understanding what it is that Inf, Arith, DS, and Cod actually test. As has already been mentioned, the research tends to support an underlying notion that these test tap memory. Since educational research at this point does not seem sophisticated enough to ferret out single aspects of intelligence, then possibly trial and error treatments are the only alternative for the moment. For example, educators could hypothesize that poor memory was the reason for the low Inf, Arith, DS, and Cod scores. Their treatment would be, for example, repetition and overteaching. If improvement was significant, memory could be considered a cause. This implies that if educators cannot find the causes, they might at least treat the symptoms.

Another potential finding might be that students in this study show an entirely different WISC profile than the one hypothesized. In that event, further research would seem appropriate to discover which facets of intelligence were being tested.

A final, positive finding of this study might be that severely retarded readers score significantly high in one or more WISC subtests.

Again, further research would seem warranted to discover what facet of

intelligence was being tapped so that educators could teach to the

student's strongest attributes.

IX. Results

A. Subjects

As the Seattle School District #1 LLD students were screened according
to the criteria for this study, it became increasingly evident that random-
ization would not be necessary. Out of the 700 students in the program,
only 288 had been screened since September, 1971, the date when more
thorough screening of LLD candidates was instigated in Seattle and the
entrance cutoff date selected for this study. Of these students, 29 boys
and 18 girls were dropped because their CA was over the 16 year limit set
for this study. This left 200 boys and 41 girls to be considered.

Table 1 categorizes by age groups these 241 remaining students showing
the reasons for deleting some from the study and the number retained for
inclusion in the study.

TABLE 1

REASONS FOR DELETION	Group I CA 7-6 to 10-5			Group II CA 10-6 to 13-5			Group III CA 13.6 to 15.11		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
ORIGINAL STUDENTS	65	16	82	81	18	99	53	7	60
DELETED STUDENTS	44	11	55	51	9	60	33	4	37
REASONS FOR DELETION									
IQ below 90	18	4	22	28	5	33	21	3	24
Incomplete WISC scores	13	4	17	10	3	13	6	0	6
Small reading deficit	5	1	6	4	1	5	2	0	2
No reading deficit	2	1	3	2	0	2	0	0	0
Dropped from LLD program	3	0	3	1	0	1	1	0	1
Absent	2	1	3	4	0	4	2	1	3
Transferred	1	0	1	2	0	2	0	0	0
Refused testing	0	0	0	0	0	0	1	0	1
Students selected for study	21	6	27	30	9	39	20	3	23

REASONS FOR DELETING STUDENTS FROM THIS STUDY

In all, 107 students from 14 schools were given the reading portion of the WRAT. Happily enough, 18 of these students had either small reading deficits or no reading deficits. Thus, 89 students were retained for this study.

B. Statistical Treatment of the Obtained Data

One of the questions asked by this study was is there a WISC subtest score pattern of low Inf, Arith, DS, and Cod characteristic of Seattle LLD students. In order to examine the WISC subtest patterns, the eleven subtest scaled scores were totaled for each subject, and his deviation from his own mean was figured by computer. The WISC mean deviations by group were then computed from the deviations from the students' own means.

The results of that treatment are shown in Graph 1 on the following page.

GRAPH 1

Group I •••• CA 7.6 to 10.5 inclusive
Group II •—• CA 10.6 to 13.5 inclusive
Group III •——• CA 13.6 to 15.11 inclusive

Subtest Key:
Inf—Information
Comp—Comprehension
Arith—Arithmetic
Sim—Similarities
Voc—Vocabulary
DS—Digit Span
PC—Picture Completion
PA—Picture Arrangement
BD—Block Design
OA—Object Assembly
Cod—Coding
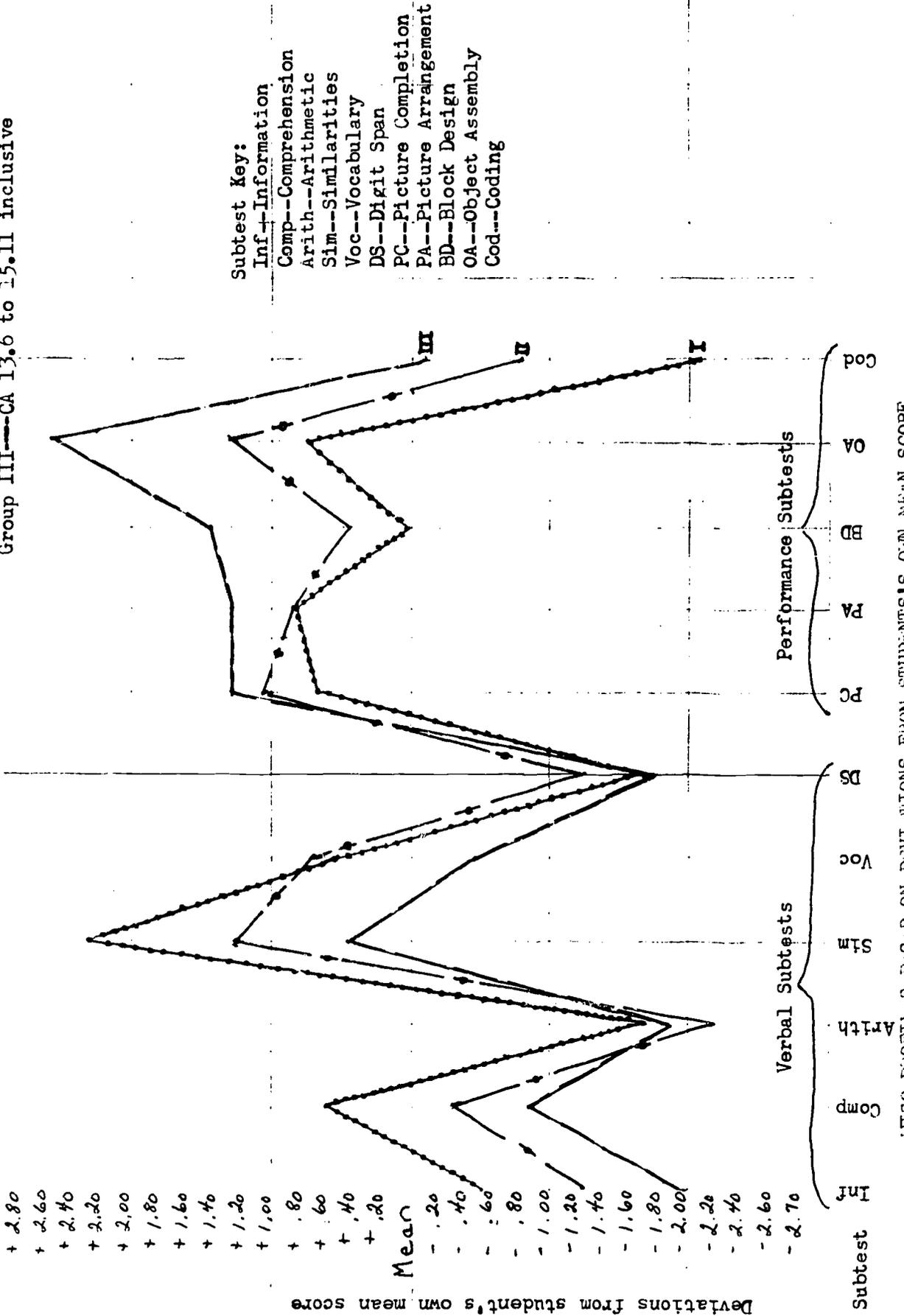
WISC PROFILES BASED ON DEVIATIONS FROM STUDENTS'S OWN MEAN SCORE

Performance Subtests

Verbal Subtests

Deviations from student's own mean score

Subtest: Inf Comp Arith Sim Voc DS PC PA BD OA Cod

+ 2.80
+ 2.60
+ 2.40
+ 2.20
+ 2.00
+ 1.80
+ 1.60
+ 1.40
+ 1.20
+ 1.00
+ .80
+ .60
+ .40
+ .20
Mean
- .20
- .40
- .60
- .80
- 1.00
- 1.20
- 1.40
- 1.60
- 1.80
- 2.00
- 2.20
- 2.40
- 2.60
- 2.70

Graphically, the patterns for the three age groups were quite similar.
All three groups were below their own means on Inf, Arith, DS, and Cod and
thus substantiated that this pattern did appear to exist for Seattle LLD
students.

Also, Group II and III exhibited scores below their own mean on Compre-
hension. All three groups were above their own mean on Similarities, Picture
Completion, Picture Arrangement, Block Design, and Object Assembly.

Note that at the bottom of the chart verbal and performance subtests
are bracketed. Group I, the younger subjects, scored higher on the verbal
tests and lower on the performance tests than the other groups. Conversely,
Group III, the older subjects, scored lower on the verbal tests than on
the performance tests, a point which is of interest in view of the fact that
all of the students in this study achieved, in one manner or another, an
adequate IQ on the complete WISC.

The WISC subtest pattern was further studied by ranking from low to
high the subtest scaled score deviations from the student's own mean.

TABLE 2

MEAN DEVIATIONS RANKED

Group I		Group II		Group III	
Cod	-2.07	Arith	-2.15	Inf	-1.94
Arith	-1.66	DS	-1.23	Arith	-1.85
DS	-1.62	Inf	-1.23	DS	-1.68
Inf	- .51	Cod	- .82	Comp	- .85
BD	+ .08	Comp	- .28	Voc	- .46
Voc.	+ .56	BD	+ .44	Cod	- .28
Comp.	+ .60	Voc	+ .72	Sim	+ .45
PC	+ .67	PA	+ .87	PA	+1.28
OA	+ .75	PC	+1.03	PC	+1.28
PA	+ .96	Sim	+1.28	BD	+1.45
Sim	+2.34	OA	+1.36	OA	+2.58

Here again, the pattern of low Inf, Arith, DS, and Cod was in evidence.
Group I and II were consistent in ranking these subtests the lowest four out
of the eleven subtests although the four subtests varied in rank position

in each group. Group III was consistent in ranking Inf, Arith, and DS the three lowest subtests. However, Cod ranked sixth lowest and was not among the lowest four subjests as it was in Group I and II.

Another way of searching for the low WISC pattern of Inf, Arith, DS, and Cod was to chart the numbers and percentage of students in each group with low deviations from their own mean on each of the WISC subtest scores. The definition of low was arbitrarily set at 1.0 or more scaled score below the student's own mean on all eleven subtests. Granted, this definition is admittedly not truly valid since the standard deviation on the WISC is a scaled score of 3. Nevertheless, it was used merely to help reflect a trend.

TABLE 3

		Verbal Subtests				Performance Subtests						
		Inf	Comp	Arith	Sim	Voc	DS	PC	PA	BD	OA	Cod	
Group I	N	14	6	17	1	6	17	6	4	9	5	19	N = 27
	%	56	24	68	4	24	63	24	16	36	20	76	
Group II	N	23	17	29	8	8	22	8	8	11	4	21	N = 39
	%	60	44	75	21	21	57	21	21	29	10	54	
Group III	N	18	13	18	5	7	15	6	4	3	1	9	N = 23
	%	77	56	77	22	30	65	26	17	13	4	39	

NUMBER AND PERCENTAGE OF STUDENTS WITH LOW DEVIATION FROM OWN MEAN ON WISC SUBTEST SCORES

That underachievers as a group scored low on Inf, Arith, DS, and Cod was relected in Table 3 by Groups I and II, both of which had the highest percentages of low deviations from their own means on the four subtests under study. Group III held to the pattern on Inf, Arith, and DS all cf which are verbal subtests. However, Comp, also a verbal test replaced Cod, a performance test, as the fourth test percentagewise on which students scored below their own mean.

In summary, it would appear that Seattle LLD students as a group do exhibit a pattern of low Inf, Arith, DS, and Cod on the WISC.

When summarizing for the groups, consideration of V, P, and FS IQ is pertinent. Undoubtedly the IQ scores considered in this study are skewed higher than those actually exhibited by the Seattle LLD population. This is because adequate IQ as set by this study and also by the Seattle LLD eligibility requirements was defined as 90 or better. In actuality, 79 of 33 percent of the original 241 students delineated for this study had WISC scores of 89 or lower and were excluded from this study for that reason.

Table 4 shows means of verbal, performance, and full scale IQ for each age group.

TABLE 4

	V IQ	P IQ	FS IQ
Group I CA 7.6 to 10.5	102	103	102
Group II CA 10.6 to 13.5	98	104	100
Group III CA 13.6 to 15.11	91	105	97

VERBAL, PERFORMANCE, AND FULL SCALE IQ BY GROUP

The standard deviation on the WISC is 3. Therefore, the drop in full scale IQ as CA increases could be significant. Full scale IQ for all three

groups was well within the normal range. Performance IQ was higher than verbal IQ for all three groups although not significantly higher for Group I. Verbal IQ was the fluctuating score and reflected a marked decrease as CA increased. Note that graphically the spread in verbal and performance IQ scores widens as CA increases.

GRAPH 2

VERBAL, PERFORMANCE, AND FULL SCALE IQ SCORES
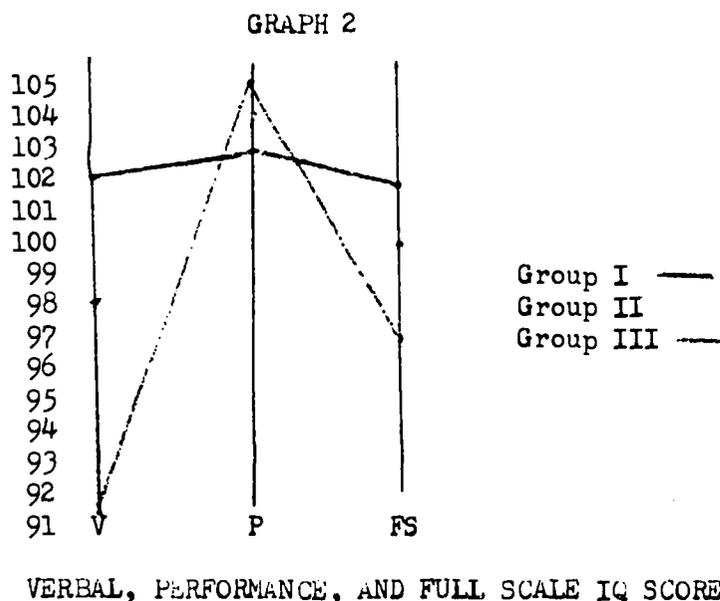
The above discussion has considered students in this study as a group. Another consideration was whether the pattern of low Inf, Arith, DS, and Cod would hold true for individuals within the groups. To study this, for each student a count was taken of the number of subtests of Inf, Arith, DS, and Cod on which he or she scored low. Again low was defined as 1.0 or more scaled score points below his own mean.

Table 5 reports by group the number of students and percentage of students who were low on a given number of the four WISC subtests under con-sideration. For example, in Group I, zero students were low on none of the tests while 5 students or 20 percent were low on all four tests.

TABLE 5

		0	1	2	3	4	Number of subtests
Group I	N	0	3	13	6	5	
	%	0	12	52	24	20	N = 27
Group II	N	1	2	19	13	4	
	%	3	5	49	34	10	N = 39
Group III	N	1	1	6	13	2	N = 23
	%	4	4	26	56	9	

FREQUENCY OF STUDENTS LOW ON A GIVEN NUMBER

OF THE FOUR SUBTESTS, INF, ARITH, DS, AND COD

As can be seen, only small percentages of each group were low on all

four subtests. Approximately half of the students in Groups I and II were

low on two of the subtests whereas over half of the students in Group III

were low on three of the subtests. Note that as CA increases a lower

percentage of students are low on all four subtests.

Thus, although Seattle LLD students as a group scored low on Inf,

Arith, DS, and Cod, it cannot be said that this pattern holds true in

individual cases.

Another question was also asked: does a child with a low profile on

Inf, Arith, DS, and Cod historically show lower reading achievement than

a child whose WISC profile is adequate in these subtests? To help answer

this question, Pearson correlations were run to compare deviations from

each student's own mean on each of the eleven WISC subtests with the

student's reading deficit. Reading deficit was recorded in positive

numbers, i.e. a smaller positive number noted a lesser deficit; a larger

positive number noted a greater reading deficit. Thus, negative correla-

tions were yielded. High WISC scores correlated negatively with high

reading deficits; low WISC scores correlated negatively with low reading

deficits.

The WISC subtests were then ranked according to degree of negative correlation, i.e. the largest negative correlation indicated the closest correlation between high reading deficit and low WISC deviation score.

Table 6 shows the WISC subtests ranked according to degree of negative correlation with reading deficit. Only the five underlined correlations showed significance at the .05 level, and these five significant correlations did not seem to fall into any pattern. Also, none of the correlations for any of the eleven subtests were particularly high correlations with reading deficit.

TABLE 6

	Group I			Group II			Group III		
		Corr.	Sig.		Corr.	Sig.		Corr.	Sig.
1.	Arith	-.3948	.021	Voc	-.4136	.005	DS	-.2689	.108
2.	DS	-.3125	.057	DS	-.3069	.029	Arith	-.2502	.125
3.	Cod	-.1192	.277	Inf	-.0672	.343	Comp	-.1339	.273
4.	PA	-.1040	.303	Cod	-.0371	.412	BD	-.1171	.298
5.	PC	-.0450	.412	Sim	-.0170	.460	Inf	-.0239	.457
6.	Voc	-.0126	.476	Comp	+.0221	.447	Voc	+.0475	.415
7.	BD	+.0154	.470	Arith	+.0221	.447	Sim	+.0650	.385
8.	Comp	+.0448	.413	OA	+.1210	.232	OA	+.0867	.348
9.	Inf	+.1456	.235	BD	+.1440	.191	PC	+.1377	.266
10.	OA	+.2954	.068	PA	+.1491	.183	PA	+.1992	.182
11.	Sim	+.4295	.013	PC	+.3134	.027	Cod	+.2530	.123

PEARSON CORRELATION COEFFICIENTS OF WISC SUBTESTS AND READING DEFICITS

RANKED ACCORDING TO DEGREE OF CORRELATION

Note that DS is the only test ranked high in all three groups, but even then only Group II yielded a significant correlation.

Thus, low DS, if any, would seem to be the only one of the four sub-tests under consideration which correlated significantly with low reading achievement.

Whereas low Arith scores ranked high with reading deficit in Group I and III, it was low in Group II. Cod ranked high in Group I, but lowest in Group III. Inf did not seem to follow any pattern.

OA was the only other subtest score that appeared to exhibit a pattern. It ranked among the four lowest subtests in all three groups.

In summary, this analysis seems to indicate that poor DS subtest scores were the only scores which consistently correlated with reading deficiency for all three groups.

Pearson correlation coefficients were also run on verbal, performance, and full scale IQ to determine the relationship between these factors and reading deficit. One would expect that IQ and reading achievement would correlate highly, but for subjects in this study the reverse held true, i.e. high IQ correlated with low reading achievement. Pearson correlation coefficients of reading deficit and IQ are shown in Table 7. Correlations significant at the .01 level of confidence are underlined.

TABLE 7

	V IQ		P IQ		FS IQ	
	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
Group I	.2104	.147	.1415	.241	.2551	.100
Group II	.4062	.006	.6967	.001	.7220	.001
Group III	.2197	.157	.6336	.001	.6133	.001

PEARSON CORRELATION COEFFICIENTS OF IQ AND READING DEFICIT

Group I, compared to Groups II and III, yielded relatively low and

nonsignificant positive correlations, although note that all were positive
correlations. Group II yielded high and very significant positive correla-
tions on verbal, performance, and full scale IQ. Group III had a low
verbal positive correlation but high and very significant positive correla-
tions on performance and full scale IQ. All this must be interpreted keeping
in mind that reading deficit in this study was reported as a positive number,
i.e. the greater the positive number, the more severe was the reading
deficit. (For example, a two year reading deficit is more severe than a
one year reading deficit.)

Interpretation of the above correlation may become clearer by consider-
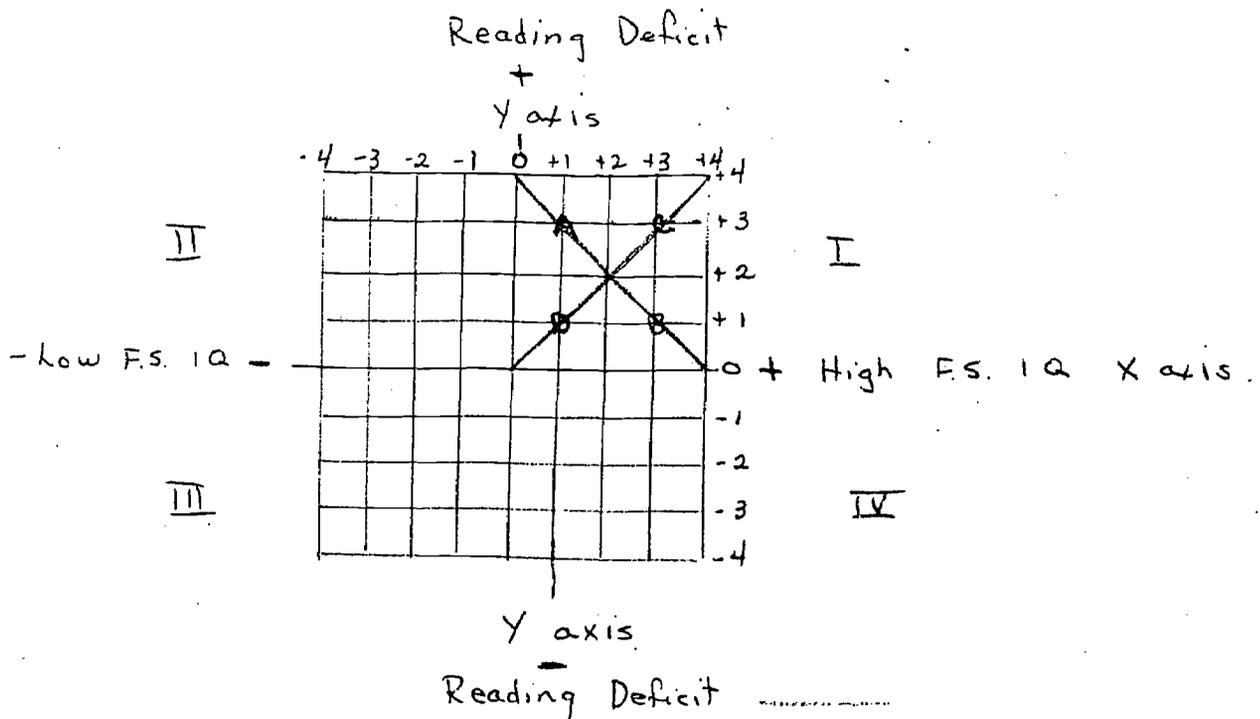ing the following quadrant grid.

CHART 1

QUADRANT GRID ILLUSTRATING POSITIVE AND NEGATIVE CORRELATIONS

If on the X axis full scale IQ scores are plotted as positive (high
IQ equals a high positive number) and on the Y axis reading deficit scores
are plotted as positive (severe deficit equals a high positive number), then
a high score on the X axis correlates positively with a low score on the

Y axis as illustrated by point B on the chart. Conversely, a low score on the X axis correlates positively with a high score on the Y axis, as illustrated by point B. Under these assumptions, a negative correlation was expected.

However, the reverse held true, and a positive correlation was obtained as indicated by points C and D on the chart thus denying the original assumption. In this study, high IQ correlated with more severe reading deficit; and conversely, low IQ correlated with less severe reading deficit. Groups II and III, in particular, yielded high correlations significant at the .001 level of confidence of high performance and full scale IQ and low reading deficit.

X. Discussion

A. Group WISC Subtest Pattern

Hypothesis A in this study was stated in the null form: there is not
a WISC subtest score pattern of low Inf, Arith, DS, and Cod characteristic
of children identified as learning/language disabled by criteria of
Seattle School District. Based on deviations from the student's own mean
on the eleven WISC subtests, all three age groups scored below their own
means on Inf, Arith, DS, and Cod. This substantiated that the pattern
under study did appear to exist for Seattle LLD students as a group.

Further evidence that the pattern existed for the group was shown by
ranking from low to high the subtest scaled score deviations from the
student's own mean. All three age groups were consistent in ranking
these subtests the lowest four out of the eleven subtests with the sole
exception of Group III which ranked Cod sixth lowest.

The low Inf, Arith, DS, and Cod pattern also was exhibited when the
number and percentage of students in each group with low deviations from
their own mean on the WISC subtests were tabulated.

These three analyses of data all lead to the implication that the
pattern is characteristic of subjects in this group and that students in
this study do not differ from those of other studies. Therefore, Hy-
pothesis A was rejected.

This lead to the question of what such a pattern meant. Here one
must refer back to the literature and the cautions against trying to
dissect out intellectual traits from the WISC subtests. Coleman and

Rasof[78] seem to have chosen a safer avenue of interpretation, that of examining studies of factorial loadings for the subtests, than did Glasser and Zimmerman[79] who attempted to analyze each subtest individually. Drawing from Coleman and Rasof, it would appear that Seattle LLD students as a group scored lowest on those WISC subtests that: (1) most highly relate to school-type learning (Inf and Arith); (2) require sustained concentration (DS); and (3) are heavily loaded with the memory factor (Cod, Arith, and DS).

Probably one of the most important implications of these findings is their usefulness in dealing with at least some LLD students. When confronted with a disabled reader who has an adequate IQ and this WISC subtest pattern, if nothing else, an educator could feel secure in advising the student that his problem was not merely underachievement or laziness. Undoubtedly many LLD students with this WISC pattern have often heard this comment when, in actuality, the mere fact that this pattern does exist for LLD students does imply that a real problem is present.

B. Individual WISC Subtest Pattern

Although research in this study lead to the conclusion that low Inf, Arith, DS, and Cod subscores were characteristic of the LLD students as a group, the pattern did not hold true for individuals. When the subjects were tabulated as to the frequency of students who were low on a given number of subtests out of the four subtests under study, small percentages of students in each group were low on all four tests. This would be in agreement with Huelsman[80] who did a similar examination on only Inf, Arith, and Cod and not DS. Thus, use of these four scores would not seem to be a valid criterion for differentiating individual disabled readers.

C. WISC Subtest Pattern and Reading Deficit

Hypothesis B in this study was also stated in the null form: the WISC subtest score pattern of Inf, Arith, DS, and Cod for underachieving readers will not vary with degree of under achievement as measured by the WRAT. In order to compare WISC subtest scores and underachievement, Pearson correlation coefficients were run by computer. Interestingly enough, none of the correlations for any group between any of the subtests and reading deficit were high. Also, the three age groups differed from each other as to low and lowest correlations on the various subtest scores. Upon ranking the correlations, it was noted that DS was the only subtest ranked high in all three groups, and at that the correlations was significant only for Group II. Ranking the correlations also showed wide variability between the groups as to which subtests were high and which were low. Therefore, according to this research, Hypothesis B must be accepted. Degree of underachievement does not appear to correlate highly or significantly with any of the WISC subtests.

This research along with the finding that the low WISC profile of Inf, Arith, DS, and Cod does not hold true for individual underachievers supports the suggestion that the WISC subtests are not valid criteria for diagnosing disabled readers.

D. Relationship of Verbal, Performance, and Full Scale IQ

Undoubtedly the criteria set for selection of subjects for this study had a heavy effect on this researcher's results concerning reading deficit and IQ. It was intended that only severely disabled students would be included in this study which meant dropping from the study those students with low IQ and those with only a mild reading deficit. Therefore, the subjects in this study have a higher mean IQ and larger reading deficit than the entire Seattle LLD population.

Of the original 241 Seattle LLD students considered for this study, 33 percent were dropped because of WISC IQ scores 89 or below, and 7 percent were dropped because of mild or no reading deficiency as measured by the WRAT. This would indicate that the Seattle LLD Department should either redefine its eligibility requirements or do further screening of candidates.

Recalling that only students with adequate IQ, i.e. 90 or above, were included in this study, it is not surprising that full scale IQ for all three age groups fell well within the normal range. The standard deviation on the WISC is 3. Based on this, performance IQ was higher than verbal IQ for all three groups although not significantly higher for Group I, the younger subjects; and performance IQ did not vary with age as indicated by scores of 103, 104, and 105 for Groups I, II, and III respectively. Verbal IQ was the differentiating IQ score and decreased significantly as CA increased. This was consistent with Reid[81] who reported superior performance abilities over verbal abilities for only his older subjects. This also was consistant with evidance yielded when the WISC subtest deviation scores from student's own means were plotted in this present resoarch. Younger students were higher than older students on verbal tests and lower on performance tests. Conversely, older students scored lower on verbal tests and higher on performance tests than the other two age groups.

This research has merit for diagnosing LLD candidates. It would appear that WISC IQ scores did not differentiate poor readers ages 7.6 to 10.5 and therefore should not be used in early identification of poor readers.

The discrepancies between low verbal and high performance IQ widened as age increased until by ages 13.6 to 15.11 inclusive a fourteen point discrepancy was noted. In agreement with Huelsman,[82] this researcher feels confident that such a large spread in scores reflected a real difference

in learning ability. Although full scale IQ was adequate for this older

group, verbal IQ was 91 and only one point within the normal IQ range. One

reason for this might be that verbal IQ takes on greater importance in

predicting academic potential as CA increases because academic emphasis

becomes increasingly more abstract and verbal at each successively higher

grade. Because of this, possibly verbal tasks on the WISC are not as de-

manding of a young child as they are of an older one. Verbal deficiencies

may exist for the younger LLD child but may not be as clearly delineated

for them by the WISC as are verbal deficiencies at an older age.

Another possibility of why verbal IQ is low for older LLD students

might be that the WISC does fairly measure verbal integrity at all ages

but that verbal competencies for LLD students do not progress evenly with

their other stages of development.

In either event, it would appear that verbal IQ lower than performance

IQ is a factor in diagnosing LLD children ages 13.6 to 15.11 inclusive.

Possibly children by this age who have continually experienced academic ·

problems and school failure have learned to cling to context clues in

their environment, thus scoring adequate full scale IQ by responding well

on performance WISC tasks.

Relative to the educational implications of the above research,

further investigations should be directed toward delineating the possible

significance of differences in WISC verbal and performance IQ scores and

toward defining the facets of intelligence that the verbal tests measure.

E. IQ and Reading Deficit

The most surprising finding in this study was the degree to which IQ

did not correlate with reading deficit.

Correlations of reading deficit with verbal, performance, and full

scale IQ were low and nonsignificant for Group I, ages 7.6 to 10.5 inclu-

sive, which leads this investigator again to the conclusion that the

WISC probably is of little dianostic value in early identification of reading disability.

In both Groups II and III verbal IQ did not correlate highly with reading deficit. However, reading deficit correlated highly (.6 or above at the .001 level of confidence) with performance and full scale IQ in both groups. Stated differently, in these groups poor readers had neither high nor low verbal IQ whereas their performance and full scale IQs were high in relation to their reading disability.

Recalling that only subjects with adequate IQ were included in this study, one explanation for the above might be that these students possessed sufficient general intelligence that they were able to lean more heavily on performance tasks by this stage of development when they were experiencing real difficulties with verbal tasks. Possibly they were able to deal most effectively with their total environment in this way although such an adjustment did not serve them will in the academic setting.

Another explanation for the reported dichotomy in IQ and reading deficit might be that this study included a large number of disadvantaged subjects rather than truly LLD subjects. The Seattle LLD Department's eligibility requirement stated that the primary cause of the student's learning disorder is not mental retardation, sensory deprivation, cultural, or instructional factors. In spite of this, this researcher felt that at least sensory deprivation and cultural factors could have been contributing causes if not root causes of reading deficiency for many subjects tested during this research. According to Dechant,[83] a disadvantaged reader tends to have reading achievement substantially below his ability level. This might account for reading deficits far more severe than IQs would indicate.

Dechant[84] also points out that research indicates that the great majority of poor readers have IQs between 80 and 100 and that frequently

the most severely retarded readers in relation to their mental age have
IQs of 130 or more. All this should tend to make educators extremely
wary of predicting reading success or disability from IQ scores.

X. Summary

Based on this present research the following observations were made.
Seattle LLD students did show a group pattern of low Inf, Arith, DS,
and Cod; but the pattern did not hold true for individual cases. The
WISC subtest pattern did not vary with degree of underachievement. WISC
verbal IQ might be a differentiating factor in diagnosing reading defi-
ciency for older children, but the WISC verbal, performance, and full
scale IQ scores were poor predictors of reading deficiency for younger
subjects. WISC full scale IQ correlated negatively with reading deficit
and was apparently a poor measure of reading success. A truly LLD child
would appear to have a more complex problem than can be reflected by mere
testing of IQ.

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I. FUNCTIONAL DEFINITIONS

A. <u>Name of Handicapping Condition</u>   Learning Language Disabilities

B. <u>Definition (approximately 5 sentences)</u>   Learning Language Disability children are unable to learn adequately in regular classrooms, have normal intelligence, test average or above in potential academic functioning level, and do not have any acute manifestations of physical and/or neurological impairment. They do have serious communication disorders, which give rise to severe limitations in the reception and/or integration and/or expression of spoken and written symbols. There is a signi-ficant difference bet.   actual reading and achievement level and functional capacity based upon an individual assessment of individual abilities.

C. <u>Eligibility Criteria (approximately 5 sentences)</u>   To be eligible, pupils will evidence an average academic functioning potential with a learning disorder in one or more of the processes of speech or language. The child also will exhibit deficits in sensory motor integration.

D. <u>Suggested methods of data collection and analysis (refer to eligibility criteria)</u>
The child will function at least in the normal intelligence range on the Wechsler Intelligence Scale;
The child will evidence a deficit in the visual and/or auditory modality on the Boder Reading and Spelling Test;
Visual motor integration age will be determined by administering such tests as Beery-Bukentica, Bender Gestalt, or the Winter Haven;
One of several standardized reading tests will be used to determine whether the total readiness or reading skills are significantly below reading expectancy (in order to determine the difference be-tween expected and potential reading and achievement, refer to models such as the following: Bond-Tinker, W.R.A.T. **);
If the need is indicated, a test for auditory discrimination and/or auditory acuity and/or visual acuity will be given.

** Bibliography to follow

Note: The Seattle Public Schools Specific Learning Disability Program Preliminary Handbook is currently under revision. Also the name of the program has been changed to Learning Language Disability. This sample page will be included in the revised handbook.