ED 063 575	24	CS 000 003

AUTHOR	Dietrich, Coralie
TITLE	Changes in Reading Achievement, Perceptual Motor Ability, and Behavior Adjustment as a Function of Perceptual Motor Training and Individualized Remedial Reading Instruction. Final Report.
INSTITUTION	Wisconsin Univ., Stevens Point. Dept. of Psychology.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-0-E-104
PUB DATE	Feb 72
GRANT	OEG-5-70-0035
NOTE	89p.

EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Behavior Change; Correlation; Elementary School Students; *Individualized Instruction; *Perceptual Motor Learning; *Reading Achievement; *Reading Instruction; Reading Research; *Remedial Reading

ABSTRACT

Forty-four 7-11 year-old subjects with normal to high IQ's but who fell in the lower half of their respective age groups in reading were studied to determine the relative effectiveness of perceptual motor training (PMT) and individualized remedial reading instruction (IRRI) upon the reading achievement, perceptual motor development, and behavior adjustment of children with reading problems. Other objectives included an examination of transfer effects of perceptual motor training on reading achievement, an analysis of characteristics of children likely to experience success under a given treatment, and an analysis of the relationships among the variables studied. Ranked by age and reading achievement, subjects were randomly assigned to three treatment groups: PMT, IRRI, and general activity (placebo control). Training consisted of five 35-minute sessions per week for six months, and pre- and post-tests were administered. Conclusions derived from an analysis of the data are: (1) PMT did not transfer to reading performance, (2) long term IRRI was more effective than PMT in developing reading achievement and adjustable school behavior. (Included are numerous references and appendices containing the school behavior profile, sample teacher daily logs, and means and standard deviations for all variables.) (Author/RD)

FINAL REPORT
Project No. 0-E-104
Grant No. OEG-5-70-0035

Changes in Reading Achievement, Perceptual Motor Ability,

and Behavior Adjustment as a Function of Perceptual Motor Training

and Individualized Remedial Reading Instruction.

Coralie Dietrich
Psychology Department
University of Wisconsin—Stevens Point
Stevens Point, Wisc. 54481

February, 1972

1

FINAL REPORT

Project No. O-E-104

Grant No. OEG-5-79-0035

Changes in Reading Achievement, Perceptual Motor Ability,

and Behavior Adjustment as a Function of Perceptual Motor Training

and Individualized Pemedial Reading Instruction.

Coralie Dietrich, Principal Investigator
University of Wisconsin-Stevens Point, Department of Psychology
Stevens Point, Wisconsin

Project Staff,
University Laboratory School
University of Wisconsin-Stevens Point

John Pearson, Project and School Coordinator

Keith Campbell and Hildegard Kuse,
Advisors and Coordinators, Reading Program

Angelyn Stielstra,
Advisor and Coordinator, Perceptual Motor Program

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

2

Table of Contents

ii

SUMMARY

The purpose of this study was to determine the relative effectiveness of perceptual motor training and individualized remedial reading instruction on the reading achievement, perceptual motor development, and behavior adjustment of children with reading problems. Additional objectives included an examination of the transfer effects of perceptual motor training on reading achievement, as well as an analysis of characteristics of children likely to experience success under a given treatment and an analysis of the relationships among the variables studied.

The sample consisted of 44 7, 8, 9, 10, and 11 year old children attending a non-graded university laboratory school. The I.Q. range of the group was normal to high and the children were in the lower half of their respective age groups in reading achievement. The subjects were ranked according to age and reading achievement and randomly assigned to one of three treatment groups. The treatment groups consisted of one perceptual motor training group, one individualized remedial reading group, and a general activity group which served as a placebo control. The subjects attended 35 minute training sessions five days a week for a six month period. A pre and post test design was employed. The evaluation instruments used were the Stanford Achievement Tests, the Purdue Perceptual Motor Survey, and the School Behavior Profile. Test statistics used for the analyses of the data were: a multivariate analysis of covariance, a combined variance and regression technique, as well as the Pearson Product Moment correlational analysis.

The analyses of the data revealed that the perceptual motor training group performed below the level of the other two groups on reading achievement and behavior adjustment. Further, no significant gains in perceptual motor ability were found for any treatment group. The reading group attained the highest post test reading score, and both the reading and control groups were significantly superior to the perceptual motor group in behavior adjustment. The regression analysis revealed that age and initial performance level were dominant factors in the success of any treatment.

Finally, the complex interactions of reading, perceptual motor, and behavioral variables found in the regression analysis suggest that the use of simple correlational techniques is a fruitless approach to the analysis of perceptual motor and reading ability relationships.

The main conclusions of the study were that perceptual motor training did not transfer to performance in reading and that of the two experimental methods examined, long term remedial reading is more effective in developing reading achievement and school behavior adjustment.

1

I. INTRODUCTION

The purpose of this project was to investigate the effects of perceptual motor training and remedial reading instruction on children's development in perceptual motor skills, reading achievement, and behavior adjustment. The study was undertaken because of recent interest and controversy surrounding the role of perceptual motor training programs in the school curriculum, (Balow, 1968., Klesius, 1970., Krippner, 1966., Mann, 1970., Robbins & Glass, 1969., Silberberg & Silberberg, 1969.) The controversy centers primarily on the question of the generalization of training in perceptual motor skills to performance in reading. Proponents of perceptual motor training programs maintain that the training develops underlying neurological and sensory-motor organization or integration which is essential to the acquisition of reading skills. Various rationales are presented for different systems of this type of training, but the activities suggested by the various systems are similar in that they involve the use of motoric and non-verbal perceptual training as a means of facilitating reading skill in children (Barsch, 1967., Delacato, 1966., Frostig and Horne, 1964., Getman, 1962., Kephart, 1960).

Unfortunately the limited research material on the problem presents conflicting evidence. Studies supporting the positive effects of perceptual motor training consist primarily of case study material of individual children (Delacato, 1966., Kephart, 1960), group studies failing to employ controls (Benyon, 1968., Delacato, 1963., Dillon, Heath, & Biggs, 1970., Lewis, 1968), or more controlled studies presenting serious problems of confounding of variables by combining perceptual motor training with traditional educational methods (Cruickshank, 1961., Gallagher, 1960., Perry, 1966). On the other hand, the bulk of the controlled research literature indicates that perceptual motor training does not provide transfer to performance in reading (Anderson, 1965., Buckland, 1969., Cohen, 1966., Falik, 1969., Foster, 1965., Emmons, 1968., Jacobs, 1968., O'Donnell & Eisenson, 1969., McBeath, 1966., Robbins, 1966).

In spite of the fact that the more soundly designed studies tend to be negative in regard to the question of the generalization of perceptual motor training to performance in reading, the literature is not completely clear cut on the transfer issue. Some research studies give positive results concerning the effectiveness of perceptual motor training on reading and academic skills in general (Chansky & Taylor, 1964., Godfrey, 1963., Halgren, 1961., Ismail & Gruber, 1967., Kershner, 1968., Lazroe, 1968., McCormick, Poetker, Schnobrich & Footlik, 1968 (a).,

5

McCormick, Schnobrich & Footlik, 1968 (b)., Rutherford, 1966., Silver, Hagin & Hersh, 1967., Simpson, 1968., Tyson, 1963). These studies, however, suffer from the problems of small samples and questionable statistical procedures (Godfrey, 1963., Halgren, 1961., Kershner, 1968., McCormick, Poetker, Schnobrich, & Footlik, 1968 (a)., McCormick, Schnobrich & Footlik, 1968 (b)., Rutherford, 1966., Silver, Hagin & Hersh, 1967., Tyson, 1963) and failure to control for the Hawthorne effect or the simple effect of extra attention given to the experimental groups involved (Chansky & Taylor, 1964., Ismail & Gruber, 1967., Lazroe, 1968., Simpson, 1968). They do, nevertheless, confound the evidence on the transfer question to such an extent that Corrine Kass, a prominent worker in the area of learning disabilities has stated: "No matter how much special educators decry the panaceas which appeal to the parents of children with learning disabilities, it must be admitted that there is not yet enough research information for accepting or rejecting most of these methods." (Kass, 1969, p. 80)

More importantly the research literature revolving around the polemics of the transfer problem does not supply the needs of educators trying to find appropriate differential methods for children with reading problems. For example, there is a tendency to discard the specific positive effects of perceptual motor training on the development of perceptual motor skills, an effect which is no trivial matter for children displaying perceptual motor problems in addition to reading disabilities, and an effect which is fairly well validated in the literature (Cohen, 1966., Cox & Hambly, 1961., Painter, 1966., Rosen, 1966., Stephens, 1970), although there are some negative indications on this point (Alley, 1968., Chasey and Wyrick, 1970., Geddes, 1968., Jacobs, 1968., Robbins, 1966).

In addition while the negative results on the transfer question generally provide a basis for the inference that traditional individualized remedial reading procedures based on the specific problems presented by each child are the most appropiate techniques to be used for children with reading disabilities this assumption has not been tested by a direct comparison of procedures between perceptual motor training and individualized remedial reading instruction.

Further, while the effects of perceptual motor training and cognitive and motor development have received much attention, little systematic investigation has been addressed to the relationship between perceptual motor training and behavior adjustment in children. This area appears to need careful study because of the relationships found between perceptual motor problems and behavior adjustment (Frostig, 1951., Hammond, 1962.,

3

McBeath, 1966., Hirt, 1970) and the use of perceptual motor train-
ing as a means of ego development and basic cognitive organiza-
tion in programs for disturbed children (Hewett, 1968., Rubin,
Simon & Betwee, 1966). Particular problems for investigation in-
clude a controlled examination of the actual behavior adjustment
gains resulting from perceptual motor training itself, and as
compared to another technique such as individualized remedial
reading instruction in which the child is provided with an optimum
learning situation. Of special interest also is the question of
personality patterns and behavior characteristics of children who
are likely to experience gains in behavior adjustment as a result
of perceptual motor training. This last question is of interest
because of the diverse personality patterns and problems in be-
havior adjustment presented by children with perceptual motor and
learning difficulties (Weiner, 1963).

The aim of this study, then, was to provide a controlled com-
parison of the effects of perceptual motor training and individ-
ualized remedial reading instruction on the perceptual motor de-
velopment, reading achievement, and behavior adjustment of read-
ing disability children in order to provide a basis for sound
differential programming for children presenting problems in
these areas. More specific goals included an investigation of
the various components of the abilities being studied, the iden-
tification of characteristics of children likely to experience
success under each treatment condition, and relationships among
the learning problems presented by the subjects. The focus of
the study was the strengths and weaknesses of each method in
relationship to the particular problems presented by a specific
child.

The project then had four objectives:

1. To determine the differential effectiveness of perceptual
    motor training and individualized remedial reading instruc-
    tion on the reading achievement, perceptual motor develop-
    ment, and behavior adjustment of children with reading
    disabilities.

2. To produce a controlled analysis of the transfer effects of
    perceptual motor training on reading achievement.

3. To determine the characteristics of children likely to
    experience gain under the treatment conditions of percep-
    tual motor training and individualized remedial reading
    instruction.

4

7

4. To determine the relationship between perceptual motor problems, reading disabilities, and behavior adjustment.

II. PROCEDURES

Sample

The subjects for the study consisted of 48 7, 8, 9, 10, and 11 year old children attending a non-graded University Laboratory School. The children were selected on the basis of their falling in the lower half of their respective age groups in reading achievement. The mean I.Q. of the group was 116, with a range of 81 to 144. 26 boys and 22 girls were included in the sample. The subjects were ranked according to age and reading achievement and then randomly assigned within levels of age and reading achievement to the experimental and control groups. Four children were withdrawn from the study during the six month experimental period leaving the total number of subjects at 44. To insure that there were were no initial inequalities among the groups, they were compared by means of analyses of variance on age, I.Q., reading achievement, perceptual motor ability, and school behavior adjustment. No significant differences existed among the groups on any of these variables. Initially, however, there was a large, though non-significant difference between one group and the other two groups on behavior adjustment. Randomization was broken, then, to correct this problem and a final analysis of variance run on the variables. Table 1 lists the means, standard deviations, and F ratios on age, I.Q., reading achievement, perceptual motor ability, and school behavior adjustment for the groups at the beginning of the study.

Instruments

Reading achievement was measured by the Stanford Achievement Tests, Reading Sections: Word Meaning, Paragraph Meaning, and Word Study Skills. (Kelly, Madden, Gardener, and Rudman, 1966). The 7 and 8 year old children were administered the Primary II form of the test and the 9, 10, and 11 year olds were given Intermediate I. Form Y was administered in October at the beginning of the study and Form W in April at the conclusion. Perceptual Motor Ability was evaluated by means of the Purdue Perceptual Motor Survey (Roach & Kephart, 1966). For purposes of analysis the twenty-two subtests of the Purdue Perceptual Motor Survey were combined into six ability areas suggested by Roach and Kephart (1966): Laterality, Directionality, Perceptual Motor Match, Balance, Physical Fitness, and Form Perception. Behavior Adjustment was measured by means of the School Behavior Profile, an

Table 1

Analysis of Pretest Scores on Main Variables

TREATMENTS

	Perceptual Motor $\bar{X}$	SD	Reading $\bar{X}$	SD	Placebo Control $\bar{X}$	SD	$\underline{F}$
Stanford Reading	82.69	31.21	82.07	37.89	84.20	34.29	.0152 NS
Purdue	72.75	7.22	71.40	7.36	73.27	4.76	.3239 NS
School Behavior Profile	34.25	24.38	39.60	20.11	40.20	23.61	.3225 NS
I.Q.	114.00	15.88	120.40	12.67	113.27	12.20	1.2339 NS
Age (Months)	119.94	14.81	113.20	19.55	116.80	14.56	.6561 NS

experimental rating scale on which the classroom teacher rates a child's behavior in five areas: General Characteristics, Language and Thought, Intrapersonal Behavior, Interpersonal Behavior, and Problem Behavior. The School Behavior Profile is contained in Appendix A.

Treatments

The three treatment conditions consisted of two experimental classes: Reading and Perceptual Motor, and one Placebo control. The classes were divided into two instructional groups. Group I for each condition consisted of 9, 10, & 11 year olds and Group II of 7 and 8 year olds. The classes met daily for 35 minute periods during the five day school week from October to April. One teacher and one teacher's aide conducted each instructional group, and the teachers and aides were changed to a different treatment group every two months in order to control for the effect of teacher personality and teaching style on the treatment variables.

Before the experimental classes were begun the teachers in each group designed an individual program for each child based on diagnostic information provided by the pre test data and the children's classroom teachers. Diagnosis and evaluation were continued throughout the project through conferences between the project teachers, classroom teachers, and a learning disabilities specialist attached to the school's faculty. Weekly evaluation sessions were also held with the teacher and aide of each treatment condition and the principal investigator.

The reading treatment condition consisted of a balanced program of word structural analysis, comprehension, and vocabulary development with special stress on each child's particular areas of difficulty. The primary level children displayed major problems in the areas of beginning word attack skills and elementary comprehension skills, and the curriculum for this group emphasized these abilities. In the intermediate group of 9, 10, and 11 year old children remedial work in grade 1 to 3 word analysis skills, advanced inference, judgement, and thinking skills were emphasized.

Activities and materials for the reading group included the SRA Reading Laboratory, teacher made and commercial reading games such as Quizmo, Concentration, Probe, crossword puzzles, library books, poems, plays, and limericks. Skill worksheets and teacher and student made stories were also used.

The Perceptual Motor Treatment consisted of a balanced pro-

7

gram of perceptual motor skills with special emphasis placed on
the deficit areas for individual children. For the instruction-
al group containing the primary level children the abilities of
laterality, directionality, and form perception were stressed,
while balance and perceptual motor match were emphasized for
the older group. The specific areas of emphasis for each group
were determined by the predominate needs of the children in each
class.

Major materials and activities for this condition included
walking board, balance beam, trampoline and chalkboard activi-
ties, stunts, geometric design work with parquetry blocks,
cubes, and peg boards, together with the Frostig-Horne Visual
Perception Program materials, tachistoscopic and auditory train-
ing activities. All visual and auditory training stimuli used
in this condition were non-verbal.

The Placebo control groups' curriculum consisted of a
series of activity units such as "Holidays," "Crafts," and
"Good Sportmanship." Reading and perceptual motor activities
were minimized in this group, and when it was necessary to in-
volve these abilities the time spent in each of these skill areas
was balanced. For example, for every lesson involving art work
where perceptual motor was most pronounced a reading related
activity was used. The reading and perceptual motor activities
that were included in this condition were of a relatively inci-
dental nature and quite different from the carefully programmed
activities in these areas in the other two experimental groups.
Films were also used extensively in these classes and an emphasis
was placed on creative motivating activities for this group.

III. RESULTS

The analysis of the data was divided in three sections.
First a multivariate analysis of covariance was conducted to
determine both treatment and age effects. Second, a descriptive
analysis involving regression procedures combined with a binary
splitting technique of variables based on the residual sums of
squares (Stover, 1971) was conducted in order to determine the
characteristics of children who experienced success under each
treatment. Third, correlation coefficients were computed to
determine the relationship among all the variables in the pop-
ulation of this study.

Multivariate Analysis of Covariance

Two 2-way multivariate analyses of covariance were con-

ducted on the post test scores using I.Q. and the pretest scores as covariates. The factors were treatments and age. The two-way model involving the age factor was used because of the importance of age as a variable in the success of perceptual motor training programs (O'Donnell & Eisenson, 1969., Roach, 1966). There were three treatment conditions and two levels of age, 90 to 119 months and 120 to 142 months. The first analysis was conducted on the 14 subtest variables. These included 3 for reading: Word Meaning, Paragraph Meaning, and Word Study Skills: 6 for perceptual motor ability: Laterality, Directionality, Perceptual Motor Match, Balance, Physical Fitness, and Form Perception; and 5 for behavior adjustment: General Characteristics, Language and Thought, Intrapersonal Behavior, Problem Behavior, and Interpersonal Behavior. The second analysis was conducted on the Reading, Perceptual Motor, and Behavior Adjustment total scores.

The analysis across treatment conditions revealed significant differences among the treatments on the behavior adjustment variables. Probability levels below the .05 level were attained for Language and Thought and Interpersonal Behavior. Borderline significance was reached for Total Behavior Adjustment, General Characteristics, and Intrapersonal Behavior. Table 2 presents the post test means and p values for the F ratios for the treatment conditions on these variables. Scheffe' contrasts revealed that the perceptual motor treatment was associated with poorer performance in each behavior adjustment area except Intrapersonal Behavior. The higher mean scores of this group listed in table 2 indicate a higher rate of problem behaviors in this area. The confidence intervals in the Scheffe' Contrasts involving the perceptual motor group in comparison with the reading and control groups had p values of .01 for Language and Thought and General Characteristics, and .05 for Total Behavior Adjustment and Interpersonal Behavior. There were no significant differences between the reading and control groups on these variables. The mean of these two groups shown in table 2, however, suggest that superior performance in Total Behavior Adjustment, General Characteristics, and Language and Thought was associated with the reading condition. The control group demonstrated the lowest behavior adjustment problem scores in the areas of Interpersonal Behavior as well as Intrapersonal Behavior.

No significant differences were found among the treatments for the perceptual motor or reading variables. The pre and post test Perceptual Motor Total mean scores shown in table 3 indicate little change in any group's performance as a function of treatment condition. The three treatment conditions did show mean differences in Total Reading scores. The reading treatment had the highest post test mean, followed by the control group. The perceptual motor training group had the lowest mean post test

9

Table 2

Treatment Differences Significant at the
.10 Level and Below

Variable	Group Post Test Means			p <
	Perceptual Motor	Reading	Control	
Language & Thought	8.75	7.14	8.14	.02
Interpersonal Behavior	10.63	9.64	9.43	.03
General Characteristics	10.31	8.14	9.64	.10
Intrapersonal Behavior	6.13	6.64	5.93	.08
Behavior Total	41.63	36.64	38.36	.09

Table 3

Pre and Post Test Means and Standard Deviations for
Perceptual Motor Total Score

Test	Treatment Group					
	Perceptual Motor		Reading		Control	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Pre	72.13	7.17	72.14	7.05	73.21	4.93
Post	71.69	4.30	72.36	5.86	71.50	5.01

Table 4

Pre and Post Test Means and Standard Deviations for
Reading Total Score

Test	Treatment Group					
	Perceptual Motor		Reading		Control	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Pre	83.69	20.14	85.79	36.62	87.50	30.62
Post	93.25	21.13	101.21	26.37	96.29	20.95

11

total reading score. The pre and post test Total Reading score
means for each condition are listed in table 4, and appendix C
contains the pre and post test means and standard deviations
for all variables.

The treatment conditions, then, produced their main effects
on the behavior adjustment variables. The analysis of age
differences revealed that this variable also had a strong ef-
fect on behavior adjustment. As indicated in table 5, signif-
icant differences between the age groups were found on Total
Behavior adjustment, and the subtest areas of General Charac-
teristics, Language and Thought, Problem Behavior, Interpersonal and Intra-
personal Behavior. The differences between age groups on this
last subtest reached only borderline significance. Age
differences were also significant for the reading comprehon-
sion variable of Paragraph Meaning., and borderline signifi-
cance was attained for the Perceptual Motor Match subtest. In
each case the older children (120-142 months) were superior
to the younger children (90-119 months). The variable of
age, then, showed a strong effect on the behavior adjustment
variables and reading comprehension, and demonstrated some
slight effect on Perceptual Motor Matching ability.

In the age x treatment analysis significant differences
were found in only two instances and these occurred at a
borderline level. First, as indicated in table 6, an age x
treatment interaction significant at the .09 level was attain-
ed for the reading comprehension variable of Paragraph Meaning.
The older children were superior in all treatments, but as table
6 and figure 1 indicate the greatest differences existed
between the older and younger children in the reading group.
The older children in this group demonstrated the greatest
superiority in reading comprehension; Scheffe' Contrasts re-
vealed that these differences were significantly higher than
those of the other two groups at the .05 level. No signifi-
cant differences existed between the perpetual motor and con-
trol groups in Paragraph Meaning. The older children who were
given specific training in reading, then, performed best on
reading comprehension.

A second age x treatment interaction approached signi-
ficance at the .06 level on the perceptual motor variable of
Physical Fitness. As shown in table 6 and figure 2, the
older children in all treatments performed equally well.
There was no difference between the older and younger chil-
dren in the placebo control group, younger children
in the perceptual motor training group were superior to those
in the reading group, but did not surpass the performance of

12

Table 5

Age Differences Significant at
the .10 Level and Below

Variable	Group Post Test Means		p <
	Older Children (122–140 mos.)	Younger Children (90–121 mos.)	
Paragraph Meaning	37.91	30.64	.001
General Characteristics	5.00	13.82	.03
Language & Thought	5.59	10.50	.01
Problem Behavior	3.59	7.18	.02
Interpersonal Behavior	6.32	13.55	.0001
Behavior Total	24.23	53.77	.0001
Intrapersonal Behavior	3.73	8.73	.06
Perceptual Motor Match	27.91	27.31	.08

13

Table 6

Treatment x Age Interactions Significant at the
.10 Level and Below

Variable		Group Post Test Means			p
	Age	Treatment Group			
		Perceptual Motor	Reading	Control	
Paragraph Meaning	Older 122– 140 mos.	34.78	44.00	36.71	
					.09
	Younger 90– 121 mos.	32.86	26.88	32.71	
Physical Fitness	Older 122– 140 mos.	4.00	4.00	4.00	
					.06
	Younger 90– 121 mos.	3.85	3.75	4.00	

14

Figure 1

Age x Treatment Interaction
for Reading Sub-test,
Paragraph Meaning
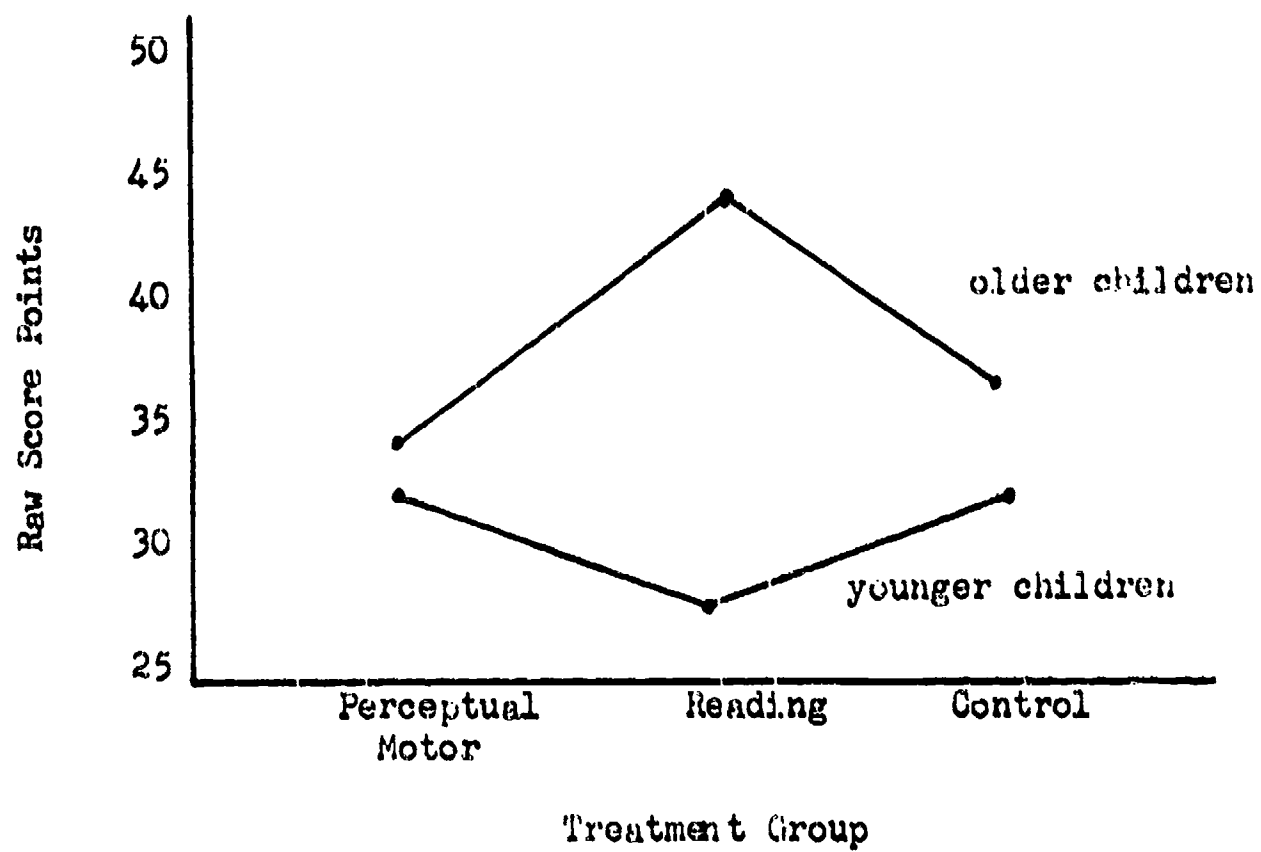
Figure 2

Age x Treatment Interaction for
Perceptual Motor Sub-Test,
Physical Fitness
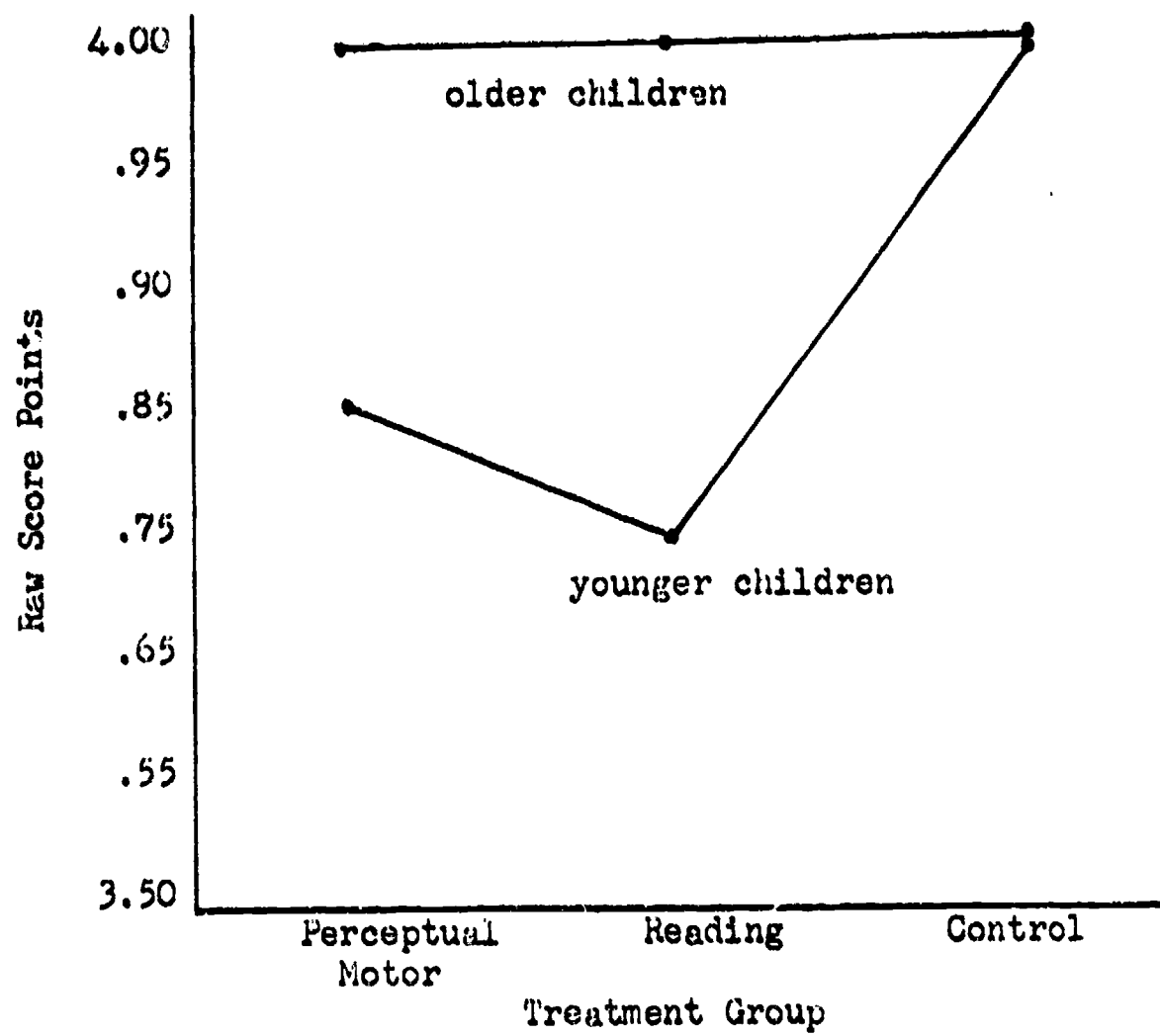
the younger children in the control group. Scheffe' Contrasts
revealed that the age differences within each treatment group
were different from the others at the .10 level. Some caution
should be observed in regard to the treatment x age interaction
results because the differences among the groups were very
small, due largely to the fact that most of the subjects
attained ceiling on the 4 point rating scale for this variable.
However, the Physical Fitness subtest is the most objective
and easily scored item on the Purdue Perceptual Motor Survey,
and is one of the most sensitive to small differences in ability
levels.

The total multivariate analyses revealed, then, that treat-
ment conditions produced significant differences in the school
behavior adjustment of the subjects. The perceptual motor
treatment was associated with poorest performance in this area,
and placement in either the reading or control groups was
associated with superior performance. No differences were
found among the treatment conditions for perceptual motor
ability. Mean differences existed between the groups on
Total Reading scores with the highest mean occurring in the reading
treatment group, the next highest in the control group, and
the lowest in the perceptual motor group. These differences,
however, did not approach significance. Age differences were
found to have a strong effect on the behavior adjustment
variables as well as reading comprehension. Age differences
were also a factor in Perceptual Motor Matching ability. In
each case the higher age levels demonstrated better perfor-
mance. The treatment x age interactions indicated that first,
older children who receive specific reading instruction per-
form better in reading comprehension than any other age and
treatment combination. Secondly, the age x treatment inter-
action of the Physical Fitness variable suggested that older
children under any treatment condition do equally well in
this area. For younger children, however, the placebo control
conditions were associated with the best performance followed
by the conditions of the perceptual motor group and the read-
ing group.

Automatic Interaction Detector Analysis

The Automatic Interaction Detector Analysis used in this
section of the analysis is a computer program designed to
explain the interrelationships among large sets of variables.
One of the variables is treated as the dependent variable.
The program uses a nonsymmetric branching technique based on
variance analysis methods. By means of a series of binary

17

splits, sets of mutually exclusive subgroups of independent variables are derived with the purpose of explaining the variance of the dependent variable. Out of the total number of groups a set of final subgroups are chosen so that their means account for more of the total sum of squares than the means of any other equal number of the subgroups. The program provides a description of which variables are related to the dependent variable under what conditions and in which combinations. Its use in this project was first, to identify precisely as possible the characteristics of children who experienced success under any particular treatment condition. Second, the program was used to determine the nature of the complex etiological factors involved in problems displayed by children on the abilities represented by the main outcome measures.

For this study twelve runs of the AID II program were made. Three analyses each were completed for each of the three treatment groups. For each group one analysis was conducted using the Reading Total post test scores as the criterion variable, one using the Perceptual Motor Total post test scores and one using the Behavior Total post test scores as the dependent variable. Three more analyses were conducted on the total sample of 44 children using the reading, perceptual motor and behavior total post test scores as dependent variables. Twenty predictor variables were used, age, IQ, sex and the 17 pre test reading, perceptual motor and behavioral variables described above. For the last three analyses the additional predictor variable of experimental group was added, making a total of 21 variables.

Perceptual Motor Group

For the perceptual motor training group six final subgroups accounted for 95.80 % of the variance of the post test Reading Total scores (see table 7 and figure 3). Pre test characteristics associated with outcome scores above the total group mean of 96.75 were Word Meaning, IQ, and Balance. High Word Meaning and high IQ scores were associated with high reading total scores and Balance was inversely related to reading success. Less successful outcome scores were associated with various combinations of low performance in reading skills and lower IQ scores.

For this same training group five final subgroups accounted for 85.03 % of the variance of post test total perceptual motor performance (see table 8 and figure 4). Initial level of Total Perceptual Motor ability distinguished the least successful and most successful performance in the area of perceptual motor ability itself. Most successful children in the perceptual motor area were characterized by proficiency in both Perceptual Motor Total ability and Word Meaning. Less successful children displayed poorer performance in Word Meaning. IQ was inversely related to post test perceptual motor performance, but high Problem Behavior ratings were associated with poorer perceptual motor performance than were low ratings.

18

Table 7

AID Analysis, Perceptual Motor Training Group, $\overline{Y}$ = Reading Total

Group	Type	N	Mean Post Test Reading Total Score	SD
8	Word Meaning – High, IQ – High, Balance – Low	2	129.00	6.00
9	Word Meaning – High, IQ – High, Balance – High	4	109.50	3.36
7	Word Meaning – Low, Word Study Skills – High	2	93.00	6.00
4	Word Meaning – High, IQ – Low	1	84.00	.00
10	Word Meaning – Very Low, Word Study Skills – Low	2	79.50	1.50
11	Word Meaning – Low Average, Word Study Skills – Low	5	70.20	4.50

Figure 3

Subgroups of Binary Splits - Perceptual Motor Group - $\bar{Y}$ = Reading Total Score

Table 8

... Analysis, Perceptual Motor Training Group, $\bar{Y}$ = Perceptual Motor Total

Group	Type		Mean Post Test Perceptual Motor Total	
		N	Score	SD
5	Perceptual Motor Total — High, Word Meaning — High	3	76.66	3.38
6	Perceptual Motor Total — High, Word Meaning — Low, IQ — Low	2	74.00	.00
8	Perceptual Motor Total — High, Word Meaning — Low, IQ — High, Problem Behavior — Low	5	70.80	.98
9	Perceptual Motor Total — High, Word Meaning — Low, IQ — High, Problem Behavior — High	4	69.00	1.00
2	Perceptual Motor Total — Low	2	63.00	1.00

Figure 4

Subgroups of Binary Splits - Perceptual Motor Group - $\overline{Y}$ = Perceptual Motor Total Group

(1) Total Sample
N = 16
$\overline{Y}$ = 71.69

(2) Perceptual Motor Total
Scores = 62
N = 2
$\overline{Y}$ = 63.00 *

(3) Perceptual Motor Total
Scores = 64.82
N = 14
$\overline{Y}$ = 72.30

(4) Word Meaning
Scores = 10-25
N = 11
$\overline{Y}$ = 70.72

(5) Word Meaning
Scores = 26-29
N = 3
$\overline{Y}$ = 76.66 *

(6) IQ
Scores = 91-98
N = 2
$\overline{Y}$ = 74.00 *

(7) IQ
Scores = 102-144
N = 9
$\overline{Y}$ = 70.00

(8) Problem Behavior
Scores = 0-2
N = 5
$\overline{Y}$ = 70.80 *

(9) Problem Behavior
Scores = 4-14
N = 4
$\overline{Y}$ = 69.00 *

25
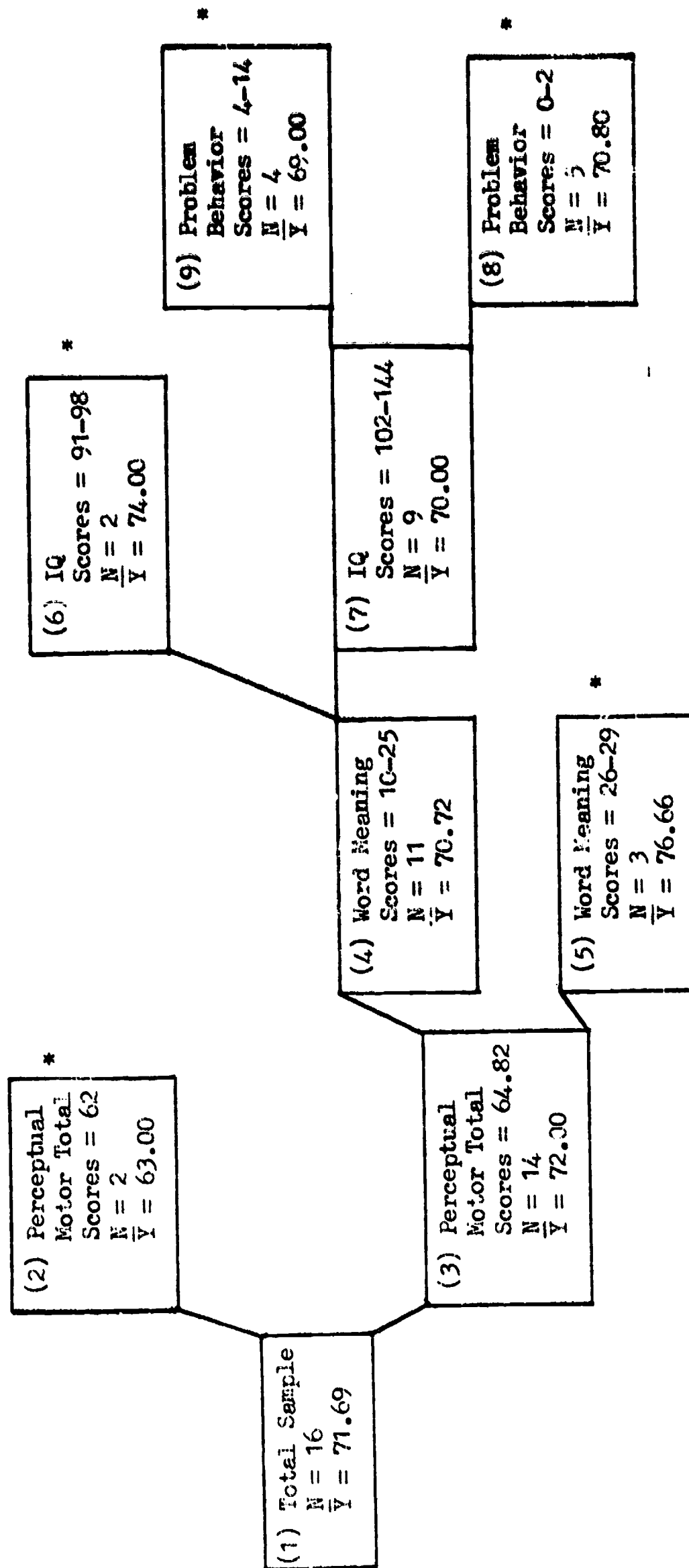
The subgroup involving the lowest criterion score of 63 is of special interest because the score value is the only one below the score of 65, the cut off point identified by Roach and Kephart (1966) as an indicator of learning problems serious enough for perceptual motor therapy. The only predictor for this score level was low initial perceptual motor performance itself.

On school Behavior Total post test performance for the perceptual motor training condition four subgroups accounted for 93.39 % of the variance (see table 9 and figure 5). Age discriminated the two upper and lower subgroups. The older children (120-142 mos.) had total behavior problem ratings below the group mean of 39.00, while the younger children (95-117 mos.) had behavior problem ratings above the mean. Intrapersonal behavior was also a factor in the upper two predictive groups. Older children who were viewed by their teachers as having few problems in relating to other people performed best in the total behavior area. Older children demonstrating more problems in Intrapersonal behavior were less successful, but still maintained performance below the mean of the group. For the lower age groups Word Meaning was an important predictive factor, but for the younger children this variable was inversely related to post test school behavior performance.

Reading Group

Four subgroups accounted for 93.39 % of the variance of Reading Total post test performance for the reading training condition (see table 10 and figure 6). Word Study Skills was the main variable distinguishing the successful from non-successful groups. Children with higher initial Word Study Skills comprised the upper two groups with post test reading scores above the mean of 96.75 for the total three experimental groups. Lower initial Word Study Skills on the other hand, was predictive of post test performance below the mean. For the upper two groups Word Meaning was also an important factor. Higher initial scores on this subtest were associated with better post test reading performance than were low scores. In the lower subgroups Laterality was an important predictor variable. High Laterality scores were associated with higher post test reading level than low Laterality scores. High Laterality, however, was associated with post test reading performance 10 points below the group mean of 96.75. These results are the reverse of those for the perceptual motor training groups, where the perceptual motor variable of balance was inversely related to successful reading performance.

Perceptual-motor performance for the reading group was predicted by four final subgroups also, (see table 11 and figure 7). Paragraph Meaning and Perceptual Motor Match accounted for 83.88 % of the variance of post test percep-

23

Table 9

AID Analysis, Perceptual Motor Training Group, $\overline{Y}$ = Behavior Total

Group	Type	N	Mean Post Test Behavior Total Score	SD
6	Age - High, Intrapersonal Behavior - Low	4	6.00	4.48
7	Age - High, Intrapersonal Behavior - High	5	31.20	6.40
4	Age - Low, Word Meaning - Low	4	48.00	11.68
5	Age - Low, Word Meaning - High	3	89.32	5.00

Figure 5

Subgroups of Binary Splits - Perceptual Motor Group - $\overline{Y}$ = Behavior Total Score

(1) Total Sample
N = 16
$\overline{Y}$ = 41.63

(2) Age
65-117 mos.
N = 7
$\overline{Y}$ = 65.72

(3) Age
120-142 mos.
N = 9
$\overline{Y}$ = 20.00

(4) Word Meaning
Scores = 9-14
N = 4
$\overline{Y}$ = 48.00
*

(5) Word Meaning
Scores = 18-23
N = 3
$\overline{Y}$ = 89.32
*

(6) Intrapersonal
Behavior
Scores = 0-1
N = 4
$\overline{Y}$ = 6.00
*

(7) Intrapersonal
Behavior
Scores = 3-10
N = 5
$\overline{Y}$ = 31.20
*
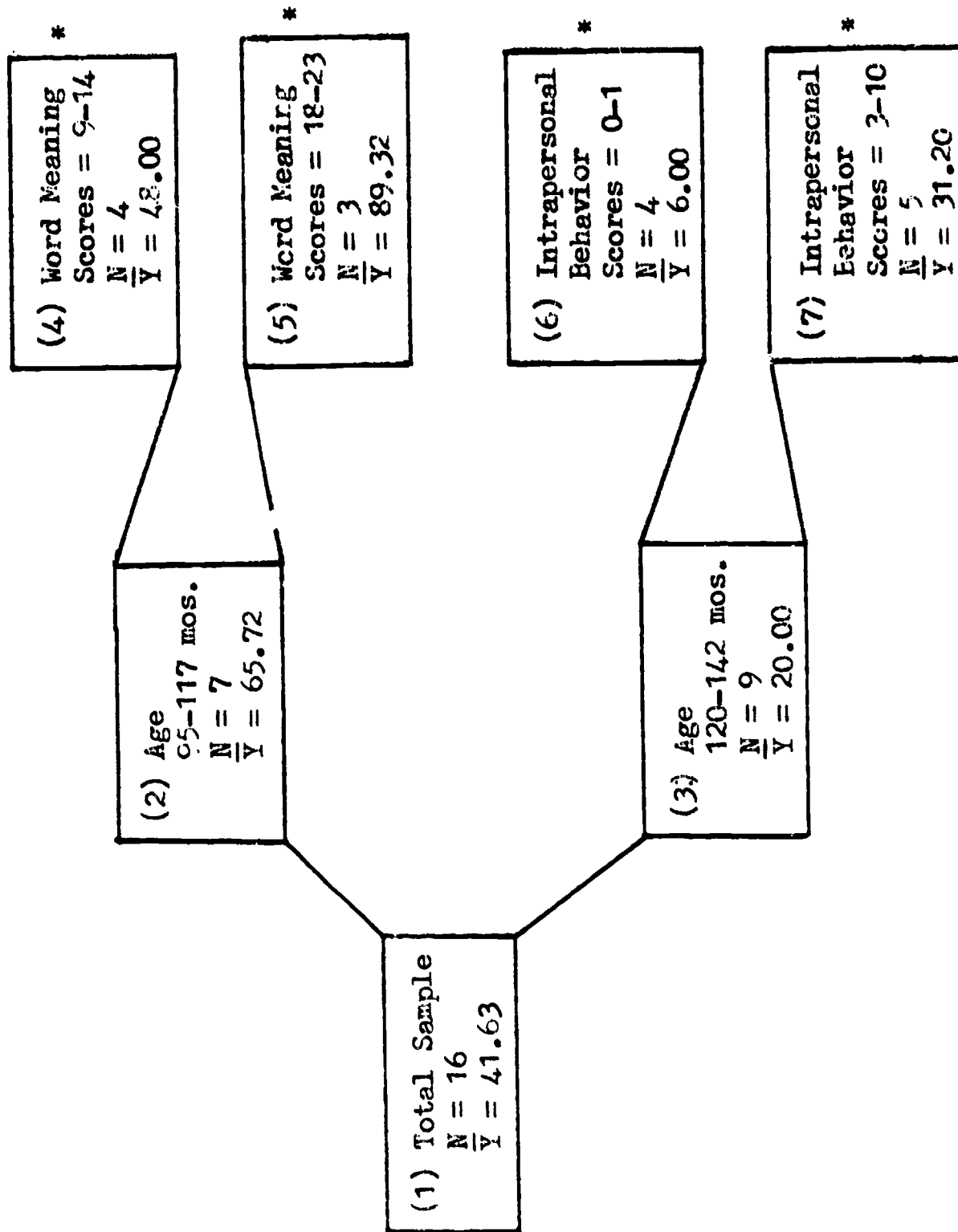
Table 10

AID Analysis, Reading Training Group, $\overline{Y}$ = Reading Total

Group	Type	N	Mean Post Test Behavior Total Score	SD
7	Word Study Skills - High, Word Meaning - High	3	134.01	5.10
6	Word Study Skills - High, Word Meaning - Low	4	115.50	8.07
5	Word Study Skills - Low, Laterality - High	4	84.75	5.37
4	Word Study Skills - Low, Laterality - Low	3	65.01	7.86

Figure 6

Subgroups of Binary Splits – Reading Group – $\bar{Y}$ = Reading Total Score


```
(1) Total Sample
    N = 14
    Ȳ = 101.21

(2) Word Study
    Skills
    Scores = 23-32
    N = 7
    Ȳ = 76.29

(3) Word Study
    Skills
    Scores = 37-56
    N = 7
    Ȳ = 123.42

(4) Laterality          *
    Scores = 4-5
    N = 3
    Ȳ = 65.01

(5) Laterality          *
    Scores = 6-7
    N = 4
    Ȳ = 84.75

(6) Word Meaning        *
    Scores = 16-31
    N = 4
    Ȳ = 115.50

(7) Word Meaning        *
    Scores = 33-34
    N = 3
    Ȳ = 124.01
```
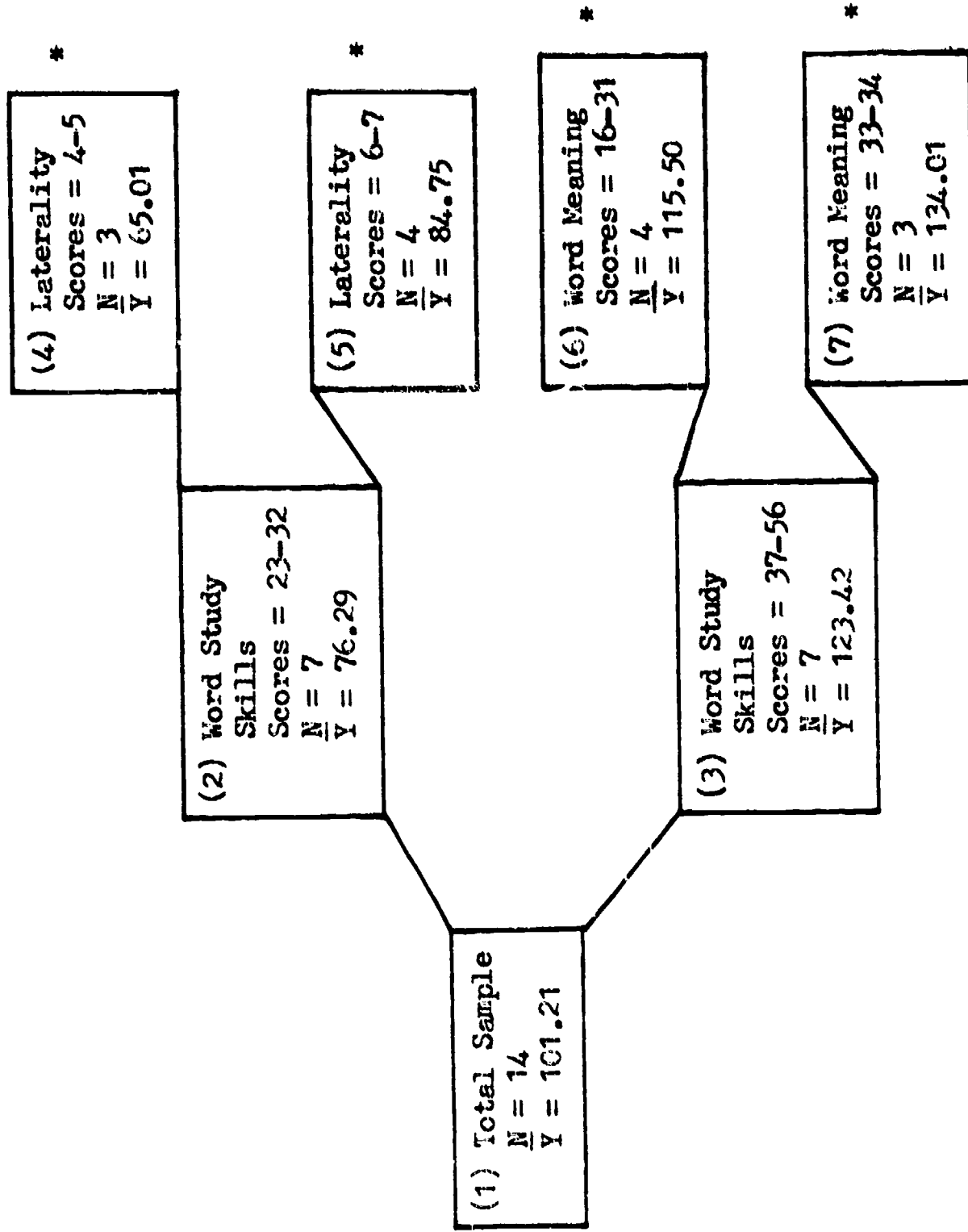
Table 11

AID Analysis, Reading Training Group, $\bar{Y}$ = Perceptual Motor Total

Group	Type	Mean Post Test Perceptual Motor		
		$\bar{X}$	Total Score	SD
5	Paragraph Meaning – High, Perceptual Motor Match – High	4	77.00	1.74
6	Paragraph Meaning – High, Perceptual Motor Match – Low	5	76.00	.00
7	Paragraph Meaning – High, Perceptual Motor Match – Average	5	73.20	1.00
2	Paragraph Meaning – Low	4	64.00	3.74

Figure 7

Subgroups of Binary Splits - Reading Group - $\bar{Y}$ = Perceptual Motor Total Score

(1) Total Sample
N = 14
$\bar{Y}$ = 72.36

(2) Paragraph
Meaning
Scores = 9-15
N = 4
$\bar{Y}$ = 64.00 *

(3) Paragraph
Meaning
Scores = 18-53
N = 10
$\bar{Y}$ = 75.00

(4) Perceptual
Motor Match
Scores = 27-31
N = 6
$\bar{Y}$ = 73.66

(5) Perceptual
Motor Match
Scores = 33-34
N = 4
$\bar{Y}$ = 77.00 *

(6) Perceptual
Motor Match
Score = 27
N = 1
$\bar{Y}$ = 76.00 *

(7) Perceptual
Motor Match
Scores = 28-31
N = 5
$\bar{Y}$ = 73.20 *
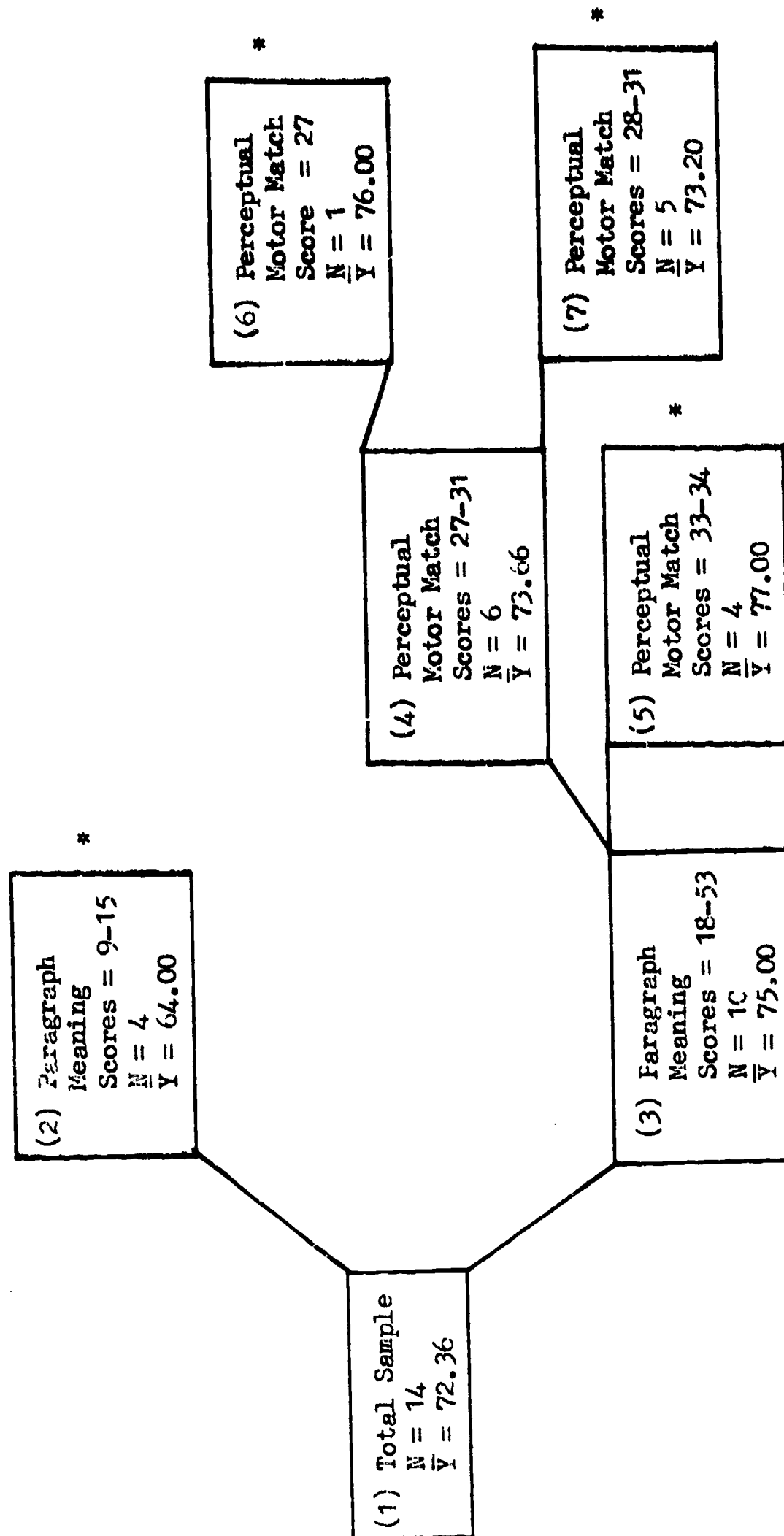
tual motor performance. The analysis for this group reveal-
ed the interesting finding that the reading comprehension
variable of Paragraph Meaning was a major predictor for post
test Total Perceptual Motor performance. High scores on
Paragraph Meaning were associated with post test perceptual
motor performance above the total group mean of 71.84. On
the other hand lower performance on Paragraph Meaning was
the sole predictor of Perceptual Motor performance below the mean. The
criterion variable of this low group was a score of 64, a
score that coincides with Roach's and Kephart's region of
learning problem performance. For the remaining upper levels
the variable of Perceptual Motor Match combined with Para-
graph Meaning as a major predictor.

School Behavior Total performance for the reading group
was associated with four subgroups (see table 12 and figure
8). General Characteristics, Laterality, and Age accounted
for 94.43 % of the variance of Behavior post test performance.
The behavioral variable of General Characteristics was the
main discriminant between the successful and non-successful
performance. Children having low initial problem ratings
on this variable had post test scores below the mean of
39.00 on post test school problem behavior. Children with
high pre test ratings on General Characteristics scored
above the mean. For the top three successful groups, Lat-
erality and Age also had important predictive functions.

Laterality was inversely related to good post test school
behavior performance. Children exhibiting lower initial
scores on Laterality had few post test problem behavior
ratings while the children with high Laterality scores dis-
played higher behavior problem ratings. Age followed the
trend found in the perceptual motor training group. Older
children (114-142 mos.) had lower post test behavior prob-
lem ratings than the younger children (90-91 mos.).

Control Group

Four subgroups accounted for 91.53 % of the variance in
the post test reading performance of the control group (see
table 13 and figure 9). Paragraph Meaning was the main
variable which distinguished the successful and unsuccessful
groups in reading. High initial scorers on Paragraph Mean-
ing comprised the top two groups having post test scores
above the total sample mean of 96.75. Children with lower
scores on this variable comprised the bottom groups in post
test reading performance. For the successful children Word
Study Skills was also an important variable. Children with

30

Table 12

AID Analysis, Reading Training Group, $\overline{Y}$ = Behavior Total

Group	Type	N	Mean Post Test Behavior Total Score	SD
4	General Characteristics - Low, Laterality - Low	2	18.00	2.00
7	General Characteristics - Low, Laterality - High, Age - High	7	29.16	2.80
6	General Characteristics - Low, Laterality - High, Age - Low	2	36.00	.00
3	General Characteristics - High	3	60.00	5.64

34

Figure 8

Subgroups of Binary Splits - Reading Group - $\overline{Y}$ = Behavior Total Score

(1) Total Sample
N = 14
$\overline{Y}$ = 36.64

(2) General
Characteristics
Score = 0-15
N = 11
$\overline{Y}$ = 28.36

(3) General
Characteristics
Scores = 16-24
N = 3
$\overline{Y}$ = 60.00 *

(4) Laterality
Scores = 5
N = 2
$\overline{Y}$ = 18.00 *

(5) Laterality
Scores = 6-8
N = 9
$\overline{Y}$ = 30.68

(6) Age
90-91 mos.
N = 2
$\overline{Y}$ = 36.00 *

(7) Age
114-142 mos.
N = 7
$\overline{Y}$ = 29.16 *
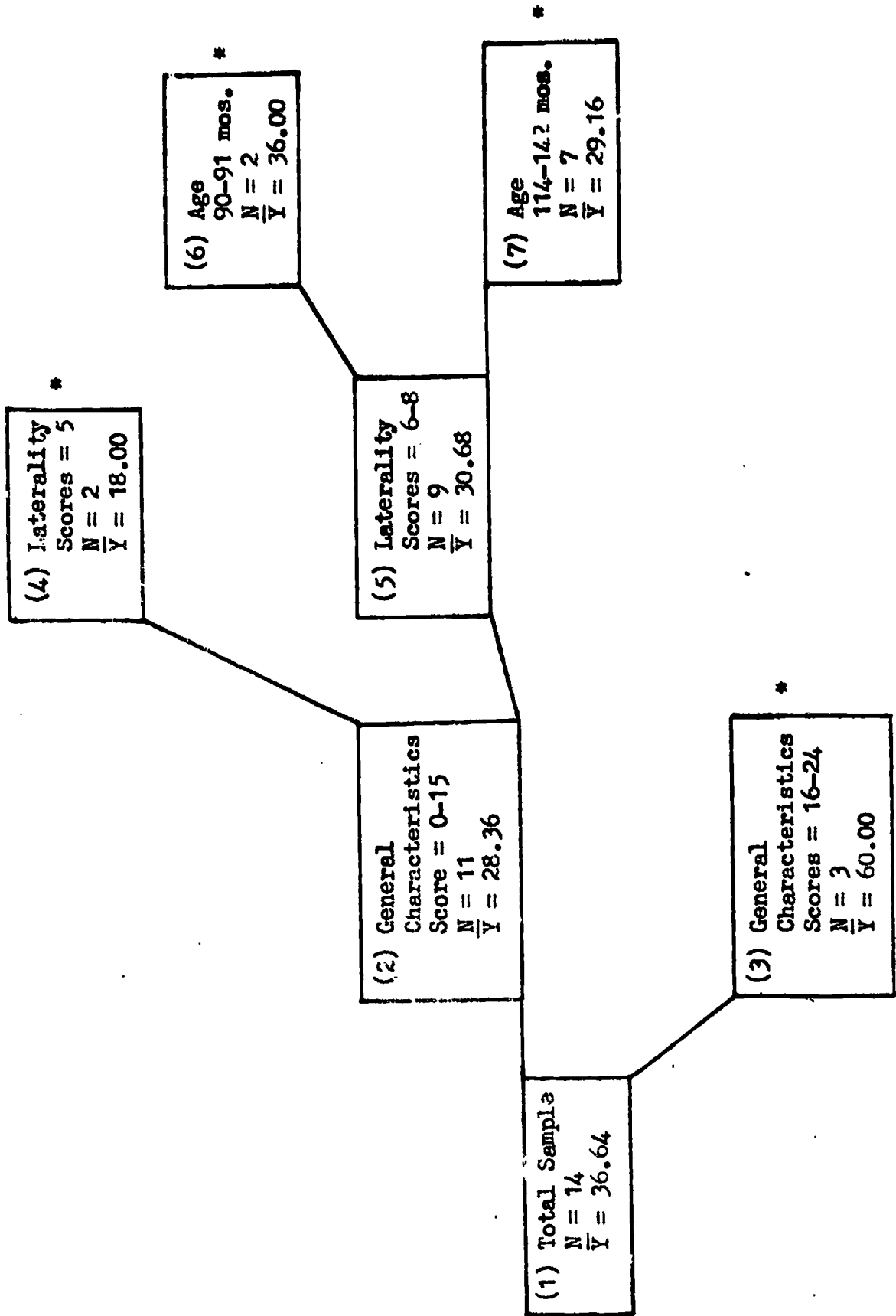
Table 13

AID Analysis, Control Group, $\bar{Y}$ = Reading Total

Group	Type	N	Mean Post Test Reading Total Score	SD
7	Paragraph Meaning – High, Word Study Skills – High	3	122.01	.57
6	Paragraph Meaning – High, Word Study Skills – Low	4	102.75	2.49
4	Paragraph Meaning – Low, Perceptual Motor Match – Low	4	92.25	6.84
5	Paragraph Meaning – Low, Perceptual Motor Match – High	3	62.01	8.61

33 36

Figure 9

Subgroups of Binary Splits - Control Group
$\overline{Y}$ = Reading Total Score

(1) Total Sample
N = 14
$\overline{Y}$ = 96.29

(2) Paragraph
Meaning
Scores = 4—31
N = 7
$\overline{Y}$ = 79.29

(3) Paragraph
Meaning
Scores = 32—57
N = 7
$\overline{Y}$ = 111.00

(4) Perceptual Motor
Match
Scores = 28—29
N = 4
$\overline{Y}$ = 92.25

(5) Perceptual
Motor Match
Scores = 32—33
N = 3
$\overline{Y}$ = 62.01

(6) Word Study
Skills
Scores = 31—43
N = 4
$\overline{Y}$ = 102.75

(7) Word Study
Skills
Scores = 45—52
N = 3
$\overline{Y}$ = 122.01

34

37
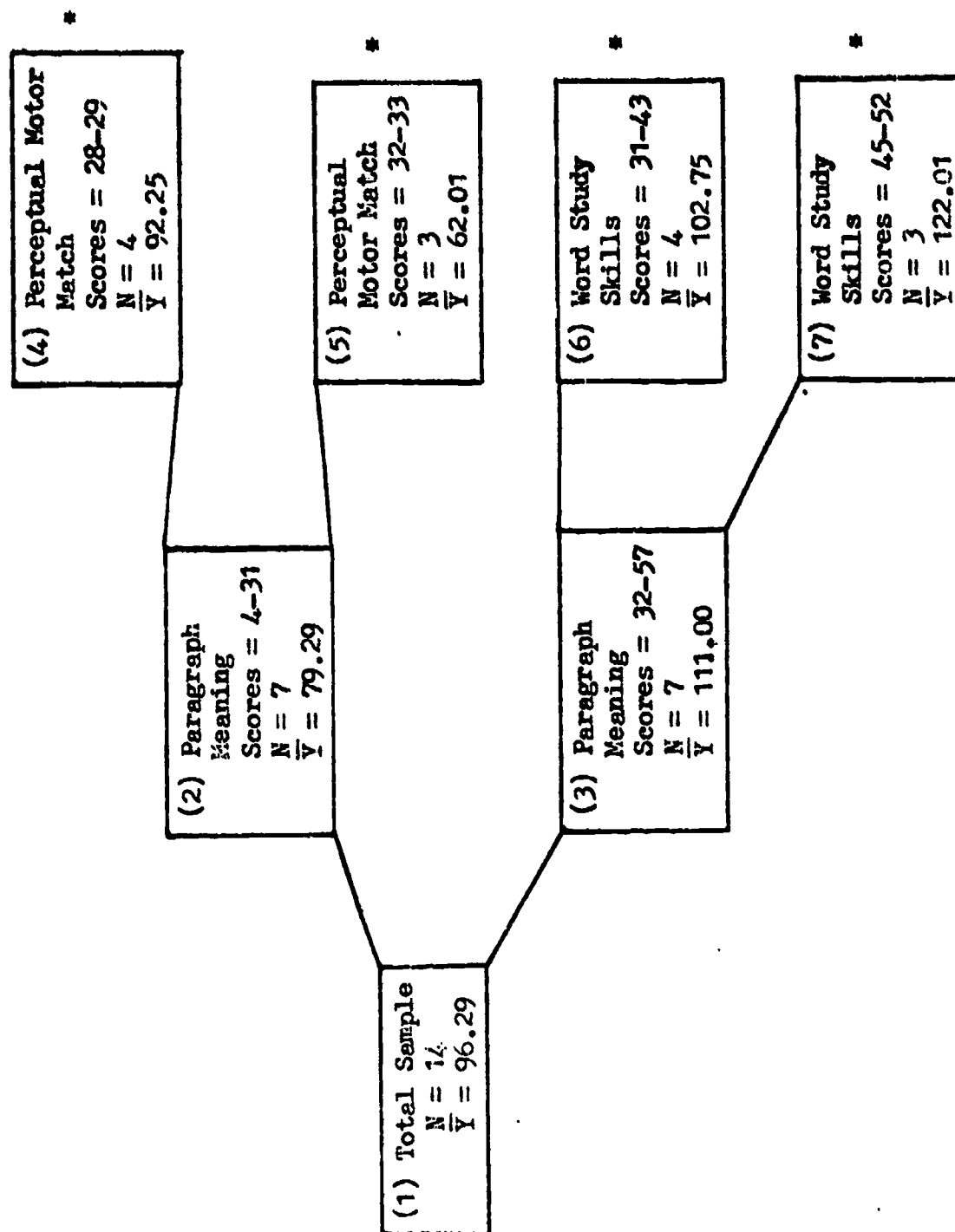
high inital Word Study Skills performed best in reading, while the lower scorers achieved only at the second level of reading achievement. Perceptual Motor Match was an important predictor in the lower groups, and this variable had an inverse relationship to post test reading success. High scores on Perceptual Motor Match were associated with the lowest post test reading mean.

The post test Perceptual Motor Total performance for this group was predicted by five final subgroups (see table 14 and figure 10). The variables of Age, Word Meaning, Problem Behavior, and Laterality accounted for 95.38 % of the post test Perceptual Motor Total performance. Age was the main discriminant for the top and bottom groups. Older children (137-142 mos.) attained the highest perceptual motor score and the younger children (90-129 mos.) formed all the groups below that level. Subjects who were initially more successful on the reading, behavioral, and perceptual motor variables were also more successful on Perceptual Motor Total performance. A particular point of interest is that Word Meaning emerged as an important predictor of perceptual motor performance. Just as in the reading and perceptual motor training groups a reading variable emerged as predictor of perceptual motor performance.

Four final subgroups accounted for 97.53 % of the variance in Total School Behavior performance for the control group (see table 15 and figure 11). Language and Thought was the most important factor in this analysis. Children who recieved low or average initial ratings for problems in Language and Thought had lower problem post test ratings for Total Behavior than children with high problem ratings on this variable. IQ was a predictive factor for the two bottom groups, and was inversely related to total Behavior problem ratings when it was combined with high problem ratings in Language and Thought.

Total Sample

Nine final subgroups accounted for 89.31 % of the variance in Reading Total performance for the total sample (see table 16 and figure 12). Word meaning was a major discriminant between the successful and non-successful scores on post test Reading Total performance. Children with high and average initial Word Meaning scores formed the groups having post test reading scores above the group mean of 96.75, while those with lower Word Meaning scores formed the groups below the mean. Word Study Skills, Language and Thought, General Characteris-

35

Table 14

AID Analysis: Control Group, $\overline{Y}$ = Perceptual Motor Total

Group	Type	Mean Post Test Perceptual Motor		
		N	Total Score	SD
3	Age – High	3	78.00	.00
6	Age – Low, Word Meaning – High, Problem Behavior – Low	4	72.50	1.66
9	Age – Low, Word Meaning – High, Problem Behavior – High, Laterality – High	5	68.80	.98
8	Age – Low, Word Meaning – High, Problem Behavior – High, Laterality – Low	1	66.00	.00
4	Age – Low, Word Meaning – Low	1	60.00	1.00

Figure 10

Subgroups of Binary Splits - Control Group
$\bar{Y}$ = Perceptual Motor Total Score

(1) Total Sample
N = 14
$\bar{Y}$ = 71.50

(2) Age
90-129 mos.
N = 11
$\bar{Y}$ = 69.10

(3) Age
137-142 mos.
N = 3
$\bar{Y}$ = 78.00 *

(4) Word Meaning
Scores = 7
N = 1
$\bar{Y}$ = 60.00 *

(5) Word Meaning
Scores = 9-29
N = 10
$\bar{Y}$ = 70.00

(6) Problem Behavior
Scores = 0
N = 4
$\bar{Y}$ = 72.50 *

(7) Problem Behavior
Scores = 1-21
N = 6
$\bar{Y}$ = 68.34

(8) Laterality
Scores = 5
N = 1
$\bar{Y}$ = 66.00 *

(9) Laterality
Scores = 6-7
N = 5
$\bar{Y}$ = 68.80 *
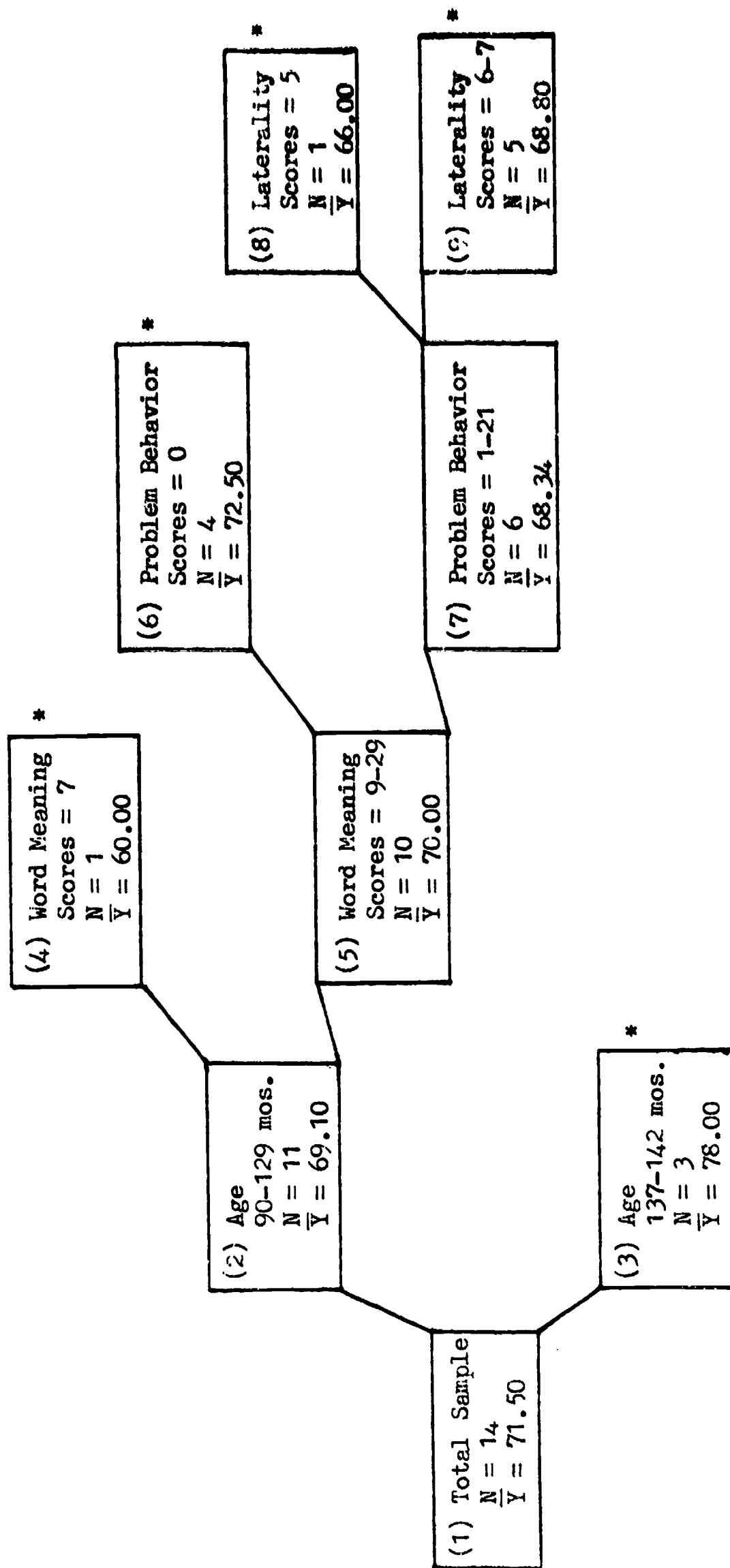
Table 15

AID Analysis, Control Group, $\bar{Y}$ = Behavior Total

Group	Type	N	Mean Post Test Behavior Total Score	SD
6	Language & Thought - Very Low	5	12.80	4.68
7	Language & Thought - Low Average	4	26.00	3.48
4	Language & Thought - High, IQ - Low	3	54.68	5.00
5	Language & Thought - High, IQ - High	2	92.00	4.00

Figure 11

Subgroups of Binary Splits - Control Group
$\overline{Y}$ = Behavior Total Score

(1) Total Sample
$N = 14$
$\overline{Y} = 38.36$

(2) Language & Thought
Scores = 3-8
$N = 9$
$\overline{Y} = 18.68$

(3) Language & Thought
Scores = 9-22
$N = 5$
$\overline{Y} = 69.60$

(6) Language & Thought
Scores = 3-5
$N = 5$
$\overline{Y} = 12.80$ *

(7) Language & Thought
Scores = 6-8
$N = 4$
$\overline{Y} = 26.00$ *

(4) IQ
Scores = 88-116
$N = 3$
$\overline{Y} = 54.68$ *

(5) IQ
Scores = 117-126
$N = 2$
$\overline{Y} = 92.00$ *

39
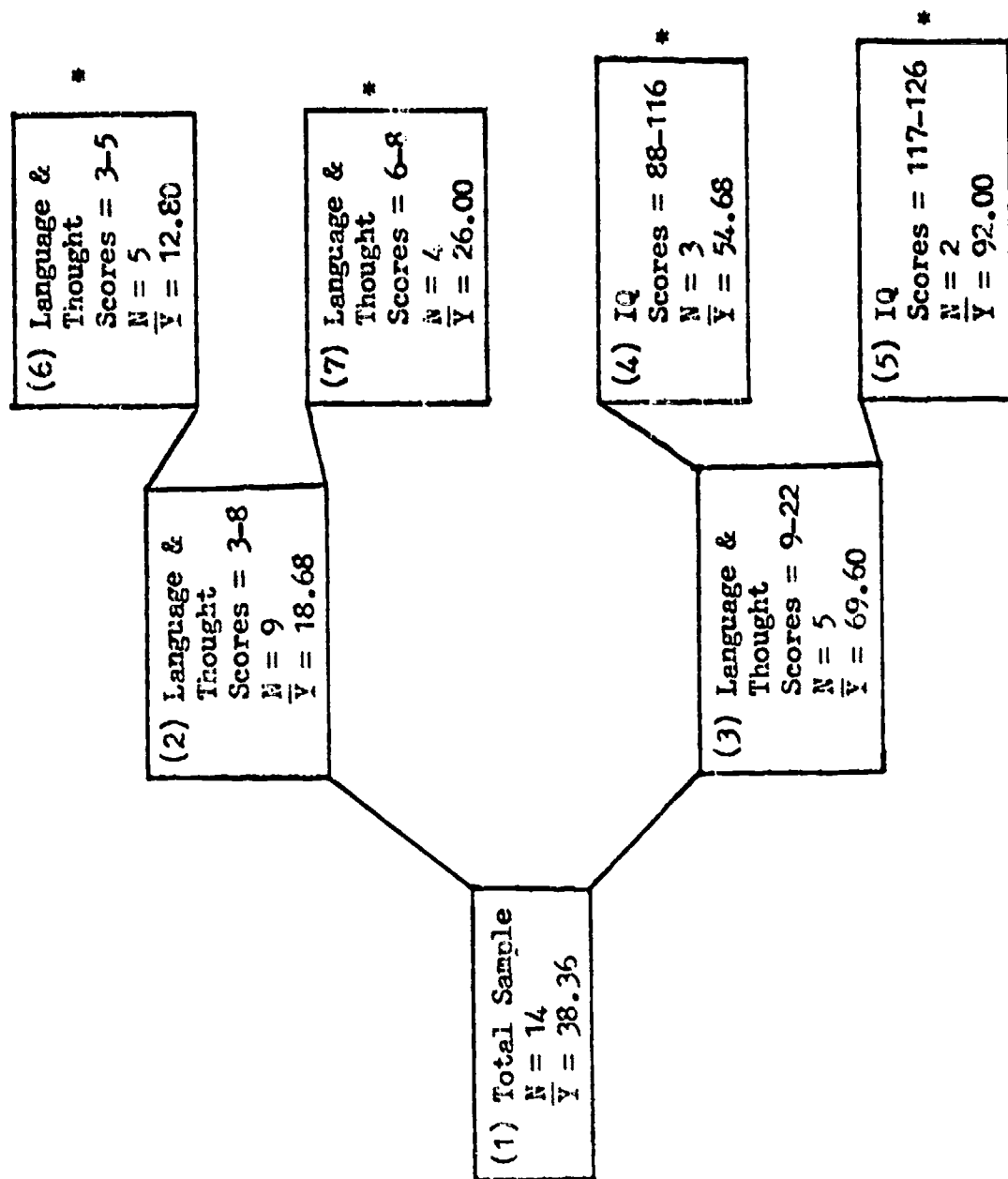
Table 16

AID Analysis, Total Sample, $\bar{Y}$ = Reading Total

Group	Type	N	Mean Post Test Reading Total Score	SD
11	Word Meaning - High 4*	3	134.01	5.10
14	Word Meaning - High 3*, Language & Thought - Low	3	126.99	6.15
19	Word Meaning - High 3*, Language & Thought - High, General Characteristics - High	5	118.80	6.72
17	Word Meaning - High 1*, Balance - High	4	108.75	3.90
18	Word Meaning - High 3*, Language & Thought - High, General Characteristics - Low	2	103.50	1.50
5	Word Meaning - Low, Word Study Skills - High	6	96.99	11.31
16	Word Meaning - High 1*, Balance - Low	3	93.00	7.35
12	Word Meaning - Low, Word Study Skills - Low, Interpersonal Behavior - Low, Age - Low	5	86.40	7.20
13	Word Meaning - Low, Word Study Skills - Low, Interpersonal Behavior - Low, Age - High	9	71.31	5.25
9	Word Meaning - Low, Word Study Skills - Low, Interpersonal Behavior - High	4	63.00	11.82

* The High Word Meaning groups are coded by number from lowest to highest

Figure 12

Subgroups of Binary Splits – Total Group – $\overline{Y}$ = Reading Total Score

(1) Total
Sample
N = 44
$\overline{Y}$ = 96.75

(2) Word
Meaning
Scores = 5–20
N = 24
$\overline{Y}$ = 79.50

(3) Word
Meaning
Scores = 21–34
N = 20
$\overline{Y}$ = 114.90

(4) Word Study
Skills
Score = 15–37
N = 18
$\overline{Y}$ = 73.68

(5) Word Study
Skills
Scores = 40–46
N = 6
$\overline{Y}$ = 96.99 *

(6) Word
Meaning
Scores = 21–25
N = 7
$\overline{Y}$ = 102.00

(7) Word
Meaning
Scores = 26–34
N = 13
$\overline{Y}$ = 121.86

(8) Interpersonal
Behavior
Scores = 1–14
N = 14
$\overline{Y}$ = 76.71

(9) Interpersonal
Behavior
Scores = 16–22
N = 4
$\overline{Y}$ = 63.00 *

(10) Word
Meaning
Scores = 26–32
N = 10
$\overline{Y}$ = 118.20

(11) Word
Meaning
Scores = 33–34
N = 3
$\overline{Y}$ = 134.01 *

(12) Age
90–105 mos.
N = 5
$\overline{Y}$ = 86.40 *

(13) Age
107–129 mos.
N = 9
$\overline{Y}$ = 71.34 *

(14) Language &
Thought
Scores = 3–4
N = 3
$\overline{Y}$ = 126.99 *

(15) Language &
Thought
Scores = 5–13
N = 7
$\overline{Y}$ = 114.42 *

(16) Balance
Scores = 9–10
N = 3
$\overline{Y}$ = 93.00 *

(17) Balance
Scores = 11
N = 4
$\overline{Y}$ = 108.75 *

(18) General
Characteristics
Scores = 4
N = 2
$\overline{Y}$ = 103.50 *

(19) General
Characteristics
Scores = 7–11
N = 5
$\overline{Y}$ = 118.80 *

41

44

tics, Interpersonal Behavior, Balance, and Age were also
important predictors. Children with high initial scores on
Word Study Skills performed at the mean level even when
their Word Meaning scores were low. Low Word Study Skills
scores on the other hand were important predictors in the
lowest levels of post test reading performance. Low prob-
lem ratings on the variables of Language and Thought and
Interpersonal Behavior were predictive of higher reading
scores than were high problem ratings on these variables.
Problem ratings in General Characteristics, however, were inversely
related to reading success when this variable was grouped
with average initial Word Meaning scores and high Language
and Thought problem ratings. Adequate initial performance
in vocabulary skills and problems in the Language and
Thought area appear to have outweighed the specific effects
of the General Characteristics variable. High initial
scores on Balance were predictive of successful reading per-
formance when this variable was grouped with adequate intial
Word Meaning scores. Low Balance scores grouped with low
Word Moaning scores, on the other hand, were associated with
post test reading performance one level below the total
group mean. Age was an important predictive factor in the
lower levels of post test reading performance. This var-
iable was inversely related to reading performance when
combined with low scores on Word Meaning, Word Study Skills,
and low problem ratings on Interpersonal Behavior.

For the total sample's Perceptual Motor Total post test
performance ten final subgroups accounted for 85.22 % of
the variance (see table 17 and figure 13). Age and percep-
tual motor variables comprised the major predictive groups.
The higher age groups were generally associated with higher
post test perceptual motor performance, except when com-
bined with low IQ. However the combination of lower age and
high initial Total Perceptual Motor performance was predic-
tive of post test perceptual motor performance above the
group mean of 71.84. Within the lower levels of perceptual
motor performance the low age and high initial perceptual
motor scores was predictive of poor perceptual motor perfor-
mance when Word Study Skills were low or when problem ratings
in Interpersonal Behavior were high. The combination of low
age and low initial level of total perceptual motor perform-
ance was the group which predicted the lowest level of post
test perceptual motor performance. Perceptual Motor Match
and Form Perception were also important predictors of post
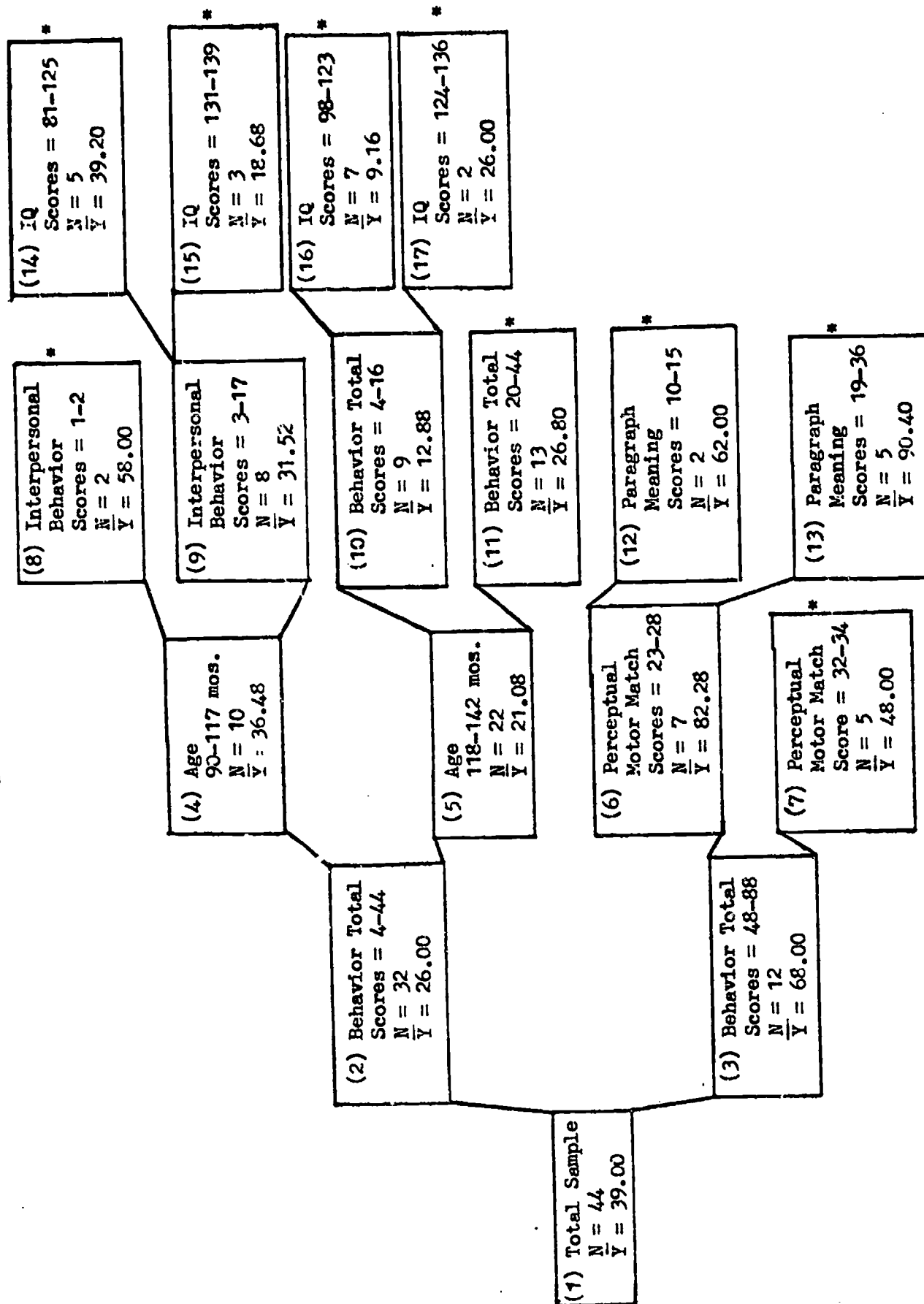test total perceptual motor performance. Initial high

42

Table 17

AID Analysis, Total Sample, $\bar{Y}$ = Perceptual Motor Total

Group	Type	N	Mean Post Test Perceptual Motor Total Score	SD
13	Age - Very Low, Perceptual Motor Total - High, Interpersonal Behavior - Low, Perceptual Motor Match - High	1	78.00	.00
14	Age - High, IQ - High, Language & Thought - Low	8	78.00	1.00
19	Age - Low Average, Perceptual Motor Total - High, Interpersonal Behavior - Low, Word Study Skills - High	1	74.00	.00
17	Age - Very Low, Perceptual Motor Total - High, Interpersonal Behavior - Low, Perceptual Motor Match - Low, Form Perception - High	6	73.34	.94
15	Age - High, IQ - High, Language & Thought - Low	2	73.00	1.00
16	Age - Very Low, Perceptual Motor Total - Low, Interpersonal Behavior - Low, Perceptual Motor Match - Low, Form Perception - Low	8	71.50	1.66
10	Age - High, IQ - Low	2	70.00	2.00
18	Age - Low Average, Perceptual Motor Total - High, Interpersonal Behavior - Low, Word Study Skills - Low	7	68.86	1.46
7	Age - Low, Perceptual Motor Total - High, Interpersonal Behavior - High	4	65.00	3.32
4	Age - Low, Perceptual Motor Total - Low	5	63.60	3.44

46

Figure 14

Subgroups of Binary Splits - Total Group
$\overline{Y}$ = Behavior Total Score

(1) Total Sample
N = 44
$\overline{Y}$ = 39.00

(2) Behavior Total Scores = 4-44
N = 32
$\overline{Y}$ = 26.00

(3) Behavior Total Scores = 48-88
N = 12
$\overline{Y}$ = 68.00

(4) Age 90-117 mos.
N = 10
$\overline{Y}$ = 36.48

(5) Age 118-142 mos.
N = 22
$\overline{Y}$ = 21.08

(6) Perceptual Motor Match Scores = 23-28
N = 7
$\overline{Y}$ = 82.28

(7) Perceptual Motor Match Score = 32-34
N = 5
$\overline{Y}$ = 48.00

(8) Interpersonal Behavior Scores = 1-2 *
N = 2
$\overline{Y}$ = 58.00

(9) Interpersonal Behavior Scores = 3-17
N = 8
$\overline{Y}$ = 31.52

(10) Behavior Total Scores = 4-16
N = 9
$\overline{Y}$ = 12.88

(11) Behavior Total Scores = 20-44 *
N = 13
$\overline{Y}$ = 26.80

(12) Paragraph Meaning Scores = 10-15 *
N = 2
$\overline{Y}$ = 62.00

(13) Paragraph Meaning Scores = 19-36 *
N = 5
$\overline{Y}$ = 90.40

(14) IQ Scores = 81-125 *
N = 5
$\overline{Y}$ = 39.20

(15) IQ Scores = 131-139 *
N = 3
$\overline{Y}$ = 18.68

(16) IQ Scores = 98-123 *
N = 7
$\overline{Y}$ = 9.16

(17) IQ Scores = 124-136 *
N = 2
$\overline{Y}$ = 26.00

44

scores on these variables were associated with better post
test performance than were low pre test scores in these
areas. Finally, low Language and Thought scores were
associated with post test perceptual motor performance
above the group mean.

Nine final subgroups accounted for 92.21 % of the var-
iance in post test Behavior Total performance (see table 18
and figure 14). Behavior Total pre test scores were the
main predictors of post test performance on this variable.
Age was also an important variable with the higher age
groups (118-142 mos.) generally being associated with lower
behavior problem total scores. When the lower age level
(90-117 mos.) was found in groups predicting lower post
test problem behavior performance it was combined with high
and average levels of IQ. Interpersonal Behavior was also
an important predictor, but it had an inverse relationship
to behavioral performance when it was found in combination
with low inital problem behavior ratings and low age level.
In the levels of non-successful behavioral post test per-
formances Perceptual Motor Match and Paragraph Meaning
emerged as important predictors. High initial scores on
Perceptual Motor Match were predictive of lower behavior
problem ratings than were low scores on this variable. On
the other hand, high scores on Paragraph Meaning were pre-
dictive of higher behavior problem ratings than were low
scores on this variable when Paragraph Meaning was found in
combination with high initial Total Behavior problem ratings
and poor Perceptual Motor Match performance.

Summary AID II Analysis

One of the outstanding findings from the automatic
Interaction Detector analysis is that success on a given
outcome variable is dependent largely on the child's initial
level of performance on that variable or factors closely
related to it. Treatment groups themselves did not emerge
as important predictive factors in the analysis of the total
sample. Rather the initial level of performance and simple
age were the outstanding factors determining sucess and non-
success. Simple chronological age was an especially important
factor in post test perceptual motor total performance. For
two groups, the control group and the total sample, age formed
the major predictive groupings for successful and non-suc-
cessful performance in this area. Age also played an important role
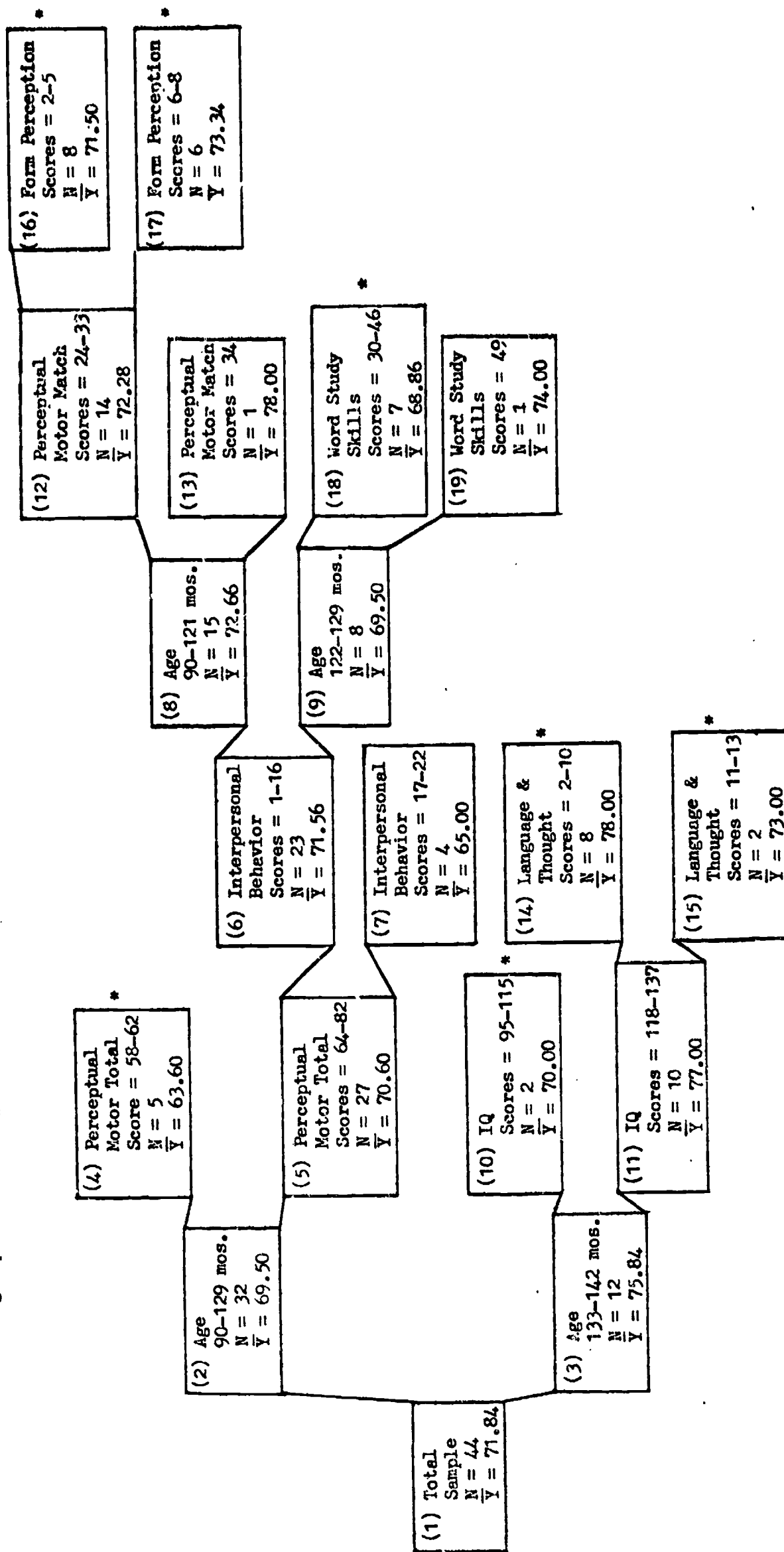in the prediction of total school behavior adjustment. For the

45

Table 18

AID Analysis, Total Sample, $\overline{Y}$ = Behavior Total

Group	Type	N	Mean Post Test Behavior Total Score	SD
16	Behavior Total – Very Low, Age – High, IQ – Average	7	9.16	5.60
15	Behavior Total – Low, Age – Low, Interpersonal Behavior – High, IQ – Very High	3	18.68	8.20
17	Behavior Total – Very Low, Age – High, IQ – High	2	26.00	6.00
11	Behavior Total – Low Average, Age – High	13	26.80	6.40
14	Behavior Total – Low, Age – Low, Interpersonal Behavior – High, IQ – Low	5	39.20	6.00
7	Behavior Total – High, Perceptual Motor Match – High	5	48.00	11.60
8	Behavior Total – Low, Age – Low, Interpersonal Behavior – Low	2	58.00	6.00
12	Behavior Total – High, Perceptual Motor Match – Low, Paragraph Meaning – Low	2	62.00	6.00
13	Behavior Total – High, Perceptual Motor Match – Low, Paragraph Meaning – High	5	90.40	4.80

Figure 13

Subgroups of Binary Splits - Total Group - $\overline{Y}$ = Perceptual Motor Total Scores

(1) Total Sample
N = 44
$\overline{Y}$ = 71.84

(2) Age 90-129 mos.
N = 32
$\overline{Y}$ = 69.50

(3) Age 133-142 mos.
N = 12
$\overline{Y}$ = 75.84

(4) Perceptual Motor Total Score = 58-62 *
N = 5
$\overline{Y}$ = 63.60

(5) Perceptual Motor Total Scores = 64-82
N = 27
$\overline{Y}$ = 70.60

(6) Interpersonal Behavior Scores = 1-16
N = 23
$\overline{Y}$ = 71.56

(7) Interpersonal Behavior Scores = 17-22
N = 4
$\overline{Y}$ = 65.00

(8) Age 90-121 mos.
N = 15
$\overline{Y}$ = 72.66

(9) Age 122-129 mos.
N = 8
$\overline{Y}$ = 69.50

(10) IQ Scores = 95-115 *
N = 2
$\overline{Y}$ = 70.00

(11) IQ Scores = 118-137
N = 10
$\overline{Y}$ = 77.00

(12) Perceptual Motor Match Scores = 24-33
N = 14
$\overline{Y}$ = 72.28

(13) Perceptual Motor Match Scores = 34
N = 1
$\overline{Y}$ = 78.00

(14) Language & Thought Scores = 2-10 *
N = 8
$\overline{Y}$ = 78.00

(15) Language & Thought Scores = 11-13 *
N = 2
$\overline{Y}$ = 73.00

(16) Form Perception Scores = 2-5 *
N = 8
$\overline{Y}$ = 71.50

(17) Form Perception Scores = 6-8 *
N = 6
$\overline{Y}$ = 73.34

(18) Word Study Skills Scores = 30-46 *
N = 7
$\overline{Y}$ = 68.86

(19) Word Study Skills Scores = 49
N = 1
$\overline{Y}$ = 74.00

perceptual motor training group age was the main discriminant between success and non-success in school behavior. In the reading training group age also played a major predictive function. In all of these groups higher age levels were associated with more successful performance in behavior adjustment, a finding which parallels the results of the multivariate analysis of covariance.

The relationships found between the perceptual motor and reading variables are also of special interest. First, in relation to the question of the effect of perceptual motor ability on reading performance it is important to note that perceptual motor variables were predictive of reading total performance only when they were combined with reading factors. Second, in two instances, one in the perceptual motor training group and one in the control group, perceptual motor performance actually had an inverse relationship to reading. Poor performance on Laterality and Balance was associated with higher reading scores than was high initial performance in these areas. Further, when a positive linear relationship was found between perceptual motor variables and reading performance the perceptual motor variables were not highly significant predictors. In the reading group, for example, low Laterality scores combined with low Word Study Skills did predict the lowest reading performance group. However, high Laterality scores were associated with reading performance below the mean of the total group. In the total sample analysis a similar finding occurred for Balance. This variable was a predictive factor when combined with Word Meaning, but high and low Balance scores discriminated only the groups just one level above and below the mean. Reading as well as behavioral and age variables were more important in discriminating the highest and lowest groups. An even more interesting finding is the predictive value of the reading variables for perceptual motor performance. This relationship was particularly strong in the reading training group where the reading comprehension variable of Paragraph Meaning outweighed the strong effect of perceptual motor and age variables and was the main discriminant of successful and non-successful performance. Low Paragraph Meaning scores predicted the actual score range of perceptual motor performance which has been identified as the point at which perceptual motor ability is supposedly at such a low level that it will have a detrimental effect on school achievement.

48

Indeed, it appears that the predictive functions are
actually in the opposite direction. This finding how-
ever, is not an unusual one in view of the work of Elkind
(1969) and Hershenson (1969) which demonstrates the guid-
ing and controlling effect of linguistic and cognitive
variables on perceptual development.

Finally, the AID analysis demonstrates the complex
interaction of variance factors associated with levels
of the outcome variables studied. These findings vividly
illustrate the fallacy of setting up of treatment con-
ditions in terms of an assumed simple one to one corres-
pondance between a given etiological factor such as per-
ceptual motor ability and problems in a performance area
such as reading.

Correlational Analysis

As indicated in table 19 the Pearson Product Moment
correlation coefficients followed the predictable pattern
of showing high relationships of each of the reading, per-
ceptual motor, and behavioral variables with one another
and low or negative relationships with variables in other
categories. Age had a higher correlation with Reading
Total scores than Perceptual Motor Total scores, and was
inversely related to high Behavior Total problem ratings.
The perceptual motor variables showed only low or moderate
correlation with the reading subtests and Form Perception
had a low negative correlation with Paragraph Meaning and
Reading Total Finally, the behavior problem ratings
were negatively correlated with the reading and perceptual
motor variables.

IV. Conclusion

The conclusions from the study will be considered in
terms of each of the four objectives stated in the intro-
duction. The findings which relate to the main problem
of determining the differential effectiveness of percep-
tual motor training and individualized remedial reading
instruction on the reading achievement, perceptual motor
development, and behavior adjustment are those of the multi-
variate analysis of covariance among the treatment con-
ditions. The perceptual motor training had no significant
effect on reading achievement, in fact this group performed
more poorly in reading than either of the other two groups.

49

Table 19

Correlation Matrix among all Variables
for the Total Sample

	AGE	IQ	WM	PM	WSS	RT	L	D	PMM	BAL	PF	FP	PT	GC	LT	IAB	PB	IEB	BT
IQ	.25																		
WM	.71	.11																	
PM	.72	.15	.85																
WSS	.71	.30	.67	.69															
RT	.79	.21	.91	.94	.86														
L	.38	.40	.25	.24	.44	.34													
D	.64	.25	.45	.41	.56	.52	.49												
PMM	.42	.28	.27	.29	.37	.34	.47	.42											
BAL	.28	.12	.27	.30	.36	.34	.29	.36	.37										
PF	.15	-.02	.21	.16	.03	.14	.04	.004	.27	.26									
FP	.08	.02	.01	-.09	.07	-.01	.29	.20	.43	.24	.09								
PT	.54	.32	.38	.36	.51	.45	.69	.70	.87	.59	.26	.57							
GC	-.57	-.24	-.18	-.20	-.41	-.29	-.40	-.48	-.35	-.20	-.20	-.05	-.45						
LT	-.45	-.26	-.08	-.09	-.28	-.16	-.34	-.41	-.33	-.16	-.27	-.06	-.40	.86					
IAB	-.32	-.30	-.15	-.04	-.16	-.03	-.14	-.30	-.30	-.11	-.02	-.05	-.30	.62	.56				
PB	-.23	-.05	-.01	.05	-.13	-.02	-.25	-.33	-.33	-.18	-.42	-.05	-.33	.71	.83	.27			
IEB	-.44	-.26	-.02	-.10	-.33	-.17	-.22	-.47	-.16	-.17	-.01	-.04	-.30	.74	.76	.71	.53		
BT	-.49	-.26	-.05	-.10	-.32	-.18	-.33	-.45	-.34	-.20	-.21	-.06	-.42	.94	.94	.73	.78	.88	

KEY: WM—Word Meaning, PM—Paragraph Meaning, WSS—Word Study Skills, RT—Reading Total, L—Laterality, D—Directionality, PMM—Perceptual Motor Match, BAL—Balance, PF—Physical Fitness, FP—Form Perception, PT—Perceptual Total, GC—General Characteristics, LT—Language and Thought, IAB—Intrapersonal Behavior, PB—Problem Behavior, IEB—Interpersonal Behavior, BT—Behavior Total

50

The reading treatment itself produced the highest post
test reading mean, but the difference between the reading
group and the other two groups was not significant. The
six months duration of the reading training, then, did
not appear to be long enough to bring about significant
gains. These findings support Balow's (1965) study
demonstrating that long term and continuous remedial reading pro-
cedures are necessary to help poor achievers in this area. The
treatment group analysis for reading achievement also
lend support to Balow's (1968) contention that remed-
ial reading procedures and not perceptual motor training
yield success in reading achievement.

Perceptual motor training was also not effective in
bringing about significant changes in perceptual motor develop-
ment itself. This finding is a more unusual result than
that of the reading analysis in terms of previous research.
These results do, however, support those of Roach (1966)
which indicate that small group perceptual motor training
may not be effective for children above 95 months. Roach,
however, used only reading achievement as a criterion
variable. The results of this study suggest that a similar
situation exists for perceptual motor ability also.
Another factor involved in this particular study is that
the children were not severely handicapped in this area.
The methods may be useful for children who exhibit more
severe problems in the perceptual motor area. The results
suggest that caution should be used in providing percep-
tual motor training for children above 9C-95 months.
Particular care should be given to assessing the degree of
perceptual motor handicap with precise objective measure-
ments which have been validated in terms of training out-
comes.

The behavior adjustment analysis indicated that the
reading and control training procedures were most effec-
tive in producing gains in this area. These results
support the results of Glavin, Wherry, and Quay (1971)
indicating that programs centering on and directly rein-
forcing academic achievement behavior in children are an
effective means of producing behavior adjustment gains.
The perceptual motor training group's significantly poorer
performance on the school behavior variables does not
support the notion that the playful non-academic atmos-
phere and simple attentional elements involved in these
programs help children with their school adjustment and

51

learning problems.

Perceptual motor training, then, did not produce significant gains in reading achievement or behavior adjustment. Further it had no value for perceptual motor development for the children in the age group and ability level of this study. Individualized remedial reading instruction produced greatest gains in reading achievement and the academically oriented programs of the reading and control groups were associated with significant gains in behavior adjustment. In terms of the second objective of the study, analysis of the transfer effects of perceptual motor training on reading achievement, the results of this study give a rather definitive negative answer. The treatment condition comparisons clearly indicate that the type of training did not transfer to reading skills. The children in the perceptual motor group attained the lowest post test reading scores. Further, the AID analysis revealed that the perceptual motor variables predicted reading outcomes only when the perceptual motor factors were grouped with reading variables. Even then the relationship was a sporadic one with the perceptual motor variables being sometimes negatively and sometimes postively related to reading. In addition the correlational analysis indicates only low and negative relationships between the perceptual motor and reading variables. The very low and negative correlations attained between Form Perception and the reading variables shown in table 19 is of particular interest in regard to the transfer issue. Form Perception should be a predominant factor in reading ability. However, the correlation analysis of this subtest of the Roach and Kephart (1966) test which uses nonverbal stimuli did not support this notion. These results support evidence provided by Rosen (1966) that training in the perception of non-verbal stimuli such as those used in the Frostig Developmental Test of Visual Perception does not transfer to reading letters and words. These results suggest that if perceptual training is to have a transfer effect on reading it should involve the use of graphemes, letters, and words. Perceptual training systems such as those proposed by Elkind (1969) and Gibson (1970) in which verbal stimuli are predominant seem to be appropiate models since they have proved successful in helping children in general reading achievement, as well as word recognition and letter identification tasks.

52

However, the findings of the present study indicate that perceptual motor training in which non-semantic stimuli are used has no transfer effects on reading skills.

Aside from examining the value of specific teaching methods in themselves, the third objective of this study was to determine the characteristics of children likely to experience gain under a specific treatment condition. The interactions found in the multivariate analysis of covariance provide two specific answers to this question, first in regard to the age x treatment interaction for Paragraph Meaning the results suggest that success in this area is most likely to be achieved by older children recieving an individualized reading program. The same type of interaction suggests that perceptual motor training may be valuable in developing physical fitness in young children, but not as valuable as a general activity program such as the one provided in the control group. The results in regard to physical fitness must be examined further, however, because of the measurement limitations of the four point scale used to define physical fitness in this study.

The AID analysis provides broader suggestions for examining characteristics of children and their interactions with specific types of instructional programs. First, the findings from this analysis point out the importance of simple maturation and levels of readiness in the outcome variables for which a child is being given a particular type of intervention. Regardless of the type of intervention these factors appear to dominate the final results. Second, the strong predictive value of pre test characteristics specific to a given outcome variable suggests that specific training in a given area such as reading will transfer more directly to performance in that area. Reading variables dominated the groupings predictive of success or nonsuccess in reading performance. With few exceptions this pattern was also repeated for the other variables. Third, the complex nature of the interaction of the predictive variables and the differential effects of this interaction on outcome performance suggest the need for a broadly based instructional programs encompassing all of a given child's educational needs. A reading program should not be organized for a child without taking into account the behavioral and physical education needs he may have. Likewise, perceptual motor

53

programming should not be undertaken in isolation as a means of developing reading performance. Finally, the individual patterns associated with success and non-success within each treatment condition should be used as a general guide to an individualized analysis of children being considered for one of the types of instruction programs examined in the study rather than as an absolute predictive standard.

The fourth objective of this study was to examine the relationships among the variables in the population of children being studied. The correlational analysis revealed that the reading variables related highly with one another and had low and inverse relationships with the perceptual motor and behavioral variables. These findings support the conclusion of Olson (1966 a, 1966b) that perceptual motor variables do not relate significantly to reading performance. They are in disagreement with the work of Bryan (1964), Frostig, Maslow, Lefever, and Whittlesey (1964), Ismail and Gruber (1967), and Kephart (1958) in which correlational techniques are used to demonstrate the notion that perceptual motor abilities as measured in this study are essential to reading and school achievement in general. The wide discrepancies in the conclusions based on the use of the same technique which yields almost identical correlation coefficients for authors who make opposing conclustions from this information suggest that the use of simple correlational techniques is not a useful tool for studying the problems of perceptual motor development and reading abilities. The complex interactions among these variables found in the AID analysis lend support to this argument. The choice of statistical techniques is not a trivial problem in this area because the questionable correlational relationships between perceptual motor and reading variables has been the prime basis for defining clinical entities such as "dyslexia". The labelling process involved in bringing such syndromes into existence then provides the foundations for possibly irrelevant and useless educational activities.

Finally, the total analyses suggest that in terms of the main problem addressed in this investigation, the perceptual motor training techniques examined here are in fact one of the "panaceas" referred to by Kass (1969), and are particularly fruitless and unfortunate approaches for the remediation of reading problems. This study suggests that for both the child's development in problem

54

reading areas and behavior adjustment, the more arduous
road of long term individualized remedial reading in-
struction is the answer.

REFERENCES

Alley, G.R. Perceptual-motor performances of mentally retarded
children after systematic visual perceptual training.
American Journal of Mental Deficiency, 1968, 73, 247-250.

Anderson, R. Effects of neuropsychological techniques on read-
ing achievement. Unpublished doctoral dissertation.
Colorado State College, Greeley, 1965.

Balow, B. The long term effect of remedial reading instruction.
The Reading Teacher, 1965, 18, 581-586.

Balow, B. Divination, legedermain, and sorcery in severe read-
ing disability. Minnesota Reading Quarterly, 1968, 13,
2-15.

Barsch, R. Achieving Perceptual-Motor Efficiency: A Space
Oriented Approach to Learning. Seattle, Wash.: Special
Child Publications, 1967.

Benyon, Sheila Intensive Programming for Slow Learners.
Columbus, Ohio: Charles Merrill, 1968.

Bryan, Q.R. Relative importance of intelligence and visual
perception in predicting reading achievement. California
Journal of Educational Research, 1964, 15, 44-48.

Buckland, Pearl The effect of visual perception training on
reading achievement in low readiness first grade pupils.
Unpublished doctoral dissertation. University of Minnesota,
Minneapolis, 1969.

Chansky, N. and Taylor, M. Perceptual training with young
retardates. American Journal of Mental Deficiency, 1964,
68, 460-468.

Chasey, W.C. and Wyrick, Waneen. Effects of a gross motor
developmental program on form perception skills of educable
mentally retarded children. Research Quarterly, 1970, 41,
345-352.

Cohen, Ruth. Remedial training of first grade children with
visual perceptual retardation. Unpublished doctoral disser-
tation. University of California, Los Angeles, 1966.

56

Cox, B.J. and Hambly, L.R.   Guided development of perceptual
    skill of visual space as a factor in the achievement of
    primary grade children. American Journal of Optometry and
    Archives of the American Academy of Optometry, 1961, 38,
    433-444.

Cruickshank, W. and others. A Teaching Method for Brain-Injured
    and Hyperactive Children. Syracuse, New York: Syracuse
    University Press, 1961.

Delacato, C.H. The Diagnosis and Treatment of Speech and Read-
    ing Problems. Springfield, Illinois: Charles C. Thomas,
    1963.

Delacato, C.H. Neurological Organizaticn and Reading. Spring-
    field, Illinois: Charles C. Thomas, 1966.

Dillon, E.J., Heath, E.J. and Biggs, C.W. Comprehensive Pro-
    gramming for Success in Learning. Columbus, Ohio: Charles
    Merrill, 1970.

Elkind, D. Reading, logic and perception an approach to reading
    instruction. In Hellmuth, J.(ed) Educational Therapy,
    Vol. II. Seattle, Washington: Special Child Publ., 1969,
    195-207.

Emmons, Coralie A. A comparison of selected gross-motor activi-
    ties of the Getman-Kane and the Kephart Perceptual-Motor
    training program and their effects upon certain readiness
    skills of first grade negro children. Unpublished doctoral
    dissertation. Ohio State University, Columbus, 1968.

Falik, L.H. The effects of special perceptual motor training in
    kindergarten on reading readiness and on second grade read-
    ing performance. Journal of Learning Disabilities, 1969,
    2, 395-402.

Foster, J. Effects of mobility training upon reading achievement
    and intelligence. Unpublished doctoral dissertation.
    University of California, Los Angeles, 1965.

Frostig, Marianne. Perceptual ability and school adjustment in
    kindergarten and primary grades. Paper presented at the
    Meeting of the California State Psychological Association,
    December, 1951.

57

Frostig, Marianne and Horne, D. The Frostig Program for the Development of Visual Perception. Chicago: Follett Publishing Co., 1964.

Frostig, Marianne, Maslow, Phyllis, Lefever, D.W., and Wittesley, J.B. The Marianne Frostig Developmental Test of Visual Perception 1963 Standardization. Palo Alto, Calif.: Consulting Psychologists Press, 1964.

Gallagher, J. The Tutoring of Brain-Injured Mentally Retarded Children. Springfield, Illinois: Charles C. Thomas, 1960.

Geddes, Dolores M. Effects of mobility patterning techniques upon selected motor skills of primary school educable mentally retarded children. The Research Quarterly, 1968, 39, 953-957.

Getman G. How to Develop Your Child's Intelligence. Luverne, Minnesota: Author, 1962.

Gibson, Eleanore. The Ontogeny of Reading. American Psychologist, 1970, 25, 136-143.

Glavin, J.P., Quay, H.C. and Wherry, J.S. Behavioral and academic gains of conduct problem children in different classroom settings. Exceptional Children, 1971, 37, 441-446.

Godfrey, Barbara B. Progress in school achievement through motor therapy. Journal of Health, Physical Education, and Recreation, 1963, 34, 43.

Halgren, M.R. Opus in see sharp. Education, 1961, 81, 369-371.

Hammond, Sarah L. and Skipper, Dora S. Factors involved in the adjustment of children entering first grade. Journal of Educational Research, 1962, 56, 75-68.

Hershenson, M. Effects of cognition on perception: a problem and paradigm for developmental study. In Hill, J.P. (ed.) Minnesota Symposia on Child Psychology, Vol. II, Minneapolis, Minn., The University of Minnesota Press, 1969, 110-124.

Hewett, F.M. The Emotionally Disturbed Child in the Classroom. Boston: Allyn and Bacon, 1968.

58

Hirt, Dorothy   Teaching children with severe learning disabilities. *The Reading Teacher*, 1970, 23, 304-310.

Ismail, A.H. and Gruber, J.J.   *Integrated Development: Motor Aptitude and Intellectual Performance*. Columbus, Ohio: Charles Merrill, 1967.

Jacobs J.N   An evaluation of the Frostig visual-perceptual training program. *Educational Leadership*, 1968, 1, 332-340.

Kass, Corrine   Learning disabilities. *Review of Educational Research*, 1969, 39, 71-82.

Kelley, T.L., Madden, R., Gardner, F., and Rudmon, H.C.   *Stanford Achievement Test*. New York: Harcourt, Brace, and World, Inc., 1966.

Kephart, N.S.   Visual behavior of the retarded child. *American Journal of Optometry*, 1958, 35, 125-133.

Kephart, N.C.   *The Slow Learner in the Classroom*. Columbus, Ohio: Charles Merrill, 1960.

Kershner, J.R.   Doman-Delacato's theory of neurological organization applied with retarded children. *Exceptional Children*, 1968, 34, 441-452.

Klesius, Stephen E.   Perceptual-motor development and reading. Paper presented at the National College Reading Association Convention, March, 1970.

Krippner, S.   Evaluating pre-readiness approaches to reading. *Education*, 1966, 87, 14-16.

Lazroe, J.   An investigation of the effects of motor training on reading readiness of kindergarten children. Unpublished doctoral dissertation. Colorado State College, Greeley, 1968.

Lewis, J.N.   The improvement of reading ability through a developmental program in visual perception. *Journal of Learning Disabilities*, 1968, 1, 24-25.

Mann, L.   Perceptual training: misdirections and redirections. *American Journal of Orthopsychiatry*, 1970, 40, 30-38.

59

McBeath, Pearl M. The effectiveness of three reading prepared-
    ness programs for perceptually handicapped kindergarteners.
    Unpublished doctoral dissertation. Stanford University,
    Palo Alto, California, 1966.

McCormick, C.C., Poetker, Janice, N., Schonbrick, ?. and Footlik,
    W.S. Improvement in reading achievement through perceptual-
    motor training. Research Quarterly, 1968, 39, 627-630. (a)

McCormick, C.C., Poetker, Janice, N., Schonbrick, J. and Footlik,
    W.S. The effect of perceptual motor training on reading
    achievement. Academic Therapy Quarterly, 1968, 4, 171-176. (b)

O'Donnell, P.A. and Eisenson, J. Delacato training for reading
    achievement and visual-motor integration. Journal of Learn-
    ing Disabilities, 1969, 2, 441-447.

Olson, A. The Frostig developmental test of visual perception
    as a predictor of specific reading abilities with second
    grade children. Elementary English, 1966, 43, 869-872. (a)

Olson, A. School achievement, reading ability, and specific
    visual perception skills in third grade. The Reading
    Teacher, 1966, 19, 490-492. (b)

Painter, Genevieve The effect of a rhythmic and sensory-motor
    activity program on perceptual-motor spatial ability
    of kindergarten children. Exceptional Children, 1966, 33,
    113-116.

Perry, H. A perceptual training program for children with learn-
    ing disorders. Memphis, Tennessee: Department of Instruc-
    tion, Memphis City Schools, 1966.

Roach, E. Evaluation of an experimental program of perceptual-
    motor training with slow readers. In Vistas in Reading.
    Newark, Delaware: International Reading Association, 1966,
    446-449.

Roach, E.G. and Kephart, N.C. The Purdue Perceptual Motor Survey.
    Columbus, Ohio: Charles Merrill, 1966.

Robbins, M.P The Delacato interpretation of neurological organi-
    zation. Reading Research Quarterly, 1966, 1, 57-78.

60

Robbins, M.P. and Glass, G.V. Doman-Delacato rationale: a critical analysis. In Hellmuth, J. (ed) Educational Therapy, Vol. II Seattle, Washington: Special Child Publ., 1969, 321-377.

Rosen, C.L. An experimental study of visual perceptual training and reading achievement in first grade. Perceptual and Motor Skills, 1966, 22, 979-986.

Rubin E.Z., Simon, C.B. and Betwee, M.C. Emotionally Handicapped Children and the Elementary School. Detroit: Wayne State University Press, 1966.

Rutherford, W. Perceptual-motor training and readiness. In Reading and Inquiry. Newark, Delaware: International Reading Association, 1966, 294-296.

Silberberg. N. and Silberberg, Margaret. Myths in remedial education. Journal of Learning Disabilities, 1969, 209-217.

Silver, A.A., Hagin, Rosa A. and Hersh, Marilyn F. Reading disability: teaching through stimulation of deficit perceptual areas. American Journal of Orthopsychiatry, 1967, 37, 744-752.

Simpson, Dorothy M. Learning to Learn. Columbus, Ohio: Charles Merrill, 1968.

Stephens, B. Promoting motor development in young retarded children. Education and Training of the Mentally Retarded, 1970, 5, 119-124,

Stover, R.G. Automatic interaction detector. Madison, Wisconsin: University of Wisconsin Social Science and Program Library Service, 1971.

Tyson, M.C. Pilot study of remedial visuo-motor training. Special Education, 1963, 52, 22-25.

Weiner, P.S. Comments on the relationship between personality patterns and central nervous system deficit in children. In Kirk, S.S. & Becker, W. (eds.)Conference on Children with Minimal Brain Impairment. Held at the University of Illinois, Urbana, January, 1963.

Appendix A

School Behavior Profile

Bruce Balow
109 Pattee Hall
University of Minnesota

The School Behavior Profile is a 68 item experimental scale on which the classroom teacher rates a child's behavior in five areas -- general characteristics, language and thought, intrapersonal behavior, interpersonal behavior, and problem behavior. The School Behavior Profile is not a test which produces a score to be compared against established norms. It is a set of terms which, when checked for a specific child, provide a description of the child's behavior in school as judged by the teacher. Teachers are instructed to check one of four ratings according to the frequency with which the child shows in school the particular behavior reflected by the item rated. The four ratings possible are Almost Always, Often, Seldom, Almost Never. Scoring may then be done using a four point scale with weights assigned each rating, or by collapsing the ratings into a dichotomous scale reflecting simply the presence or absence of the behavior.

The School Behavior Profile was developed from an original pool of nearly 200 terms selected from a variety of checklists and scales for the assessment of deviant behavior. Terms that were identical, highly similar, or not relevant were eliminated leaving 84 terms that appeared to reflect behavior which could be observed by teachers in the course of their regular classroom duties. These 84 terms were then cast into words that would be as much as possible unambiguous, understandable, and representative of observable bits of behavior. The 84 items were evaluated by four psychologists and five physicians. Based on their evaluations a number of items were revised or dropped.

A 73 item form was then subjected to trial in a number of elementary schools in which approximately 15 different teachers each rated several children. Additional changes were made on the basis of the teachers' critiques, resulting in 68 items with four possible ratings for each item as described above.

SCHOOL BEHAVIOR PROFILE

Bruce Balow
109 Pattee Hall
University of Minnesota

Directions to the Teacher: The items below are descriptive terms that apply to many children. Each item can be answered from your observations of the child in question; do not try to compare the child to other children.

Please circle the letter or letters for "Almost always", "Often", "Seldom", or "Almost Never" according to the frequency with which the child shows the particular behavior in school.

TEACHER COMMENTS

A. GENERAL CHARACTERISTICS

1. Neat, clean personal appearance   AA O S AN

2. For Boys: effeminate behavior   AA O S AN

   For Girls: tomboy behavior   AA O S AN

3. Sluggishness, lethargy   AA O S AN

4. Sucks thumb or finger   AA O S AN

5. Bites nails or fingers   AA O S AN

6. Clumsiness, awkwardness   AA O S AN

7. Nervousness, jitteriness, jumpiness AA O S AN

8. Hyperactivity; hardly ever still   AA O S AN

9. Twitches, mannerisms or tics of
   the face or body   AA O S AN

10. Shows odd movements such as flap-
    ping of arms, twisting movements
    of hands in front of face or facial
    grimacing   AA O S AN

64

B. LANGUAGE AND THOUGHT

11. Doesn't speak; uses only grunts
or noises to communicate   AA   O   S   AN

12. Although able to speak, uses mime
or demonstration instead   AA   O   S   AN

13. Speech unintelligible   AA   O   S   AN

14. Expresses ideas poorly; difficult
to follow train of thought   AA   O   S   AN

15. Stutters or stammers   AA   O   S   AN

16. Speech articulation difficulty,
(e.g., omits sounds, substitutes
sounds)   AA   O   S   AN

17. Talkative, chatterbox   AA   O   S   AN

18. Shows rapid thinking   AA   O   S   AN

19. Short attention span   AA   O   S   AN

20. Distracted by sights or sounds
in classroom   AA   O   S   AN

21. Distracted from within self (e.g.,
petit mal like lapses, shifts of
activity or verbal content with-
out apparent external cause)   AA   O   S   AN

22. Dislikes school work   AA   O   S   AN

23. Preoccupied with a fixed idea
(e.g., constantly pretending to be
a train or always drawing the same
things over long periods)   AA   O   S   AN

24. Preoccupied with certain aspects of
things (e.g., their shininess,
texture of color)   AA   O   S   AN

65

C. INTRAPERSONAL BEHAVIOR   TEACHER COMMENTS

    25. Depressed   AA O S AN

    26. Hypersensitivity; feelings   AA O S AN

    27. Crying over minor annoyances and
        hurts   AA O S AN

    28. Self-consciousness; easily
        embarrassed   AA O S AN

    29. Daydreaming   AA O S AN

    30. Anxiety, general fearfulness   AA O S AN

    31. Trusting, trustful   AA O S AN

    32. Reticent or secretive   AA O S AN

    33. Fussy or over-particular   AA O S AN

    34. Examines things in odd ways (e.g.,   AA O S AN
        by sniffing or biting them)

D. PROBLEM BEHAVIOR

    35. Fights with other children   AA O S AN

    36. Bullie other children   AA O S AN

    37. Profane language; swearing, cursing AA O S AN

    38. Temper tantrums (complete loss of
        temper with shouting, angry move-
        ments, etc.)   AA O S AN

    39 Tells lies   AA O S AN

    40. Destructive of property (his own
        or others)   AA O S AN

    41. Daredevil actions   AA O S AN

    42. Boisterousness, rowdiness   AA O S AN

    43. Steals   AA O S AN

    44. Disobedience; does not accept
        adult control   AA O S AN

45. Disruptiveness; tendency to annoy
and bother others   AA   O   S   AN

46. Acts impulsively with little
forethought   AA   O   S   AN

47. Irresponsibility, undependability   AA   O   S   AN

F. INTERPERSONAL BEHAVIOR

48. Formal, controlled responses to
others; "adult-like"   AA   O   S   AN

49. Prefers to play with older children   AA   O   S   AN

50. Prefers to play with younger
children   AA   O   S   AN

51. Social withdrawal, preference for
solitary activities   AA   O   S   AN

52. Uncooperative in group situations   AA   O   S   AN

53. Inattentive to what others say   AA   O   S   AN

54. Attention-seeking, "show-off"
behavior   AA   O   S   AN

55. Self-assertive; seeks leadership
role   AA   O   S   AN

56. Critical of others   AA   O   S   AN

57. Negativistic and contrary   AA   O   S   AN

58. Irritability; hot-tempered, easily
aroused to anger   AA   O   S   AN

59. Jealousy over attention paid
other children   AA   O   S   AN

60. Avoids looking at others directly;
looks past or through them   AA   O   S   AN

61. Passivity, suggestibility; easily
led   AA   O   S   AN

62. Sympathetic to others   AA   O   S   AN

F. ADDITIONS   TEACHER COMMENTS

63. Away from his desk without
    permission   AA   O   S   AN

64. Talking out of order   AA   O   S   AN

65. Does messy work   AA   O   S   AN

66. Tires easily   AA   O   S   AN

67. Generally unnoticed by others   AA   O   S   AN

68. Tattles   AA   C   S   AN

68

Appendix B

TEACHER LOG
READING GROUP

Monday, November 30 - Friday, December 4

SUBJECT 21, Instructional Group II. Areas needing emphasis: 1) Word
Structural Analysis - medial sounds, short vowels, consonant digraphs,
accents & syllables 2) Comprehension 3) Vocabulary.

ABILITY	ACTIVITY
11/30 Comprehension	Read Teacher composed story about his own activities. Answer comprehension questions.
12/1 Structural Analysis-Blends- Vocabulary-Comprehension Visual Memory	Game-Quizmo Sentence construction Game-Concentration
12/2 Comprehension - Vocabulary	Sight reading
12/3 absent-illness	
12/4 absent-illness	

SUBJECT 22, Instructional Group II. Areas needing emphasis: 1) Word
Structural Analysis - medial sounds, accents & syllabication 2) Comprehension 3) Vocabulary.

ABILITY	ACTIVITY
11/30 Word Structural Analysis	Practice and review of beginning, blends ch, th, sh, wh, SRA Phonics survey
12/1 Word Structural Analysis- Blends-Comprehension-Vocabulary, Visual Memory	Game-Quizmo Sentence Construction Game-Concentration
12/2 Word Structural Analysis Sight Reading	Development and Practice oa, ow, oe sounds, Sentence Construction Game
12/3 Word Structural Analysis	Medial vowels-review and practice oa, ai sounds
12/4 Sight Reading, Vocabulary, Comprehension	"Reading Bee" - recognizing words, using them in sentences

SUBJECT 23, Instructional Group II. Areas needing emphasis: 1) Word
Structural Analysis-ending sounds, short vowels 2) Comprehension 3)
Vocabulary

ABILITY	ACTIVITY
11/30 Comprehension	Sequencing and answering compre-

		henuion questions from a Teacher composed story about the child's activities
	Word Structural Analysis	Seat work, review of short vowels
12/1	Comprehension - Vocabulary	Sentence construction
	Word Study Skills	Ending sounds-review, practice beginning blends-game "Quizmo"
12/2	Sight Reading	Game played by making sentences from phrases constructed by students
12/3	Comprehension	Reading a story followed by comprehension questions
	Visual Memory	Game-Concentration
12/4	Comprehension	Continue reading and work on story, Constructing sentences

SUBJECT 24, Instructional Group II. Areas needing emphasis: 1) Word Structural Analysis - beginning digraphs 2) Comprehension 3) Vocabulary.

	ABILITY	ACTIVITY
11/30	Word Structural Analysis	Beginning and ending blends-th, sh, ch, wh, - SRA Phonics survey
12/1	Word Structural Analysis	Blends-game, Quizmo
12/2	Sight Reading, Vocabulary	Sentence construction
12/3	Vocabulary and Visual Memory Skills	Game-Concentration
12/4	Comprehension, Vocabulary	Constructing sentences from phrases made up by students

SUBJECT 25, Instructional Group II. Areas needing emphasis: 1) Word Structural Analysis: medial digraphs, accents and syllabication.

	ABILIT	ACTIVITY
11/30	Comprehension	Sequencing and answering comprehension questions from a Teacher composed story of child's activities
	Word Structural Analysis	Medial digraphs, seat work

12/1	Sight Reading, Vocabulary	Sentence construction
	Visual Memory	Game-Concentration
	Word Structural Analysis and Vocabulary	Quizmo game using blends and blend words
12/2	Sight Reading, Comprehension, Vocabulary	Sentence construction from phrases made by the teacher
12/3	Sight Reading, Comprehension, Vocabulary	Sentence construction
	Visual Memory	Game-Concentration
,12/4	Comprehension	Original sentence construction and meaning analysis of phrases

SUBJECT 26, Instructional Group II. Areas needing special emphasis: 1) Word Structural Analysis-medial digraphs 2) Comprehension.

	ABILITY	ACTIVITY
11/30	Comprehension, Vocabulary, Medial digraphs	SRA Reading Laboratory
12/1	Word Structural Analysis Comprehension Visual Memory-Phrases	Homophones-Development, Practice Sentence Construction Game-Concentration
12/2	Word Structural Analysis	Identifying Visual Word Elements in sentences constructed yesterday
12/3	Vocabulary	Development and review of new words used in week's sentence construction activity
	Visual Memory	Game-Concentration
12/4	Word Structural Analysis	Review blends; ch, sh, th, wh SRA Phonics survey

SUBJECT 27, Instructional Group II. Areas needing special emphasis: 1) Word Structural Analysis-medial vowels, syllabication, accents 2) Vocabulary.

	ABILITY	ACTIVITY
11/30	Comprehension, Vocabulary, Medial digraphs	SRA Reading Laboratory
12/1	Comprehension, Vocabulary, Medial digraphs	SRA Reading Laboratory

Teacher Log-Reading Group
November 30-December 4, 1970
Page 4

12/2	Visual Structural Analysis, Vocabulary	Crossword Puzzle, Dictionary Practice
12/3	Visual Word Analysis, Vocabulary	"Probe" game
12/4	Comprehension, Vocabulary, Syllaoication	SRA Reading Laboratory, Crossword Puzzle, Dictionary Practice

73

TEACHER'S LOG
READING GROUP
November 30 - December 4

SUBJECT 28, Instructional Group I.   Areas needing special emphasis:
Vocabulary and Comprehension.

	ABILITY	ACTIVITY
11/30	Inference, Meaning, inter- pretation	Limericks
	Medial digraphs, vocabulary	Homophones
12/1	Comprehension, Vocabulary Word Structural Analysis	SRA Laboratory
12/2	Comprehension, Vocabulary Word Structural Analysis	SRA Laboratory Concentration
12/3	Word Analysis, Vocabulary	"Probe" (word game)
12/4	Word Analysis, Vocabulary	"Probe"

SUBJECT 29, Instructional Group I.   Areas needing special emphasis: 1.
Word Structural Analysis-medial sounds 2. Comprehension

	ABILITY	ACTIVITY
11/30	Absent	
12/1	Comprehension, Vocabulary Word Structural Analysis	SRA Reading Laboratory
12/2	Visual Word Analysis	Crossword Puzzles
12/3	Visual Word Analysis	Crossword Puzzles
12/4	Visual Word Analysis	Crossword Puzzles

SUBJECT 210, Instructional Group I.   Areas needing special emphasis: 1.
Comprehension 2. Word Structural Analysis-Syllabication.

	ABILITY	ACTIVITY
11/30	Syllabication	Developmental lesson and worksheet
12/1	Comprehension, Word Meaning	SRA Reading Laboratory. Word definitions-Dictionary work
12/2	Vocabulary	Scrabble
12/3	Vocabulary	Scrabble

12/4   Comprehension, Vocabulary,   SRA Reading Laboratory
         Word Study-Syllabication

SUBJECT 211, Instructional Group I. Areas needing special emphasis:
1. Comprehension 2. Vocabulary

ABILITY	ACTIVITY
11/30 Comprehension, Vocabulary, Word Study	SRA Reading Laboratory
12/1 Comprehension, Vocabulary, Word Study	SRA Reading Laboratory
12/2 Word Analysis, Vocabulary	Word game-"Probe"
12/3 Comprehension	Limericks. Independent reading
12/4 Vocabulary, Comprehension	Crossword Puzzle

SUBJECT 212, Instructional Group I. Areas needing special emphasis:
1. Word Structural Analysis-medial sounds, syllabication 2. Vocabulary

ABILITY	ACTIVITY
11/30 Comprehension, Vocabulary, Word Structural Analysis-Medial sounds and syllabication	SRA Reading Laboratory Short story "Mama and The Occasion"
12/1 Absent	
12/2 Comprehension	Independent reading
12/3 Visual Word Analysis-Vocabulary	Word game-"Probe"
12/4 Vocabulary, Comprehension	Sentence Construction

SUBJECT 213, Instructional Group I. Areas needing special emphasis:
Comprehension

ABILITY	ACTIVITY
11/30 Comprehension, Vocabulary, Word Study	SRA Reading Laboratory
12/1 Visual Word Analysis, Vocabulary	Crossword Puzzles

Teacher's Log-Reading Group
November 30-December 4, 1970
Page 2

12/2	Comprehension	Independent reading for book report
12/3	Absent	
12/4	Comprehension	Sentence construction

SUBJECT 214, Instructional Group I. Areas needing special emphasis:
1. Vocabulary 2. Word Structural Analysis-Syllabication.

	ABILITY	ACTIVITY
11/30	Comprehension, Vocabulary, Word Study	SRA Reading Laboratory
12/1	Vocabulary	Dictionary work
12/2	Vocabulary	Synonyms- Definitions
12/3	Syllabication	Developmental lesson and work sheet
12/4	Comprehension - Vocabulary	Poetry reading and interpretation

SUBJECT 215, Instructional Group I. Areas needing special emphasis:
1. Comprehension 2. Vocabulary 3. Word Structural Analysis-Syllabication

	ABILITY	ACTIVITY
11/30	Comprehension, Vocabulary, Word Study	SRA Reading Laboratory
12/1	Comprehension, Visual Word Analysis, Vocabulary	SRA Reading Laboratory, Crossword Puzzle-construction
12/2	Comprehension, vocabulary	Independent Reading
12/3	Absent	
12/4	Visual Word Analysis- Vocabulary	Completed crossword puzzle

76

TEACHER'S LOG

PERCEPTUAL MOTOR GROUP
November 30 - December 4

SUBJECT 31, Instructional Group II. Deficit areas: 1) Laterality 2) Directionality 3) Perceptual Motor Match-especially ocular pursuits.

	ABILITY	ACTIVITY
11/30	1. Ocular Pursuits 2. Perceptual Motor Match	Eye tracking Chalkboard exercise, circles, squares, cursive letters, dot to dot matching, designs, (seatwork)
12/1	1. Ocular Pursuits 2. Perceptual Motor Match	Eye tracking Chalkboard, tracing, cutting, posting geometric designs
12/2	Laterality, directionality, coordination & balance	Ball control movements - games
12/3	Absent (illness)	
12/4	1. Ocular pursuits 2. Directionality 3. Directionality, laterality, balance	Eye tracking Obstacle course games Ball control movements

SUBJECT 32. Instructional Group II. Deficit areas: 1.) Laterality 2) Directionality 3) Perceptual Motor-ocular pursuit (Right eye)

	ABILITY	ACTIVITY
11/30	1. Ocular Pursuits 2. Perceptual Motor Match	Eye tracking Chalkboard exercise, tracing, cutting, posting, geometric designs
12/1	1. Ocular Pursuits 2. Perceptual Motor Match	Eye tracking Chalkboard, dot to dot, matching designs
12/2	Laterality, directionality, balance	Ball control movements
12/3	Laterality, directionality, balance	Ball control movements
12/4	Laterality, directionality, balance	Obstacle course, ball control movements

SUBJECT 33, Instructional Group II. Deficit areas: 1) Laterality 2) Directionality 3) Perceptual Motor Match-ocular pursuits.

	ABILITY	ACTIVITY
11/30	1. Ocular Pursuits	Eye tracking
	2. Perceptual Motor Match	Chalkboard exercise, tracing, cutting, posting geometric designs
12/1	1. Ocular Pursuits	Eye tracking
	2. Perceptual Motor Match	Chalkboard, dot to dot, matching designs
12/2	Laterality, directionality balance	Ball control movements
12/3	Laterality, directionality balance	Ball control movements
12/4	Laterality, directionality balance	Obstacle course, ball control movements

SUBJECT 34, Instructional Group II. Deficit areas: 1) Perceptual Motor Match-Ocular Pursuits 2) Form Perceptual 3)Directionality 4) Laterality

	ABILITY	ACTIVITY
11/30	1. Ocular Pursuits	Eye tracking
	2. Form Perception	Matching geometric designs
	3. Perceptual Motor Match	Cutting, posting, tracing designs, chalkboard exercises
12/1	1. Ocular Pursuits	Eye tracking
	2. Form Perception	Match lined designs
	3. Perceptual Motor Match	Copying dot to dot lined designs, chalkboard exercises
12/2	Laterality, directionality	Ball control movements
12/3	Laterality, directionality	Ball control movements
12/4	Laterality, directionality	Ball control movements, obstacle course

SUBJECT 35, Instructional Group II. Deficit areas: 1) Directionality 2) Form Perception 3) Advanced Balance 4) Perceptual Motor Match

	ABILITY	ACTIVITY
11/30	Form Perception	Eye tracking, matching geometric designs

	Perceptual Motor Match	Tracing, cutting, posting geometric designs, chalkboard exercise
12/1	Form Perception Perceptual Motor Match	Matching geometric designs dot to dot lined matching designs
12/2	Directionality, Balance	Ball control techniques
12/3	Directionality, Balance	Ball control techniques, obstacle course
12/4	Directionality, Balance	Ball control techniques, obstacle course games

SUBJECT 36, Instructional Group II. Deficit areas: 1) Ocular Pursuits
2) Balance (advanced) 3) Laterality

	ABILITY	ACTIVITY
11/30	Balance	Balance Board exercises, Ball stunts, animal walks-wheelborrow
12/1	Balance	Balance Board stunts
12/2	Laterality, Balance	Ball control techniques
12/3	Laterality, Balance, Directionality	Ball control techniques, obstacle course
12/4	Laterality, Balance, Directionality	Ball control techniques, obstacle course

SUBJECT 37, Instructional Group I. Deficit areas: 1) Perceptual Motor Match, Ocular Pursuits 2) Laterality

	ABILITY	ACTIVITY
11/30	Perceptual Motor Match	Matching, tracing, cutting, posting geometric designs
12/1	Perceptual Motor Match	Dot to dot matching lined designs
12/2	Laterality, Directionality	Ball control movements
12/3	Laterality, Directionality	Ball control movements
12/4	Laterality, Directionality	Ball control movements, obstacle course

SUBJECT 38, Instructional Group I. Deficit areas: 1) Form Perception
2) Perceptual Motor Match-Ocular Pursuits 3) Balance 4) Directionality

	ABILITY	ACTIVITY
11/30	Form Perception Perceptual Motor Match	Matching designs Tracing, cutting, posting geometric designs
12/1	Form Perception Perceptual Motor Match	Matching designs Dot to dot lined design matches

12/2	Balance, Directionality	Ball control techniques
12/3	Balance, Directionality	Ball control techniques, obstacle course
12/4	Balance, Directionality	Ball control techniques, obstacle course

SUBJECT 39, Instructional Group II. Deficit areas: 1) Laterality 2) Perceptual Motor Match

ABILITY		ACTIVITY
11/30	Laterality, Directionality	Balance board techniques stunts
12/1	Laterality, Directionality	Balance board stunts
12/2	Laterality, Directionality	Ball control techniques
12/3	Laterality, Directionality	Ball control techniques, obstacle course
12/4	Laterality, Directionality	Ball control techniques, obstacle course

SUBJECT 310, Instructional Group II. Deficit areas: 1) Perceptual Motor Match 2) Form Perception 3) Balance-directionality (advanced)

ABILITY		ACTIVITY
11/30	Balance, Directionality	Balance board technique stunts
12/1	Balance, Directionality	Balance board stunts
12/2	Balance, Directionality	Ball control techniques
12/3	Balance, Directionality	Ball control techniques, obstacle course
12/4	Balance, Directionality	Ball control techniques, obstacle course

SUBJECT 311, Instructional Group II. Deficit areas: 1) Perceptual Motor Match 2) Laterality

ABILITY		ACTIVITY
11/30	Laterality, Directionality	Balance board stunts
12/1	Laterality, Directionality	Balance board stunts
12/2	Laterality, Directionality	Ball control techniques
12/3	Laterality, Directionality	Ball control techniques, obstacle course
12/4	Laterality, Directionality	Ball control techniques, obstacle course

SUBJECT 312, Instructional Group II. Deficit areas: 1) Form Perception 2) Perceptual Motor Match 3) Laterality 4) Directionality

ABILITY		ACTIVITY

11/30	Laterality, Directionality	Balance board stunts
12/1	Laterality, Directionality	Balance board stunts
12/2	Laterality, Directionality	Ball control techniques
12/3	Laterality, Directionality	Ball control techniques, obstacle course
12/4	Laterality, Directionality	Ball control techniques, obstacle course

SUBJECT 313, Instructional Group II. Deficit areas: 1) Balance 2)
Form Perception 3) Perceptual Motor Match-Ocular Pursuits

	ABILITY		ACTIVITY
11/30	Balance		Balance board stunts
12/1	Laterality, Directionality		Balance board stunts
12/2	Laterality, Directionality		Ball control techniques
12/3	Laterality, Directionality		Ball control techniques, obstacle course
12/4	Laterality, Directionality		Ball control techniques, obstacle course

SUBJECT 314, Instructional Group II. Deficit areas: 1) Form Perception
2) Perceptual Motor Match 3) Balance

	ABILITY		ACTIVITY
11/30	Balance		Balance board stunts
12/1	Laterality, Directionality		Balance board stunts
12/2	Laterality, Directionality		Ball control techniques
12/3	Laterality, Directionality		Ball control techniques, obstacle course
12/4	Laterality, Directionality		Ball control techniques, obstacle course

SUBJECT 315, Instructional Group II. Deficit areas: 1) Perceptual Motor
Match 2) Laterality

	ABILITY		ACTIVITY
11/30	Laterality, Directionality		Balance board stunts
12/1	Laterality, Directionality		Balance board stunts
12/2	Laterality, Directionality		Ball control techniques
12/3	Laterality, Directionality		Ball control techniques, obstacle course
12/4	Laterality, Directionality		Ball control techniques, obstacle course

SUBJECT 316, Instructional Group II. Deficit areas: 1) Perceptual Motor
Match-Ocular Pursuits 2) Balance 3) Laterality

Teacher's Log-Perceptual Motor Group
November 30 -December 4
Page 6

	ABILITY	ACTIVITY
11/30	Balance, Laterality	Balance board stunts
12/1	Laterality, Directionality	Balance board stunts
12/2	Laterality, Directionality	Ball control techniques
12/3	Laterality, Directionality	Ball control techniques, obstacle course
12/4	Laterality, Directionality	Ball control techniques, obstacle course

82

85

TEACHER'S LOG
Placebo Control Group
November 30 - December 4

During this week the children in this group completed a unit on children of other lands and began a unit on crafts. The main follow up activity for the "Children of Other Lands" unit, making a cartoon story of themselves living in one of the countries studied, was used because of its relation to a previous unit, "Animation as a Medium".

11/30 Movie on Eskimo Children and Discussion

12/1   Beginning of project of drawing a cartoon story of themselves living in one of the countries they had studied during this unit

12/2   Continuation of Cartoon Story

12/3   Continuation of Cartoon Story

12/4   Began Crafts Unit. First topic: "Paper Construction". Children saw two short movies: Paper Sculpture and Paper in the Pound. Discussion followed of the techniques employed and projects for making paper objects discussed in the film.

83

Appendix C

Pre and Post Test Means and Standard Deviations
for all Variables

Test			Treatment Group			
	PERCEPTUAL MOTOR		READING		CONTROL	
	X̄	SD	X̄	SD	X̄	SD
			WORD MEANING			
Pre	18.19	6.88	18.86	10.60	21.00	8.03
Post	22.63	5.94	24.43	8.00	23.50	6.24
			PARAGRAPH MEANING			
Pre	30.19	9.19	29.00	14.95	30.79	15.12
Post	33.94	8.04	34.21	12.18	34.71	9.32
			WORD STUDY SKILLS			
Pre	35.31	9.03	37.93	12.37	35.71	10.29
Post	36.94	10.88	42.57	9.01	38.07	10.44
			READING TOTAL			
Pre	83.69	20.14	85.79	36.62	87.50	30.62
Post	93.25	21.13	101.21	26.37	96.29	20.95
			LATERALITY			
Pre	5.94	1.64	6.50	1.18	6.71	.88
Post	6.25	1.30	6.43	1.12	6.86	.83
			DIRECTIONALITY			
Pre	17.00	2.32	16.86	1.73	17.21	1.47
Post	17.13	2.12	18.14	1.46	17.86	1.60
			PERCEPTUAL MOTOR MATCH			
Pre	29.38	3.30	29.86	3.00	30.21	3.03
Post	27.94	2.61	28.00	3.16	26.86	3.44
			BALANCE			
Pre	10.75	.97	10.00	1.51	10.00	.93
Post	10.69	.92	10.36	.61	10.36	1.50

Test	PERCEPTUAL MOTOR		READING		CONTROL	
	X̄	SD	X̄	SD	X̄	SD
	PHYSICAL FITNESS					
Pre	3.94	.24	3.86	.35	3.86	.35
Post	3.93	.56	3.86	.35	4.00	.00
	FORM PERCEPTION					
Pre	5.13	1.32	5.07	1.58	5.21	.86
Post	5.63	1.05	5.57	1.24	5.57	.10
	PERCEPTUAL MOTOR TOTAL					
Pre	72.13	7.17	72.14	7.05	73.21	4.93
Post	71.69	4.30	72.36	5.86	71.50	5.01
	GENERAL CHARACTERISTICS					
Pre	9.31	7.26	9.43	6.54	9.29	7.02
Post	10.31	9.17	8.14	4.34	9.64	8.55
	LANGUAGE and THOUGHT					
Pre	7.44	5.07	7.86	4.05	8.50	5.18
Post	8.75	4.75	7.14	2.20	8.14	6.03
	INTRAPERSONAL BEHAVIOR					
Pre	4.69	4.15	5.21	4.07	6.71	4.88
Post	6.13	5.36	6.64	3.46	5.93	5.02
	PROBLEM BEHAVIOR					
Pre	4.25	4.68	5.00	4.07	4.14	5.64
Post	5.81	5.76	5.07	2.87	5.21	5.63
	INTERPERSONAL BEHAVIOR					
Pre	8.56	5.67	10.29	4.76	9.64	5.41
Post	10.63	6.32	9.64	4.82	9.43	5.75
	BEHAVIOR TOTAL					
Pre	34.25	24.38	37.79	19.59	38.29	23.29
Post	41.63	28.91	36.64	14.10	38.36	27.67