

EFFECTIVENESS OF THE BENTON RIGHT-LEFT DISCRIMINATION TEST
IN IDENTIFYING CHILDREN WITH READING DISABILITIES

by

GLENN DARYLL HUNDLEBY

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Supervisor: Assistant Professor Ronald E. Tinney

ABSTRACT

This study investigated the effectiveness of the Benton Right-Left Discrimination Test in identifying children with reading disabilities among eighty-six grade three subjects, selected randomly from seven elementary schools in Victoria, British Columbia. The children were classified as either confused (C) or not confused (NC), and again, as either reversal (R) or normal (N), in their responses on right-left discrimination. The criterion variable, reading ability, was determined on three separate measures.

The effectiveness of the Benton Right-Left Discrimination Test was demonstrated when children in the C and R groups were found to be significantly poorer readers, on two measures of reading ability, than children in the NC and the N groups. Differences on the third measure of reading ability, Word Knowledge, were not significant, indicating that poor word recognition skills are probably not characteristic of the reading disability identified. A strong trend toward a significant difference in intelligence was observed between the C and NC groups, however, there appeared to be no relationship between intelligence and systematic reversal, as this trend did not occur between the R and N groups.

Examiners: _____

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
The Purpose	1
Significance of the Problem	2
Definitions of Terms Used in the Literature	3
Lateral Dominance	3
Directional Confusion	4
II. REVIEW OF THE RELEVANT LITERATURE	5
Studies Dealing With the Relationship Between Lateral Preference and Reading Ability	5
Crossed Dominance	5
Incomplete Hand, Eye, and Foot Dominance	6
Mixed Dominance	10
Studies Dealing With the Relationship Between Directional Confusion and Reading Ability	12
Studies Dealing With Tests of Directional Confusion, Reading Ability and Intelligence	14
Benton Right-Left Discrimination Test	15
Reading Disability	16
Metropolitan Elementary Reading Test	17
Informal Reading Inventory	18
Intelligence	18
Lorge-Thorndike Intelligence Test	19
Summary	20
III. PROBLEM AND STATEMENT OF THE HYPOTHESES	22
Statement of the problem	24
Hypotheses	24
Research Model	24
Criterion Measure	26
Definitions	27
Statement of the hypotheses	28

CHAPTER	PAGE
IV. A. METHOD	29
Experimental Design	29
Subjects	29
Procedure	29
Benton Right-Left Discrimination Test	30
Administration	30
Recording responses	31
Informal Reading Inventory	31
Administration	32
Scoring	32
Other Testing	32
Assignment of Subjects	33
Statistical Design	36
B. RESULTS	37
Summary of Findings	42
V. DISCUSSION AND SUMMARY	47
Limitations of this Investigation	47
Discussion and Educational Implications	48
Summary	52
REFERENCES	54
APPENDICES	59
ANOVA on I.Q. (Total), IR, WK, and RDG Between Confused and Not Confused Groups	60
Right-Left Discrimination Test (Question Sheet)	61

LIST OF TABLES

TABLE	PAGE
1. Experimental Design	34
2. Assignment of Subjects According to Scores on the <u>Benton Right-Left Discrimination Test</u>	39
3. F Tests of Homogeneity of Variance on Intelligence, Age and Reading Scores	40
4. <u>t</u> Tests on Intelligence and Age	41
5. Analysis of Covariance on IR, WK and RDG Between Confused and Not Confused Groups With I.Q. (Total) as the Covariate	43
6. Correlations Between I.Q. (Total) and IR, WK and RDG	44
7. Analysis of Covariance Adjustments on IR, WK and RDG Mean Grade Levels for Confused and Not Confused Groups with I.Q. (Total) as the Covariate	44
8. <u>t</u> Tests on IR, WK and RDG for Reversal and Normal Groups	45

LIST OF FIGURES

1. Distribution of Scores on the Benton Right-Left
Discrimination Test 35

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CHAPTER I

INTRODUCTION

The Purpose

There exists within the normal school population a number of children who meet unexpected difficulties in learning to read. Early theoretical formulations attempted to explain these difficulties in terms of poorly developed lateral dominance (Orton, 1928; Dearborn, 1931; Monroe, 1932). However, nearly four decades of extensive research has failed to produce a definitive answer to the question of whether a relationship exists between lateral dominance and reading ability.

Part of the reason that this controversy has gone on so long is because of the numerous distinguishing traits identified as reflecting lateral dominance. Investigators have studied crossed dominance, incomplete dominance, mixed dominance, handedness, ocular dominance, and directional confusion, among other things, with little concern for the diluting effect of so many conditions. Indeed, it would seem that with all these patterns of lateral dominance being identified, no one trait could reach significance among poor readers, in any case. Thus, there is a need to identify a more general category of lateral dominance. This consideration, then, became the basis of the present investigation.

Two aspects of "laterality" or right-left behavior have been described by Benton (1957). The motor aspect, being represented by the degree of hand preference, and the perceptual aspect, which is reflected in the ability to discriminate between the right and left sides of one's body. Thus "awareness" becomes the distinguishing factor between these general categories of lateral dominance.

The present investigation was designed to study the possible relationship of one of these factors, right-left discrimination, to reading ability. The purpose was to determine the effectiveness of the Benton Right-Left Discrimination Test in identifying reading disability in grade three children.

Significance of the Problem

Although poorly established lateral dominance and weaknesses in right-left discrimination have frequently been described as important diagnostic features of dyslexia or reading disability (Orton, 1928, 1937; Harris, 1961), reviews of the research (Money, 1962; Bateman, 1964; Robinson, Weintraub, and Hostetter, 1968; Penn, 1966; Weintraub, 1968) continue to report confusion and contradiction. Comparison of findings has been most difficult because of differences in the specific aspect of lateral dominance studied or controlled. These include not only differences in the specific aspect of lateral dominance studied, but in age, intelligence, and in the degree and type of reading disability, as well.

There has been no empirical evidence, outside of pure conjecture (Delacato, 1959, 1963, 1966; Kephart, 1960; Kephart and Roach, 1966) that remediation of laterality problems has any effect upon reading ability. Yet, reading clinics often encounter dyslexic children who reverse letters and words in attempting to read. A closer look at the related research may provide reasons for the apparent differences of opinion between reading clinicians and researchers. The present study was designed to seek out and then empirically test some of these reasons.

Definitions of Terms Used in the Literature

A number of definitions are required at this point, to help provide a more meaningful review of the research. The following definitions are taken from Harris (1958, p. 3) and have been found to be synonymous with accepted usage (Arey, Burrows, Greenhill, and Hewitt, 1957).

Lateral Dominance

The term "lateral dominance", also known as lateral preference, laterality, and visual motor consistency, refers to the preferred use and better performance of one side of the body as compared to the other. While there is a general tendency to be consistently right dominant or left dominant, a number of different kinds of dominance patterns may be found:

- a. Crossed dominance. The term "crossed dominance" applies when the dominant hand and the dominant eye

are on opposite sides of the body.

b. Mixed or incomplete (hand, eye, or foot) dominance.

The term "mixed hand, eye, or foot dominance" applies when an individual does not show consistent preference for one hand, eye, or foot. When there is complete or almost complete equality of the two hands, a person is said to be ambidextrous.

c. Mixed dominance. The term "mixed dominance", without specific reference to hand, eye, or foot, includes both crossed dominance and incomplete dominance.

Directional confusion

The term "directional confusion" refers to a knowledge of left and right. This is usually demonstrated by a subject in response to simple questions such as "point to your left ear", and is distinct from actual use of the dominant hand, eye, or foot in performance tasks. In addition, on the Benton Right-Left Discrimination Test, subjects are asked to carry out crossed commands such as "point to your left ear with your right hand," as well as demonstrate an ability to identify left and right in a picture of a man facing them.

CHAPTER II

REVIEW OF THE RELEVANT LITERATURE

This chapter will be divided into three main parts: first, a review of research concerned with the relationship between lateral preference and reading ability; next a review of research concerned with the relationship between directional confusion and reading ability; and finally a brief survey of opinion on the selection and application of the tests to be used in this investigation. Summaries are given at the end of each section.

Studies Dealing With the Relationship Between Lateral Preference and Reading Ability

Crossed dominance

Having the dominant hand and eye on the same side of the body or on opposite sides of the body, was found by Stephens, Cunningham, and Stegler (1967) to have no significant effect upon reading readiness. They grouped beginning readers according to hand-eye preference patterns and then studied their scores on the Metropolitan Reading Readiness Test for differences in achievement. Balow (1963) using the Gates Reading Readiness and Primary Reading Tests, found no significant difference in reading readiness, as well, between right dominant and crossed dominant children in a random sample of grade one children.

Using a random sample of 120 public school children in Levittown, New York, Cohen and Glass (1968) were unable to establish any evidence of a relationship between reading disability and crossed dominance, at either the grade one or grade four levels.

Harris, (1957) compared 316 clinical reading disability children with 245 unselected school children for performance on the Harris Tests of Lateral Dominance (Harris, 1956). Included is a test of directional confusion, five tests of hand dominance, two tests of eye dominance, and two tests of foot dominance. He found that a significant number of children with a reading disability had crossed hand and eye preferences. It could be argued, however, that something more than just crossed dominance was being observed in this case. Since the incidence of mixed hand dominance was also significantly high among the disabled readers, this significance was reflected when hand and eye preferences were compared.

Incomplete Hand, Eye, and Foot Dominance

Consistency of hand preference during ball throwing, whittling, and pencil activities, was studied by De Hirsch, Jansky, and Langford (1966) to show consistent functional dominance. The 53 children used in their study came from lower middle-class homes, had a mean C.A. of 5 years 10 months, and ranged in I.Q. from 84 to 116. The findings indicated that two-thirds of the children

settled early (age 5) on a preferred hand, but did not score any higher in reading readiness than those who were still ambidextrous.

Retarded readers were found not to differ significantly from normal readers in any type of mixed dominance, in a study by Balow and Balow (1964). A sample of 250 grade two children was selected from the random sample of 302 first grade children studied the year before by Balow (1963). It seems likely that such a procedure would tend to insure verification of the previous findings. Nevertheless, a study of 209 Scottish school boys by Belmont and Birch (1965) also indicated no relationship between inconsistent lateral preference and reading disability.

Since tests of lateral preference involve relatively simple tasks, their discriminating ability has often been questioned (Cohen and Glass, 1968; Hillerich, 1964). Smith (1950) made an interesting discovery in this connection, studying a group of retarded readers and a group of reading achievers aged nine to eleven. The extensive battery of tests administered included tests of hand, eye, foot, and ear preference, tests of reversals, mirror image drawing, as well as the Van Riper Test of Central Dominance (Van Riper, 1935). Results showed that only the Van Riper Test, a sensitive test of hand preference, revealed significant differences between the good and poor readers.

Gradually, as better tests of lateral dominance were developed, other investigators began to find signs of a relationship between

mixed hand dominance and reading disability, in children at the primary level. Using the Harris Test of Lateral Dominance, Harris, (1957) found that 40% of his reading disability children, at age seven, exhibited incomplete hand dominance, at age nine 25% had similar difficulties. In a later study (Harris, 1958), however, the incidence of incomplete hand dominance in eleven year old reading disability children showed a significant drop.

Confirmation of these results has been presented by Cohen and Glass (1968), who also used the Harris Tests of Lateral Dominance. They found poor readers in grade one were more likely to have incomplete hand dominance, while good readers were more likely to have a dominant hand. Among grade four children no such distinguishing factor could be found.

One might question why the incidence of incomplete hand dominance in reading disability cases appears to diminish with age. One possible explanation (Cohen and Glass, 1968), is that the tests of laterality involve relatively simple identification tasks which lose their discriminating ability among older children, because of the effects of chronological growth upon the individual. This would suggest that incomplete hand dominance may still exist among more mature poor readers, but that the tests used are not sufficiently discriminating to measure it.

An interesting study by Silver and Hagin (1960) appears to have overcome these maturational effects. They administered a

large number of neurological and perceptual tests to 100 third and fourth grade public school children. Included among the tests of dominance was a rather simple method for evaluating the "dominant cerebral hemisphere". It consisted of observing the higher elevated hand when a child was asked to extend his arms in front of the body, while keeping his eyes closed and his fingers spread. A discrepancy between the higher elevated hand on this "extension of arms test" and the dominant hand (that used in writing), was observed in 96% of the 41 children found to be reading below their mental age and grade placement. There was no incidence of a discrepancy among the remaining control group. Ages of the children ranged from 8-6 to 14 years, while I.Q. varied from 81 to 123.

A longitudinal study was carried out using thirty children with reading disability and thirty control children taken from the same clinical population (Silver and Hagin, 1964). Both groups were matched for age, sex, and I.Q. Ten years after the initial testing (mean C.A. now 19 years) the "extension of arms test" still distinguished between the reading disability cases and the adequate readers. Whether such a test gives a true indication of lateral dominance is another question.

It was noted by Schilder (1927) that on the extension of the arms, with the eyes closed and the finger spread, one hand tended to be slightly higher than the other. Thus, it was suggested

(Silver and Hagin, 1960) that in the absence of peripheral orthopedic or neurologic defects, the elevated extremity was the one with the greater muscle tone and hence an indication of the dominant cerebral hemisphere. A discrepancy between the elevated hand on this "extension test" and the peripherally dominant hand (that used for writing) was considered evidence of inconsistent or incomplete hand dominance. However, this suggestion appears to go well beyond the interpretations presented by Schilder (1927). Indeed, proof of the validity of the "extension test" as a measure of any type of dominance has yet to be published.

Mixed Dominance

In tests of hand, eye, and foot dominance, Silver and Hagin (1960) found the incidence of mixed dominance to be no greater in a group of disabled readers than in a control group of 100 third and fourth grade children selected from a public school in suburban New Jersey. Similar findings were reported by Tinker (1965). He identified 67 poor readers in grades two, four and six, and matched them with a control group of normal readers of the same sex, grade, and I.Q. A three year study by Hillerich (1964), beginning with 520 children in kindergarten and ending with 400 in grade three, also suggested that mixed dominance was not significantly associated with differences in reading. The mean I.Q. of these children was 115, however, raising the question as to whether intelligence may have been a factor in overcoming any handicapping effect of mixed dominance. Further evidence,

rejecting the possibility that a relationship exists between mixed dominance and reading disability, has been presented by Balow and Balow (1964).

The research studies discussed in this first section indicate that:

- (a) The lack of sensitivity of the tests used to measure dominance patterns leaves most studies open to serious criticism. Even the more elaborate tests of laterality involve relatively simple identification tasks which fail to discriminate between learned and unlearned dominance patterns.
- (b) The degree of reading disability varies from study to study causing results to be contradictory. There is some evidence, also, which indicates that where reading disability is severe (clinic cases) there is a greater chance of finding a relationship between lateral preference and reading ability.
- (c) With the exception of incomplete hand dominance, there is a consistent lack of support for any relationship between lateral preference and reading ability. Indeed, among older disabled readers no distinguishing lateral preference trait could be found.

Studies Dealing with the Relationship Between
Directional Confusion and Reading Ability

Harris (1957) was one of the first investigators to report a high incidence of directional confusion among children with reading disabilities. While 38% of his poor readers showed confusion, age seven, only 5% of the unselected or control children had similar difficulties. Knowledge of left and right at age nine, however, did not differentiate between normal and poor readers at all.

Similar findings, reported by Cohen and Glass (1968), also indicate that grade one children with reading disabilities often have difficulty identifying the left and right sides of their bodies. They also found the incidence of directional confusion among poor readers in grade four was not significant, confirming the observations of Harris.

Silver and Hagin (1960) reported evidence that while the simple identification tasks of directional confusion may be learned by older poor readers, more complex tasks could be added, thereby causing directional confusion to appear as a more enduring phenomenon. Studying children aged 8-6 to 14 years, they found 92% of the poor readers exhibited defects in right-left discrimination. At the same time, no such defects were found in the control group of thirty children taken from the same population.

Benton and Kemble (1959) studied twenty children of average reading ability and twenty children receiving remedial reading instruction. All were within the age range of eight to ten years, and were matched with respect to the "decisively important factor of intelligence level" (Benton, 1959). While two average readers showed deviant responses on Forms A and V of the Benton Right-Left Discrimination Test, six reading disability children were so rated. It appeared that the salient difference between the two groups was in the higher incidence of systematic reversals in children with reading disability. These children, who consistently reversed left and right when responding to the test questions, rather than exhibiting the expected general confusion, made up two-thirds of the deviant cases. However, the extremely small number of deviant cases identified seriously limits any interpretations which may have been drawn from this study.

A similar investigation (Benton, 1958), attempted to assess the significance of systematic reversal upon achievement in arithmetic, reading and language skills. Of the thirty-four fourth grade children studied only seven were classified as making systematic reversals. Thus, even though a significant difference in reading achievement was reported between children who made systematic reversals and those who did not, the small sample size hampers any direct interpretation. Despite the weaknesses inherent in these two studies, however, it appears that the Benton Right-Left Discrimination Test may be able to

distinguish directional confusion in older children.

A number of conclusions are evident from the findings reported in this section.

- (a) Tests of directional confusion are usually only able to discriminate between left and right among younger children. However, there is some evidence to indicate that when more complex tasks of right-left discrimination are included such tests may be used to identify directional confusion in much older subjects. The Benton Right-Left Discrimination Test is an example of such a test.
- (b) There appears to be consistent evidence that directional confusion is related to reading disability, at least in younger children.
- (c) While the Benton Right-Left Discrimination Test is primarily designed to assess the ability of an individual to differentiate between left and right, it was suggested that a consistent reversal of left and right in response to questions on this test, might also be related to achievement in reading.

Studies Dealing With Tests of Directional Confusion,

Reading Ability and Intelligence

This section includes a summary of research indicating possible test procedures to be followed. As well, a brief state-

ment is given concerning the application of the tests selected for use in the present investigation. General conclusions will be found at the end of each section.

Benton Right-Left Discrimination Test

A "Victoria Form" (Benton and Spreen, 1969) of the Benton Right-Left Discrimination Test (Benton, 1959) has recently been developed by combining thirty-two selected items from the original forms A and V. Normative data for this new Form was obtained by testing a randomly selected sample of school children in Victoria, British Columbia (Spreen and Gaddes, 1968). Children with known learning or behavior problems, with known brain dysfunction or who had repeated one or more grades in school, were excluded from the population.

An analysis of the data reveals the distribution of discrimination scores to be bimodal in nature. In the total sample (N=281), which ranged in age from eight to fifteen, approximately 21% of the subjects scored in the lower mode while 79% fell into the higher group. While over half the eight year old children exhibited directional confusion on the test, a fairly consistent percentage (15% to 23%) was similarly identified at each subsequent age level, nine through fifteen. This appears to be in agreement with observations of right-left discrimination first made by Binet and Simon (1908), who noted the developmental nature of this ability in six and seven year old children.

Possibly one of the reasons why the Benton Right-Left Discrimination Test is successful in distinguishing directional confusion in older children, is that it is one of the few well constructed tests in the area. In obtaining normative data for the "Victoria Form", the discriminating ability of each question was assessed, showing that the last 20 items have an item reliability index of between .40 and .60.

The first twelve items, which call for simple identification of the right and left sides of the subject's body, appear to serve only as a warm-up and all have an item reliability index of .10 or less. The Kuder-Richardson formula 20 reliability for the entire test was found to be 0.922 using this sample. Further, a well documented case for the validity of the test has been compiled by Benton (1959). In summary, then, the Benton Right-Left Discrimination Test is probably the best measure available to date, among tests of lateral preference and directional sense.

Reading Disability

Very little concern has been expressed in the literature over either the nature of the reading disability observed or the tests used to identify it. Often, vague references are made to retardation in reading in relation to grade placement (Silver and Hagin, 1960; Harris, 1957) while in other instances (Cohen and Glass, 1968) reading ability is determined by teacher evaluation. The more controlled studies (Balow, 1963; Balow and Balow, 1964;

Benton, 1958) used various forms of standardized tests of reading achievement. For comparative purposes, it would seem that a well standardized measure of reading achievement would yield the most reliable results.

Metropolitan Elementary Reading Test (MERT)

Robinson (1965) reviewed the Metropolitan Reading Test, finding it to be one of the best survey tests of reading achievement on the market today. It features two separate subtests, Reading and Word Knowledge. The Reading subtest, which should not be confused with the total reading test, is a measure of paragraph meaning and questions four kinds of comprehension skills: main thought, details, inferences, and meaning of words from context. The subtest Word Knowledge measures vocabulary and word recognition. Thus, an independent score may be obtained in reading comprehension, distinct from that received in vocabulary.

Despite being rated outstanding for every pupil measurement and evaluation in reading, the Metropolitan Reading Test must still only be considered a rough measure of reading ability (Robinson, 1965). Various investigators (McCracken, 1967; Plessas, 1967) have concluded that standardized tests, in general, often place the child from one to four years above the level at which he is actually reading. Poor readers, particularly, may receive inflated scores purely by chance. Any study which attempts to compare reading achievement with school grade, then, requires a

more accurate means of placing the child at the appropriate grade level in reading.

Informal Reading Inventory

Used correctly, the Informal Reading Inventory is a great deal more accurate in placing the child at the appropriate reading level than most standardized tests (Goudy and Olson, 1968). This is because the child is placed in a functional reading situation where he reads standard selections from a basal reading series, i.e. the Ginn Series. The instructional reading level is determined by combining the comprehension level, in both silent and oral reading situations, with the level of word recognition in oral reading.

While the Informal Reading Inventory tends to be more accurate than standardized reading tests, it is also more subjective in its interpretation, partly due to its individual administration. Hence, any researcher wishing to identify reading disability would be wise to use both a standardized test of reading as well as an informal inventory, in order that the best features of both may be utilized.

Intelligence

Although most studies reviewed made some attempt to control intelligence, only one investigator (Benton, 1959) explained the reason for such a procedure. He studied a group of 46 children within the age range of 6 to 9 years, whose intelligence quotients ranged from 116 to 138. When the right-left discrimination

performances of these superior children were compared with the established norms, a distinct correlation was found between accelerated development of right-left discrimination ability and superior intelligence. It was concluded, then, that care must be taken to match the control and experimental groups with respect to intelligence level when using the Benton Right-Left Discrimination Test for comparative purposes.

Lorge-Thorndike Intelligence Test

Critical reviews (Freeman, 1959; Milholland, 1959) of the Lorge-Thorndike Intelligence Test rank it among the best group tests available, from the point of view of the psychological constructs upon which it is based and that of statistical standardization.

It is made up with both a verbal and a non-verbal battery. The authors (Lorge and Thorndike, 1964) encourage the use of the non-verbal battery with retarded readers as it enables "an estimate of mental ability which is not influenced by specific disability in reading" (Lorge and Thorndike, 1964, p. 39). Pidgeon (1959), however, warns the user to qualify any such procedures, since paper and pencil tests can be influenced by more factors than just inability to read. Nevertheless, non-verbal intelligence quotients are often still the best estimate of mental ability available when using group tests such as the Lorge-Thorndike Test.

Summary

The first section of this chapter presented a review of research on the relationship between lateral preference and reading ability. A summary of this section suggested that little support could be found for linking reading disability with problems of lateral preference. Tests of lateral preference were found lacking in discriminating dominance traits, particularly with older children. In general then, more sensitive tests of lateral preference are required before meaningful results can be expected from research in this area.

The second section of this chapter presented findings of the few studies that investigated directional confusion and its relationship to reading ability. The results of these studies indicated that directional confusion appears to be related to reading disability in young children. A lack of sensitivity in the tests used to determine directional confusion was also noted. However, there was some evidence to indicate that more complex questions of right-left discrimination may be successful in distinguishing directional confusion in older children. Thus, it may be concluded that a sensitive test of right-left discrimination, such as the Benton Right-Left Discrimination Test, should be successful in identifying a relationship between directional confusion and reading disability in older children.

Finally, the third section of this chapter included a brief discussion of the test procedures followed in the various studies

reviewed. Tests selected for the present investigation were also reviewed. Conclusions which were drawn from this section were:

- (a) The Benton Right-Left Discrimination Test is one of the best measures available among tests of directional sense.
- (b) An accurate assessment of reading ability would best include scores from a standardized test of reading achievement as well as those from an Informal Reading Inventory.
- (c) Care must be taken to control for intelligence when using the Benton Right-Left Discrimination Test for comparative purposes.

While there have been a great number of investigations reported in the literature which attempted to study the relationship between lateral dominance and reading ability, very few investigations have dealt with the specific aspect of lateral dominance known as directional confusion. Indeed, it would appear that directional confusion, particularly as measured by complex questions or right-left discrimination, certainly warrants much more intensive investigation.

CHAPTER III

PROBLEM AND STATEMENT OF THE HYPOTHESES

Since reading involves the need to perceive letters and words in their proper order and direction, it is not surprising that many studies have attempted to link difficulties in lateral dominance and directional confusion with reading disability. That the investigations have failed to show any direct relationship between these two areas, does not mean that better methods and procedures will not succeed. Indeed, while no relationship between laterality and reading ability has been proven it is still not sufficient to assume that none exists.

Problem

Most studies have sought to identify some abnormal laterality pattern common to a group of children with selective retardation in reading. But, outside the fact of reading retardation, which by definition is common to these children, it has been very difficult to isolate any other common distinguishing factor. Indeed, it would appear that the groups of retarded readers (variously defined and selected in the different studies) included children of not just one type, but of several (Kinsbourne and Warrington, 1963).

Harris (1961, p. 258) suggests that this inclusion of one or more contrasting types of case within what had been assumed to be a homogeneous sample of retarded readers, makes it possible to explain why the results of the many research studies conflict. Whether or not a particular investigator can find enough children of any one laterality pattern in his reading disability group to show some statistical relationship, will depend on the sensitivity of the test used to determine lateral dominance and the severity of the reading disability observed (Hillerich, 1964). Investigations which fail to account for these two very important variables, then could be predestined to find no significant relationship between reading disability and lateral dominance.

From the literature, it is apparent that there are very few tests of lateral dominance which remain sensitive to the lateral preferences of older children. Since incomplete or mixed hand dominance is the only such distinguishing trait which appears to be in any way related to reading disability, attention should be given to tests of hand dominance.

Early tests, such as the Van Riper Test (Van Riper, 1935), although once considered among the more sensitive indicators (Smith, 1950), have received little attention since the development of the Harris Tests of Lateral Dominance (Harris, 1958). However, even this test has been shown to lose its effectiveness in identifying mixed hand dominance, as the age of the subjects increases (Harris, 1958; Cohen and Glass, 1968).

On the other hand, investigation of a relationship between directional confusion and reading disability appears to be a more promising endeavor. Evidence of a relationship between the ability to complete simple tasks of right-left identification, and the ability to read in the early grades, has been presented by a number of studies (Harris, 1957; Cohen and Glass, 1968). Other studies (Silver and Hagen, 1960; Benton and Kemble, 1959; Benton, 1958) suggest that more complex questions of directional confusion may be successful in identifying older retarded readers. At the same time, normative data for the Benton Right-Left Discrimination Test indicates that it is sufficiently sensitive to identify a fairly consistent percentage (15%-23%) of directionally confused subjects among a randomly selected sample of school children, ranging in age from nine to fifteen years. Thus, a logical step from the literature published to date is:

Statement of the problem. To examine the effectiveness of the Benton Right-Left Discrimination Test in identifying children with reading disabilities.

Hypotheses

Research Model

It would be unwise to contend that most children with a reading disability suffer from directional confusion, or for that matter, have any disturbances in laterality. Yet, the majority of studies reviewed, attempted to determine the incidence of

abnormal laterality patterns among groups of retarded readers. This procedure can only show whether or not children with laterality problems comprise a significant group among children with reading disabilities. In view of the comments of Harris (1961, p. 258) and Hillerich (1964) concerning the problems of not obtaining a homogeneous sample of reading disability cases, and of varying the severity of reading disability from study to study, it is not surprising that the results of these studies appear confusing.

A more workable model, was used by Balow (1963), Balow and Balow (1964), and Benton (1958). They studied random samples of school children and divided them into various groups according to lateral preferences or right-left discrimination ability. By comparing the reading ability of these groups it was possible to show whether or not children with laterality problems were significantly poorer readers than children with normal laterality. Thus such a model affords a clear assessment of the relationship between lateral dominance and reading ability without superfluous contamination.

Following this model in the present study, the children are classified as directionally "confused" or "not confused" according to their score on the Benton Right-Left Discrimination Test. A significant difference between these two groups on the measure of reading ability, then, is considered evidence of a general reading disability.

In addition, two investigators (Benton, 1958; Benton and Kemble, 1959) have suggested that children who systematically reverse left and right in response to certain questions on the Benton Right-Left Discrimination Test, also exhibit deficits in reading ability (Benton, 1959, p. 42). Thus, a second comparison is made in the present study, between children classified as "systematic reversal" or "normal" in their responses on the Benton Right-Left Discrimination Test. Once again, a significant difference between these two groups on the measures of reading ability is considered evidence of a general reading disability.

Criterion Measure

The criterion measure in this study is reading ability. In view of the arguments of Robinson (1965), McCracken (1967), and Plessas (1967) found in the review of literature, reading ability is assessed according to three variables.

These criterion variables are instructional reading (IR) level, word knowledge (WK) level and reading (RDG) level. They are derived as follows:

IR - the instructional reading level is the standard grade level scored on the Informal Reading Inventory.

WK - the word knowledge level is the standard grade level scored on the Word Knowledge subtest of the Metropolitan Elementary Reading Test.

RDG - the reading level is the standard grade level scored on the Reading subtest of the Metropolitan Elementary Reading Test.

Definitions

Systematic reversals. A reversal score of one (corresponding to a correct answer) is given for each question involving crossed commands and confrontation testing (items 13 through 32) on the Benton Right-Left Discrimination Test, in which left and right are consistently reversed.

Total score. The total score on the Benton Right-Left Discrimination Test is the number of questions answered correctly or the number of systematic reversals, whichever is greater.

Right-left discrimination. Right-left discrimination categories "confused and not confused" (C and NC), and "reversal and normal" (R and N) are defined for the purpose of this study as:

C - is a classification into which any child is placed if his total score is 21 or less.

NC - is a classification into which any child is placed if his total score is 22 or greater.

R - is a classification into which any child is placed if his total score is equal to the number of systematic reversals he made on the test.

N - is a classification into which any child is placed if his total score is equal to the number of correct responses he made on the test.

Statement of the hypotheses

The following hypotheses are tested in this study:

1. Children classified as confused (C) will not differ significantly in their scores on the criterion variables (IR, WK, RDG), from children classified as not confused (NC).
2. Children classified as reversals (R) will not differ significantly, in their scores on the criterion variables (IR, WK, RDG), from children classified as normal (N).

CHAPTER IV

METHOD AND RESULTS

Experimental Design

This study was designed to ascertain the effectiveness of the Benton Right-Left Discrimination Test in identifying reading disability, in grade three children. Since this test has been shown to be successful in distinguishing systematic reversal as well as basic confusion in right-left discrimination (Benton, 1958), both aspects were investigated.

Subjects

The subjects (Ss) were 86 grade three children, who were randomly selected, using a table of random numbers, from seven elementary schools in Victoria, B.C. The schools were impartially chosen by the Greater Victoria School District for participation in this study and were considered to be a reasonable cross-section of elementary schools in the Victoria area.

Procedure

The procedure entailed the administration of a number of tests. This testing took place during April and May, 1969; with the exception of those tests given by the classroom teachers:

The Lorge-Thorndike Intelligence Test and The Metropolitan Elementary

Reading Test, which were administered during February and March, 1969, respectively. A complete procedure is given below for those tests administered by the investigator.

Benton Right-Left Discrimination Test

The "Victoria Form" of the Benton Right-Left Discrimination Test was administered on an individual basis to all Ss. It consists of 32 items. Reversal scores are allowed for items 17 through 20 and items 25 through 32. For items 13 through 16 and 21 through 24 a reversal score was allowed only if right and left were consistently reversed (if all four items in either of these sections were reversed). No reversal scores were given for items 1 through 12.

Administration. The S was seated across a table from the examiner (E) and was given the instructions as laid out in the question sheet (see Appendix B). In the first twelve items, the S was asked to show that he knew the left from right on his own body. The next twelve items utilized a 7" wide by 10" high black ink line drawing of a boy (full length). This picture was laid flat in front of the S who did not manipulate it in any way. The last 8 items on the test used eight (5" wide by 7½" high) black ink line drawings of the head and torso of a man. These were laid flat in front of the S in the same manner as the drawing of the boy. Any item was repeated and no time limit was imposed.

Recording responses. Ss responses were recorded in three columns for machine scoring: (a) correct, (b) incorrect, (c) reversal. Reversal scores were only counted as set out above. If the S changed his answer before the next item was given, the changed answer was recorded.

Informal Reading Inventory

Two sections of the Informal Reading Inventory were also individually administered by the E to all Ss. These sections included (a) the graded silent reading passages and (b) the graded oral reading passages, from which the instructional reading (IR) level was derived.

- a. Silent reading. The functional silent reading level is the graded level immediately preceding the level at which the S fails to score 70% or higher on the silent reading comprehension questions.
- b. Oral reading. The functional oral reading level is measured in two parts, and is the graded level immediately preceding the level at which the S fails to score (a) over 85% in word recognition, or (b) 70% or higher on the oral reading comprehension questions.

The instructional reading (IR) grade level is the lower of the two functional reading levels, silent or oral; i.e., the level immediately preceding the level at which word recognition or comprehension fall below an acceptable point.

Administration. The S was seated at a table and began with the graded oral reading selection which was approximately two reading levels below his present grade level in school. The S was asked to read the passage aloud while the E marked the appropriate errors. When the S finished the passage, the E then asked him the oral reading comprehension questions which follow the selection.

Then, the S was instructed to open a reader to the graded silent reading passage of approximately the same reading level, and to read the selection silently. When the S finished reading the passage, the E asked him the silent reading comprehension questions which follow the selection.

Thus, the S proceeded through each succeeding graded level in this manner until the instructional reading grade level was reached.

Scoring. Answers to all comprehension questions are given in the test booklet and are scored as either correct or incorrect. Errors in word recognition are: substitutions, omissions, insertions, mispronunciations, and E pronunciations.

Other testing.

In addition to the tests administered by the E, all children were given the Lorge-Thorndike Intelligence Test (Canadian Form)

and the Metropolitan Elementary Reading Test as part of the regular testing program carried on by the Greater Victoria School District. The results of these tests which were administered on a group basis by the regular classroom teachers, were provided for use in this study.

Assignment of subjects

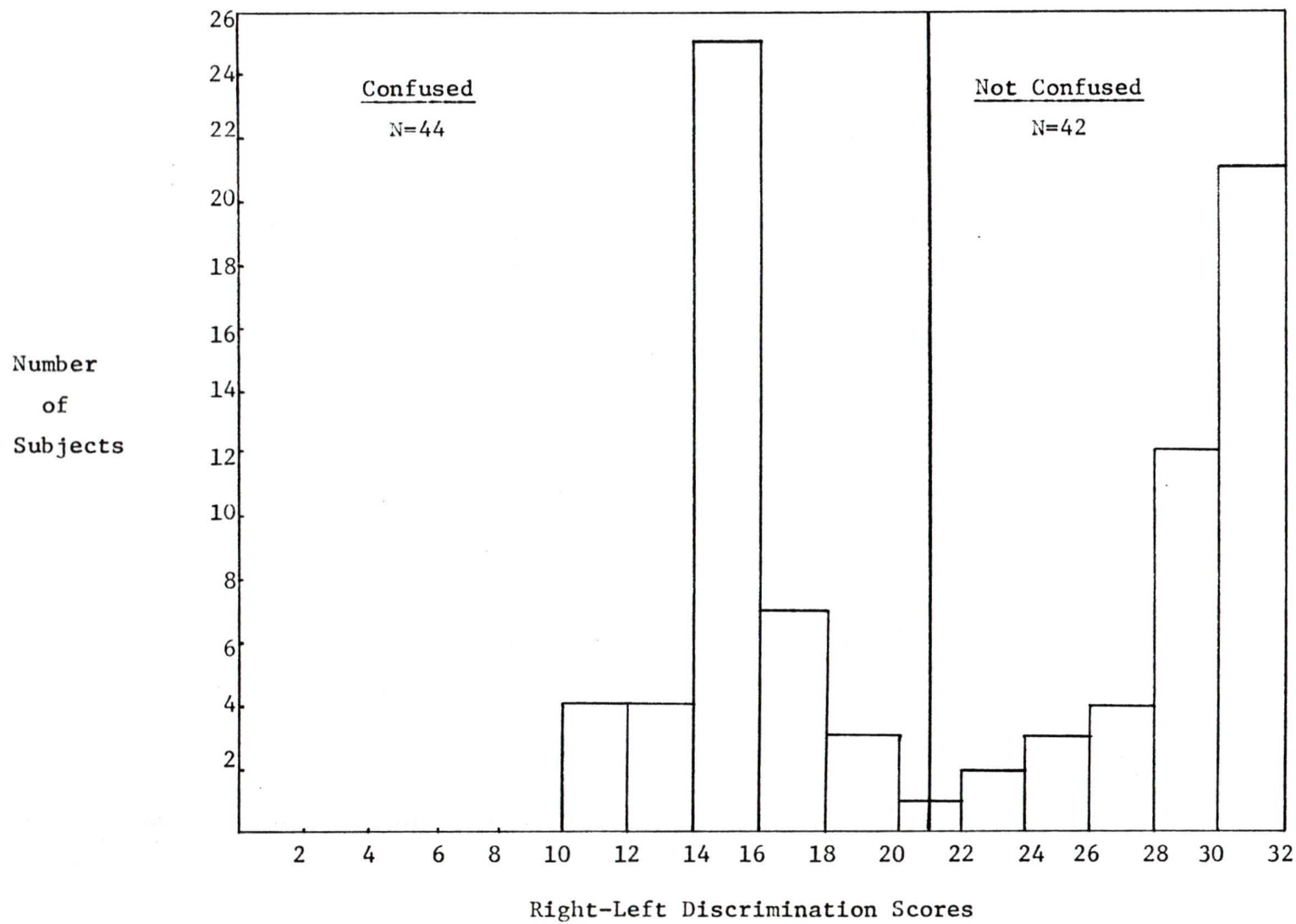
After all testing had been completed the Ss were divided into two groups on the basis of scores obtained on the Benton Right-Left Discrimination Test. The distribution of scores on this test was found to be bimodal in nature allowing the sample to be divided at the mid-point between the two modes. The lower group, comprising the confused (C) Ss, had a range in scores from 11 through 21, and included 44 children. The higher group, comprising the not confused (NC) Ss, had a range in scores from 23 through 32, and included the remaining 42 children. Comparisons between these two groups were then made on all criterion variables (IR, WK, RDG).

On completion of the analysis above, the Ss were again divided into two groups, this time on the basis of systematic reversal. Ss whose "reversal score" exceeded their "correct score" formed the reversal (R) group. Twenty-four Ss were so classified. The remaining sixty-two Ss, whose "correct score" exceeded their "reversal score", formed the normal (N) group. Comparisons between these two groups were then made on all criterion variables (IR, WK, RDG).

TABLE I
Experimental Design

Variable	Comparison Groups	
	<u>Confused</u>	<u>Not Confused</u>
Right-Left Discrimination	S ₁	S ₄₃
	⋮	⋮
	⋮	⋮
	S ₄₄	S ₈₆
Systematic Reversal	<u>Reversal</u>	<u>Normal</u>
	S ₁	S ₂₅
	⋮	⋮
	S ₂₄	S ₈₆

DISTRIBUTION OF SCORES ON THE
BENTON RIGHT-LEFT DISCRIMINATION TEST



Statistical Design

Initial t comparisons were made between the groups classified as confused (C) or not confused (NC), and again between the groups classified as reversal (R) or normal (N), for differences in age and intelligence.

Mean scores for the three dependent variables (Instructional Reading - IR, Word Knowledge - WK, and Reading - RDG) of reading ability were then analyzed.

An analysis of covariance was used to control differences in intelligence between the C and NC groups when mean reading scores for these groups were compared. Between the R and N groups, comparison of reading scores was accomplished by means of t tests.

A separate test for homogeneity of variance was made using an F test, as suggested by Winer (1962), before proceeding with the analysis of covariance and t tests. The Welch "t" Prime Approximation (Ferguson, 1966) was used in place of the regular t tests where variances exceeded the critical value F ($p < .01$).

RESULTS

This section of the chapter deals with the analysis of the data on reading ability. Tests for differences in age and intelligence are also included. A brief summary of the findings is included at the end of this chapter. Generalizations and conclusions made from the findings will be discussed in Chapter V.

Sample sizes (see Table 2) for the groups classified as confused (C) and not confused (NC) were approximately equal ($n = 44$ and 42), however, the sample sizes for the groups classified as reversal (R) and normal (N) were in the proportion of almost 1:3 ($N = 24$ and 62). Separate comparisons were made between the C and NC groups, and then between the R and N groups on reading ability (Instructional Reading - IR, Word Knowledge - WK, and Reading - RDG), age and intelligence.

Initially, F tests for homogeneity of variance were made for all comparisons. Results are shown in Table 3. It can be seen that two values of F were found to be significant. Since the assumptions justifying the use of the t test could not be met for these cases, corrected values of t were calculated using the Welch "t" Prime Approximation (Ferguson, 1966).

Mean age and intelligence scores were compared for differences between the C and NC groups, and again between the R and N groups. Results of subsequent t tests are shown in Table 4. The three I.Q.

scores, Verbal, Non-Verbal, and Total, are included for comparative purposes.

It can be seen that no significant differences were found between any of the groups (C and NC or R and N) with respect to age or to intelligence. However, it appeared that there was a trend toward a significant difference in intelligence between the C and NC groups. No such trend was observed between the R and N groups.

An analysis of covariance, with intelligence (total) as the covariate, was carried out on the reading scores of the C and NC groups. This analysis was undertaken for two reasons: first, there was a strong trend toward a significant difference in intelligence between these two groups; and secondly, there was found to be a high correlation (see Table 6) between intelligence and reading (IR, WK, and RDG). This combination of events, then, indicated that the effects of intelligence needed to be controlled, to permit a valid evaluation of differences in reading scores between the C and the NC groups.

Care was taken to insure that assumptions underlying use of the analysis of covariance were met. Homogeneity of variance appeared to be lacking in one instance (see Table 3), however, the difference appeared quite moderate and was not considered to present a problem. Indeed, Hays (1963) has suggested that this assumption of homogeneous variances can be violated without serious

TABLE 2

Assignment of Subjects According to Scores on the
Benton Right-Left Discrimination Test

Classification	Right-Left Discrimination Scores		
	Mean	Range	N
Confused	15.89	11-21	44
Not Confused	28.58	23-32	42
Reversal	15.00	12-16	24
Normal	24.80	11-32	62
Total Group	22.06	11-32	86

TABLE 3

F Tests of Homogeneity of Variance on Intelligence, Age, and Reading Scores

	Variances			Variances		
	Confused	Not Confused	F	Reversal	Normal	F
Intelligence	N = 44	N = 42		N = 24	N = 62	
Total	166.34	315.54	1.90	178.91	273.33	1.53
Verbal	193.75	339.38	1.75	176.36	313.79	1.78
Non-Verbal	205.03	385.36	1.89	255.92	315.62	1.23
Age in Months	28.06	16.66	1.68	12.99	26.02	2.00
Reading						
IR	1.44	2.17	1.50	.91	2.14	2.37
WK	1.11	1.31	1.19	.93	1.33	1.43
RDG	.53	1.96	3.69*	.33	1.64	5.02*

*
p < .01

TABLE 4

t Tests on Intelligence and Age

	Classification			
	Confused N = 44	Not Confused N = 42	Reversal N = 24	Normal N = 62
Intelligence:				
(Total)				
Mean	96.98	102.81	98.46	100.35
S.D.	12.90	17.76	13.38	16.58
t		1.74		.50
Probability		.09		.62
(Verbal)				
Mean	96.07	102.83	97.87	99.95
S.D.	13.92	18.42	13.28	17.71
t		1.91		.51
Probability		.06		.61
(Non-Verbal)				
Mean	96.98	102.31	97.79	100.27
S.D.	14.32	19.63	16.00	17.77
t		1.43		.59
Probability		.16		.56
Age in Months:				
Mean	108.61	108.00	107.58	108.60
S.D.	5.30	4.08	3.60	5.10
t		.59		.88
Probability		.56		.38

risk, provided the number in each sample is approximately the same. In addition, regression effects were checked and found to be normal.

Table 5 presents findings of the analysis of covariance on reading scores IR, WK, and RDG, between the C and NC groups. Results of the t tests between the R and N groups on the same reading scores, are summarized in Table 8. Differences in the IR level for the C and NC groups as well as the R and N groups were significant at the .001 level. Significant differences ($p < .05$) were also found in the RDG level, between the same groups. No differences were observed in the WK level on any of the comparisons.

An inspection of the grade level means included in Tables 7 and 8 shows the C and the R groups to be reading (IR) approximately 15 months below the NC and the N groups, respectively. On the Reading subtest (RDG) of the Metropolitan Elementary Reading Test, differences of approximately 8 months are shown between these groups, while only slight differences occurred on the Word Knowledge (WK) subtest.

Summary of Findings

This study was designed to answer certain questions about the effectiveness of the Benton Right-Left Discrimination Test in identifying children with reading disability. The findings were summarized according to the two hypotheses, which are restated

Analysis of Covariance on IR, WK, and RDG Between
Confused and Not Confused Groups with I.Q. (Total)
as the Covariate*

A. Instructional Reading (IR) Level

Source	Sum of Squares	df	Mean Square	F	Probability
Between	16.73	1	16.73	11.36	.001
Within	122.01	83	1.47		
Total	138.74	84			

B. Word Knowledge (WK) Level

Source	Sum of Squares	df	Mean Square	F	Probability
Between	.46	1	.46	.48	.49
Within	.81	83	.97		
Total	1.27	84			

C. Reading (RDG) Level

Source	Sum of Squares	df	Mean Square	F	Probability
Between	5.28	1	5.28	5.39	.02
Within	.81	83	.98		
Total	6.09	84			

* For ANOVA Tables see Appendix A.

TABLE 6

Correlations Between I.Q. (Total) and IR, WK, and RDG

	IR	WK	RDG
Intelligence (Total)	.49	.49	.50

TABLE 7

Analysis of Covariance Adjustments on IR, WK, and RDG Mean Grade Levels for Confused and Not Confused Groups with I.Q. (Total) as the Covariate

Classification	Reading Grade Level					
	IR		WK		RDG	
	unadj.	adj.	unadj.	adj.	unadj.	adj.
Confused (C)	3.17	3.28	4.13	4.23	3.89	3.99
Not Confused (NC)	4.30	4.18	4.48	4.38	4.59	4.49

TABLE 8

t Tests on IR, WK, and RDG Between
Reversal and Normal Groups

Reading Scores	Classification	
	Reversal N=24	Normal N=62
Instructional Reading (IR)		
Mean	2.81	4.07
S.D.	.95	1.46
t		3.85
Probability		.0002
Word Knowledge (WK)		
Mean	4.10	4.37
S.D.	.97	1.15
t		1.00
Probability		.32
Reading (RDG)		
Mean	3.78	4.41
S.D.	.57	1.28
t		3.11*
Probability		.003*

* Adjusted using Welch "t" Prime Approximation

here in general form:

1. Is there a significant difference in reading scores (IR, WK, RDG) between the confused (C) and the not confused (NC) groups?

A significant difference was observed between the C and NC groups on IR and RDG scores, favoring the NC group. No significant difference was found on WK scores or age, however. A trend towards a significant difference between the C and NC groups on intelligence was controlled through an analysis of covariance.

2. Is there a significant difference in reading scores (IR, WK, RDG) between the reversal (R) and the normal (N) groups?

The group of children classified as R scored significantly lower than the N group on IR and RDG scores. No differences were recorded between these two groups on WK scores. There was found to be no difference between the R and N groups with respect to intelligence or age.

CHAPTER V

DISCUSSION AND SUMMARY

This study showed that differences in reading ability scores, between directionally confused children and those not exhibiting confusion, were significant. At the same time, differences in word recognition scores were not significant. These findings are considered to support the basic hypothesis of this study that the Benton Right-Left Discrimination Test is effective in identifying children with reading disability.

Limitations of this Investigation

Caution should be exercised in interpreting the findings of this study in view of its limitations.

The random sample of children was drawn from the public schools of Victoria, British Columbia. Any generalizations to populations in other areas, should be made with great care, particularly where comparisons are made with respect to intelligence or reading ability scores.

Generalizations to actual school grade levels in reference to reading ability grade levels may not be warranted. In addition, comparisons of grade level scores between the Informal Reading Inventory and the Metropolitan Elementary Reading Test

should not be undertaken, since it was expected that these scores would differ (McCracken, 1967; Plessas, 1967).

Another limitation lies within the tests used in this study. The validity and reliability of the findings depend on the validity and reliability of these tests as they apply to the sample.

Discussion and Educational Implications

Two types of directional confusion were identified by the Benton Right-Left Discrimination Test: inability to discriminate left and right (C group) and systematic reversal in right-left discrimination (R group). The relationship of these two conditions to reading ability appears quite similar. Children in the confused (C) and the reversal (R) groups were significantly poorer readers than those in the not confused (NC) and the normal (N) groups, respectively, when the Instructional Reading (IR) and Reading (RDG) scores were compared.

There were no significant differences between the C and NC groups or the R and N groups on Word Knowledge (WK) scores. This is an interesting development, particularly in light of its practical implications. It would seem that directionally confused children are able to recognize words, but have trouble in reading words in a series, as in a phrase or sentence. It may be that isolated words are more easily recognized by these children since the learning of single words is often oral, where as words in a series require more complex processes of reading. In any event, further investigation of this finding should prove to be a

worthwhile endeavor.

While this investigation made no attempt to predict differences in the results obtained from the two dependent variables WK and RDG, eventual findings were not totally unexpected. In this study, choice of the Metropolitan Elementary Reading Test was made in part because it yielded two separate scores, WK and RDG, which might give some indication as to specific areas of weakness in connection with any reading disability observed. It would appear that such a choice was well justified. A test yielding just one score may have resulted in a loss of information and a subsequent dilution of observed differences between groups. It would seem, then, that even more selective tests of reading ability could well be used in future investigations of this nature.

The overall findings of this study indicate that the Benton Right-Left Discrimination Test is effective in identifying children with reading disability. Difficulties in functional reading situations and in paragraph comprehension appear to be particular features of this reading disability. While it was not the purpose nor the result of this investigation to identify any causal relationships, there is a need for teachers to know that a relationship between directional confusion and reading disability seems to exist. It could also be suggested that remedial procedures for directionally confused children might best concentrate on the reading of words in the context of a sentence or paragraph, for it would appear that weaknesses occur in

comprehension rather than in word recognition skills.

Suggestions made by the authors of the Lorge-Thorndike Intelligence Test (Lorge and Thorndike, 1968) that the non-verbal intelligence battery be used with retarded readers, could not be supported by the findings of this study. Differences between the total I.Q., the verbal I.Q. and the non-verbal I.Q. among either the C and NC groups or the R and N groups, were very slight in spite of the fact that the C and R groups were comprised of significantly poorer readers. Thus, where any comparisons were made on the basis of intelligence, the total I.Q. was used.

It was apparent, upon examination of the findings, that differences existed between the C and R groups, in spite of the similarities they shared in connection with reading disability. One such difference appeared in respect to intelligence. While the C children showed a strong trend toward significantly poorer I.Q. scores than NC children, differences in intelligence between R and N children were well within the realm of chance. This observation has not been reported before. Previous investigators (Benton, 1958; Kemble and Benton, 1959) have suggested that a close relationship exists between the development of right-left discrimination ability and intelligence, however, no investigation has studied the significance of systematic reversal in such a relationship.

Implications for further research into the relationship between intelligence and directional confusion, particularly in

connection with systematic reversal, are evident. However, implications for education are even more important. Indeed, the often held notion that directional confusion denotes low intelligence, must be questioned, in light of the findings of this study. It may even be that children showing directional confusion suffer from severe reading disabilities which appear as a general deficit on pencil and paper intelligence tests. It is suggested, therefore, that teachers not look upon directional confusion as indicating an inability to learn, for it would seem to be related to an inability to read.

The incidence of systematic reversal, and an inability to discriminate left and right, is another important consideration uncovered in this study. It seems evident that many teachers are oblivious to the possible significance of directional confusion in the regular classroom, since such traits are rarely mentioned in connection with "normal" children. Yet, in this investigation, over 50% of the grade three children observed, suffered from some degree of directional confusion. If confusion is actually so widespread, then many cases must remain undetected. Thus, use of the Benton Right-Left Discrimination Test for identifying children with directional confusion, should be of benefit in itself. However, in light of the relationship reported between directional confusion and reading ability, the diagnostic value of this test may lead to new and useful educational theories and practices.

Summary

This investigation was designed to study the effectiveness of the Benton Right-Left Discrimination Test in identifying children with reading disabilities. The sample of eighty-six grade three children was randomly selected from seven elementary schools in Victoria, British Columbia. All children were classified as either confused (C) or not confused (NC), and again, as either reversal (R) or normal (N), in their responses on the Benton Right-Left Discrimination Test. The criterion measure, reading ability, was determined on three different variables: Instructional Reading (IR) level, Word Knowledge (WK) level, and Reading (RDG) level.

Comparisons, using the t distribution, were made between the C and NC groups, and then between the R and N groups, for differences in age and intelligence. Differences on IR, WK, and RDG were compared between the C and NC groups through an analysis of covariance with intelligence as the covariate. Between the R and N groups, differences on IR, WK, and RDG were compared by the use of t tests.

Children classified as C scored significantly lower on IR and RDG than children classified as NC. No differences in WK, age or intelligence were observed between the C and NC groups. However, there was a trend toward a significant difference in intelligence between these two groups.

Significant differences were also found between the R and N groups on IR and RDG, favoring the N group. With respect to WK, age and intelligence, however, no significant differences were observed. It was suggested, in the absence of a trend toward a significant difference in intelligence between the R and N groups, that there is probably no relationship between systematic reversal and intelligence.

In conclusion, this study showed that there is a relationship between directional confusion and reading ability. Children who demonstrated an inability to discriminate left and right, or who systematically reversed left and right, on the Benton Right-Left Discrimination Test, were significantly poorer readers than children not exhibiting such traits. Thus, these findings support the overall hypothesis of this study that the Benton Right-Left Discrimination Test is effective in identifying children with reading disabilities.

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APPENDICES

APPENDIX A

ANOVA on I.Q. (Total), IR, WK, and RDG Between
Confused and Not Confused Groups

A. Intelligence

Source	Sum of Squares	df	Mean Square	F	Probability
Between	730.63	1	730.63	2.98	.08
Within	20571.81	84	244.90		
Total	21302.44	85			

B. Instructional Reading (IR) Level

Source	Sum of Squares	df	Mean Square	F	Probability
Between	27.41	1	27.41	14.89	.0002
Within	154.58	84	1.84		
Total	181.20	85			

C. Word Knowledge (WK) Level

Source	Sum of Squares	df	Mean Square	F	Probability
Between	2.58	1	2.58	2.09	.15
Within	103.73	84	1.24		
Total	106.31	85			

D. Reading (RDG) Level

Source	Sum of Squares	df	Mean Square	F	Probability
Between	10.66	1	10.66	8.49	.005
Within	105.47	84	1.26		
Total	116.13	85			

APPENDIX B

RIGHT-LEFT DISCRIMINATION TEST

Question Sheet

Examiner to Subject

1. Show me your left hand.
2. Show me your right eye.
3. Show me your left ear.
4. Show me your right hand.

5. Touch your left ear with your left hand.
6. Touch your right eye with your left hand.
7. Touch your right knee with your right hand.
8. Touch your left eye with your left hand.
9. Touch your right ear with your left hand.
10. Touch your left knee with your right hand.
11. Touch your right ear with your right hand.
12. Touch your left eye with your right hand.

THIS BOY (PICTURE A) IS FACING YOU JUST AS I AM.
REMEMBER, HE IS FACING YOU.

13. Point to the boy's right eye.
14. Point to the boy's left leg.
15. Point to the boy's left ear.
16. Point to the boy's right hand.

17. Put your right hand on the boy's left ear.
18. Put your left hand on the boy's left eye.
19. Put your left hand on the boy's right shoulder.
20. Put your right hand on the boy's right eye.

(NAMING)

- | | |
|------------------------------------|---------------------|
| 21. (E points to boy's right hand) | WHICH HAND IS THIS? |
| 22. (left ear) | WHICH EAR IS THIS? |
| 23. (left hand) | WHICH HAND IS THIS? |
| 24. (right eye) | WHICH EYE IS THIS? |

NOW LOOK AT THESE PICTURES. I WANT YOU TO TELL ME

- | | |
|-------------------------------------|-----------------------------|
| 25. (Picture B (left-hand-left ear) | WHICH HAND IS ON WHICH EAR? |
| 26. (C (right hand-left eye) | WHICH HAND IS ON WHICH EYE? |
| 27. (D (right hand-right ear) | WHICH HAND IS ON WHICH EAR? |
| 28. (E (left hand-right eye) | WHICH HAND IS ON WHICH EYE? |
| 29. (F (right hand-left ear) | WHICH HAND IS ON WHICH EAR? |
| 30. (G (right hand-right eye) | WHICH HAND IS ON WHICH EYE? |
| 31. (H (left hand-left eye) | WHICH HAND IS ON WHICH EYE? |
| 32. (I (left hand-right ear) | WHICH HAND IS ON WHICH EAR? |

Surname: HUNDLEBY Given Names: GLENN DARYLL

Place of Birth: VICTORIA, B.C. Date of Birth: AUGUST 12, 1942

Educational Institutions Attended, with Dates of Entering and Leaving:

<u>VICTORIA COLLEGE</u>	<u>1960 to 1962</u>
<u>UNIVERSITY OF BRITISH COLUMBIA</u>	<u>1962 to 1963</u>
<u>UNIVERSITY OF BRITISH COLUMBIA</u>	<u>1966 to 1967</u>
<u>UNIVERSITY OF VICTORIA</u>	<u>1968 to 1969</u>

Degrees, Diplomas, Etc., Awarded, with Dates and Names of Institutions:

<u>B.Ed.</u>	<u>1967</u>	<u>University of British Columbia</u>
<u>_____</u>	<u>_____</u>	<u>_____</u>
<u>_____</u>	<u>_____</u>	<u>_____</u>
<u>_____</u>	<u>_____</u>	<u>_____</u>

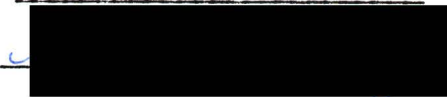
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